Differential object indexing in Bulgarian

The role of discourse prominence and predictability

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Abstract

In this study, I argue that object reduplication in Bulgarian is a special encoding strategy that is concerned with discourse management and primarily used to mark (perceived) deviances from expectations with respect to the status of referents in discourse. In particular, I adopt a new perspective by capturing the phenomenon under discussion as a form of differential object marking with a person index, i.e., differential object indexing (DOI). Based on theoretical considerations, corpus evidence and a comprehensive empirical investigation, I reject the interpretation of Bulgarian DOI as a topic marker and suggest a functional explanation in terms of discourse prominence. In addition, I emphasize the role of predictability as a relevant dimension underlying this type of differential marking. I present evidence from acceptability judgment studies and web-based experiments suggesting that DOI in Bulgarian is typically used to (re-)activate or clarify the discourse prominence status of a less prominent referent. In terms of processing, I present the results from an ERP experiment and a visual cueing web-experiment showing that the presence of an object index during online processing modulates (discourse-based) expectations, initiates discourse updating and interacts with (visually induced) salience of a referent. Throughout this study, I elaborate on the association of discourse prominence and language-related predictability with more general cognitive mechanisms, such as attention and predictions.

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List of abbreviations

A	Agent
ACC	Accusative
ADJ	Adjective
ADM	Admirative
ADV	Adverb/Adverbial
AGR	Agreement
ART	(Definite) Article
AUX	Auxiliary
CD	Clitic doubling
CL	Clitic
CLD	Clitic dislocation
CLLD	Clitic left dislocation
CLRD	Clitic right dislocation
COM	Comment
COMP	Complementizer
COMPAR	Comparative
CV	Cue validity
DAT	Dative
DEM	Demonstrative
DEF	Definite
DET	Determiner
DIM	Diminutive
DOF	Differential object flagging
DOI	Differential object indexing
DOM	Differential object marking
EEG	Electroencephalography
ERG	Ergative
ERP	Event-related potential
F	Feminine (grammatical gender)
FOC	Focus
FUT	Future (tense)
IPFV	Imperfective (aspect)
M	Masculine (grammatical gender)
N	Neuter (grammatical gender)
NEG	Negation
NOM	Nominative
NAI	Non-at-issue material
OBJ	Object
OBL	Oblique
OR	Object reduplication
P	Patient
PASS	Passive (voice)
PFV	Perfective (aspect)
PL	Plural
POSS	Possessive
PREP	Preposition
PRF	Perfect (tense)
PRS	Present (tense)
PST	Past (tense)
PTCP	Participle
PTC	Particle of concord
QUE	Question marker
R	Recipient/experiencer
REFL	Reflexive
REL	Relative marker
S	Sole argument of an intransitive verb
SBJ/SUBJ	Subject
SG	Singular
SPR	Self-paced reading
SUPER	Superlative
TOP	Topic

1 Introduction

In this dissertation, I argue that object reduplication in Bulgarian is a special encoding strategy that is concerned with reference tracking and particularly used to mark perceived deviances from discourse-based predictions with respect to the status of referents in discourse. For the purpose of this investigation, I adopt a new perspective for capturing object reduplication as a form of differential object marking with a person marker and draw on a recent discourse-oriented framework to account for the function of object reduplication in Bulgarian.

In the following section, I outline the motivation and general aim of this investigation and point out the key aspects of my analysis. In section 1.2, I state some preliminary remarks on different forms of argument marking and their associations with different linguistic levels to set the stage for my own investigation. At the end of this chapter, I outline the structure of this dissertation (section 1.3).

1.1 Aim of the dissertation

1.1.1 Structure-building principles in language

Language is not only a structural system of items and rules but also a social phenomenon of communicative interaction deeply embedded in human cognition. As such, it is a complex instance of human behaviour and therefore ultimately processed by the brain. This issue appears even more intriguing if we take into account the vast number of different languages – estimates range from 6.000 to 15.000 distinct languages – that are currently spoken all over the world. Languages come in many facettes and multifold shapes.

From the beginning, linguistics aimed at accounting for this variability by identifying commonalities in form and function, abstracting away to some extent from the actual shape a particular structure takes. It became clear that the same function may be expressed by different forms, and apparently similar forms may express quite distinct functions. Typological research identifies regularities in these patterns and allows for systematic generalizations over a large number of languages. Besides this core task, it is an important endeavour in linguistics to develop interface models that relate and associate the form and function of linguistic patterns with more general mechanisms of the mind and ultimately the brain.

This issue is particularly addressed in a research domain sometimes called *neurotypology*. Influenced by classical typology, this line of research "aims to establish crosslinguistic generalizations in the neurocognition of language as well as identify dimensions of variation" (Bornkessel-Schlesewsky & Schlesewsky, 2013, p. 241). In this research programme, the focus is shifted from the structural examination of linguistic patterns itself to a more generalized account of the form and function of language in terms of cognition and the explanation of systematic patterns in line with the understanding of patterns in cognition. However, in most cases, there is no direct link or one-to-one correspondence between overt linguistic patterns and cognitive mechanisms. Instead, there must be some interface process linking the two.

A promising approach to tackle this issue is the idea that certain underlying principles mediate between cognitive constraints and requirements and the pairing of form and function in language. These underlying principles are conceptualized as structure-building

mechanisms that contribute to the functional and structural organization of language and are claimed to be related to more general cognitive mechanisms in the human mind. In that sense, linguistic principles are higher-order organizational entities whose precise shape and function is subject to language-specific structural reorganization (i.e., language change).

In a broad sense, all four dimensions – linguistic patterns (i.e., overt language structure), structure-building principles, cognitive mechanisms, and neural correlates – are potential targets for linguistic research. Special emphasis should be placed on the interrelation of these dimensions. Additionally, more attention must be paid to the mediating role of linguistic principles (and their related cognitive mechanisms) when investigating the link between the processing of language patterns and neural correlates. Often, there is no direct link between these two. Focusing on the mediating principles and mechanisms between these two could inform the overall understanding of language, in processing as well as structure.

The existence and application of linguistic principles and general cognitive mechanisms is arguably driven by the need for efficient information exchange (i.e., communication) and information processing. Among others, two mechanisms seem to be central for this task in human cognition, namely salience[1] (in the sense of guiding attention) and predictions (the ability to generate models that anticipate the shape and type of upcoming input). Both dimensions received a lot of attention in recent models of the cognitive sciences.

On the one hand, attention is both a pre-condition as well as a central part of perception and subsequent information processing (Corbetta & Shulman, 2002). Humans necessarily centre their attention to stimuli standing out from other elements. On the other hand, there is more and more evidence that perception is not achieved by purely detecting elements or features from the surrounding, but rather that forward models are constantly generated in order to account for incoming information (Friston, 2010). Both mechanisms arguably contribute to the efficiency and speed of cognition.

Due to their importance in cognition, these mechanisms are also expected to be reflected in linguistic behaviour as well as language structure. A recent account brought forward the idea of a linguistic principle that directly reflects attention centring and salience with respect to patterns and structure in language (Himmelmann & Primus, 2015; von Heusinger & Schumacher, 2019). *Linguistic prominence* is conceptualized as a structure-building principle operating at all linguistic levels that accounts for the fact that certain elements stand out from elements of the same type and receive more attention due to their particular prominence status.

In addition (and most likely, in interaction) with linguistic prominence, there is some indication that prediction-related processes operate in language. In contrast to prominence, there is no unitary framework or definition that captures the description and investigation

[1]When I talk about *salience* in this dissertation, I refer to a general cognitive mechanism of attention that operates at different cognitive domains (and can be specified domain-specific as *visual salience*, *auditory salience* etc.). Distinct from that, I use the term *prominence* as a language-specific mechanism or principle in line with the recent concept of prominence developed by Himmelmann and Primus (2015) and subsequent research. Following this line of research, the concept of prominence in language bears some association with the concept of salience in cognition. In linguistic research, the two terms are sometimes used interchangeably but I keep them conceptually apart (at least from a methodological perspective). Note, however, that the exact differentiation of prominence and salience requires additional research. For more details, see the description of the concept of prominence in section 4.1 and the discussion of visual salience and prominence in section 7.3.

of predictive processes, anticipation of linguistic elements, and expectation-based mechanisms in language. On the contrary, notions of predictability can be found with different perspectives and scopes in linguistic research. It is clearly beyond the scope of this dissertation to develop a systematic concept of predictability but I contribute to the idea that such a principle requires more research by emphasizing the role of predictive processes in structure and processing of special encoding. In particular, I investigate object reduplication (OR) in Bulgarian as a special encoding strategy with respect to these two principles.

1.1.2 Prominence and predictability in special argument encoding

The application of both (acclaimed) principles can be illustrated with respect to argument structure. All languages have developed certain patterns that serve the task to determine as quickly and unambiguously as possible *who did what to whom*. Among the most typical morphosyntactic encoding strategies are case, agreement, and order. For instance, in the following example[2] from Bulgarian, the first noun in the sentence is marked for nominative case (at the article), agrees with the verb via a person marker (inflection), and is located in the first position of the sentence. In this sentence, all the three markers jointly contribute to the interpretation of the first noun as the subject and agent (A).

(1) Agent marking in Bulgarian (de Saint-Exupéry, 2016, p. 83)

Malki**jat** princ go pogledn**a**
little-ART.SG.M.NOM prince 3SG.M.ACC watch.PST.3SG
'The little prince looked at him.'

With respect to argument marking, it is frequently argued that the agent of a sentence is the most prominent referent of the event and that several argument-marking cues facilitate the role interpretation with respect to this prominent element (Bickel et al., 2015; Bornkessel, 2002). Furthermore, it is often assumed that the parser builds up agent-oriented predictions during language processing. For instance, a sentence-initial referent is typically interpreted as the agent of the sentence, hence, there is a strong prediction to associate this referent with this particular role.

Nevertheless, it is not always the case that the agent of the sentence is the most prominent element. Therefore, "on specific occasions roles other than agent may become the attentional centre. For such cases, grammars have conventionalized specific formal means of indicating this shift." (Himmelmann & Primus, 2015, p. 48). In particular, this "shifting the a-centre from agent to non-agent has to be accompanied by a change in structural position and/or morphosyntactic realization" (Himmelmann & Primus, 2015, p. 49). A case in point are passive sentences in which a non-agent role receives a more prominent position. Another typical example are systematic coding asymmetries when a particular

[2]In this dissertation, I use language examples from three different sources. For examples taken from the linguistic literature the reference is directly given. Most examples were taken from the *Bulgarian Web 2012* corpus (and very few from the *Europarl7* corpus) available on http://www.sketchengine.eu. For these examples, the corpus is stated and the token number as used in *sketchengine* provided for reference. Additional examples are taken from the Bulgarian translation and the Spanish original version of the novel *La sombra del viento* (Ruiz Zafón, 2001a, 2001b). Digital editions of both versions were used for parallel corpus queries. The examples from this mini-corpus are given with the reference code "SDV" (indicating the novel), a number indicating the respective chapter and the language code for Spanish (ES) or Bulgarian (BG).

sub-group of elements receives a particular coding in special contexts as in differential argument marking. Importantly, argument structure heavily interacts with other linguistic levels such as information structure or discourse structure and this is particularly true for the conditions of special encoding.

Arguably, it is not necessarily the lower role or prominence status itself that causes special encoding but rather the deviance from an expected role and prominence assignment that motivates the use of special encoding. Therefore, the need for special encoding can be related to the marking of prediction deviances from frequency-based patterns in language, and this association needs to entail some more systematic concept of predictability (Haspelmath, 2021a).

For instance, in many differential object marking (DOM) systems, animate, definite, and topical patient (P) or recipient/experiencer (R) referents receive the differential marker because of the rarity and therefore unexpectedness of patients with such features (Comrie, 1989; Schikowski & Iemmolo, 2015). Therefore, systematic accounts of prominence and predictability might shed light on the understanding of differential marking patterns in language.

There is some clear indication that prominence and predictability contribute to the determination of (at least some) structure in language. These principles are also potential targets for linking linguistic theory to more cognitively (and neurobiologically) informed accounts of the mind and brain. The exact relation of the dimensions mentioned above is up to future research. At this stage of a principle- and mechanism-oriented research programme, it is important to investigate structure more deeply and identify links to these principles. This must take a thorough typological analysis of particular patterns as a starting point. It is particularly helpful to focus on special encoding mechanisms because they lay open the principles at work.

1.1.3 The present investigation

In the present investigation, I am concerned with a special encoding strategy in Bulgarian. In this language, objects can be reduplicated by a short pronoun in particular contexts. This case is illustrated in example (2) where the definite object noun (*tezi filmčeta*) is cross-referenced by a short pronoun (*gi*).

(2) Post-verbal object reduplication (BG-Web2012, 113659249)

tolkova **gi** običah **tezi** **filmčeta**, kato bjah
so_much 3PL.ACC love-PST.1SG DEM.PL film-DIM-ART.PL when be-PST.1SG
po-malka.
COMPAR-little.F
'I loved these films, when I was younger'

This structure is traditionally known as *object reduplication* or *clitic doubling (CD)*. Interestingly, this structure can interact with word order. When the object is reduplicated and located in the pre-verbal position, a related construction emerges, sometimes called pre-verbal object reduplication or *clitic left dislocation (CLLD)*. The following example 3 illustrates pre-verbal object reduplication.

(3) Pre-verbal object reduplication (BG-Web2012, 172987381)

no vse edno koj e kmetăt, **jabălkata** **ja** pazi
but all one who be.PRS.3SG mayor-ART.SG.M apple-ART.SG.F 3SG.F.ACC keep.PRS.3SG
sekretarkata
secretary-ART.SG.F
'No matter who the mayor is, the secretary keeps the apple.'

In previous research, it was frequently stated that the additional cross-reference with the short pronoun is a means of topic-marking. However, there is some indication that a simple association of object reduplication with a topic marking function does not hold or at least not fully capture the function of object reduplication in Bulgarian. Previous research typically looked at this structure as a construction *sui generis* and paid less attention to the involvement of the short pronoun as a person form. Furthermore, the fact that object reduplication is a means of differential object marking was not discussed sufficiently before.

In my analysis, I take a new perspective to account for the structure and function of object reduplication in Bulgarian. Based on recent accounts in DOM research (Iemmolo, 2011; Schikowski & Iemmolo, 2015), I will argue that object reduplication phenomena are an instance of *differential object indexing (DOI)*. DOI is a sub-type of DOM that can be distinguished from differential object flagging (DOF; i.e., differential marking with case or adposition) in terms of the functional association exhibited by the respective marker type (see chapter 3 for details).

With the perspective of differential object indexing, I begin my analysis by emphasizing similarities of subject agreement and object clitics with respect to reference tracking and indicating degrees of explicitness as a referential expression. I apply the notion of *indexing* (Haspelmath, 2013, 2019) to describe these similarities in a more generalizable way and particularly draw on some general typological aspects of patient (P) indexing. I then focus on the second aspect of DOI, namely differential object marking – showing that DOI is indeed a type of differential marking. In line with the general notion of indexing as a means of tracking referents in discourse and relating referents to discourse roles, I also highlight recent DOM research that accounts for the function of these encoding strategies by means of information structure (Dalrymple & Nikolaeva, 2011; Nikolaeva, 1999, 2001) and discourse (Iemmolo, 2011; Schikowski & Iemmolo, 2015).

In terms of function, I want to establish the perspective that DOI (at least in Bulgarian) is not directly a topic marker but rather a special encoding strategy for marking a (relatively less predictable) deviance or elevation in discourse prominence of a referent with a particular prominence level. Interestingly, as will turn out in chapter 2 and 4, both in previous research on Bulgarian and in DOM research, there is some indication that the actual function is not directly to be found in topicality but rather associated with what is more recently captured in the concept of discourse prominence (Himmelmann & Primus, 2015; von Heusinger & Schumacher, 2019).

Particularly for Bulgarian DOI, I provide evidence that classical notions of topicality seem to be invalid for the description of DOI. For this purpose, I will discuss some shortcomings of the notion of topicality and suggest that discourse prominence is a more adequate framework to discuss differential object indexing, particularly due to the role of object indexing as a referential expression. Discourse prominence captures the situation of

ranking several referents in discourse and shifting them dynamically in a more direct, less categorial way than the notion of topicality implies. This account also complements the notion of discourse topic(s) by capturing different rankings via prominence.

In addition to identifying the role of discourse prominence, I point out that a certain notion of predictability in determining the relative deviance from a prominence level needs to be included in an explanation of DOI. This is in line with the earlier intuition and recent systematic suggestion in typology that special encoding in language hinges at least on some notion of predictability (Haspelmath, 2021a). Throughout this dissertation, I will point out that predictability is a necessary concept in accounting for differential marking and suggest that the role of prediction is arguably even bigger than previously assumed (both in processing as well as structure).

Based on this functional-typologically oriented discussion that I mainly outline in chapter 3 and 4, I develop a definition of differential object indexing with respect to Bulgarian P cross-indexing that captures most of the functions and aspects discussed throughout this chapter and investigated in the empirical section of my dissertation. In my investigation, I argue that

> **differential object indexing** is a type of *differential marking* of a P referent by means of a *person index* in cases when there is *a certain level of unpredictability* with respect to the (re)establishment or elevation of the *discourse prominence status* of this referent.

In line with this definition and based on my analysis, I want to argue that Bulgarian DOI with patient referents is typically used to (re)establish the (discourse) prominence status of a P referent whose status is uncertain or less predictable or to elevate the (discourse) prominence status of one out of several referents with almost equal ranking (i.e., whose precise hierarchical ranking is less clear). In addition to the general discussion of the concept of DOI and the elaboration with corpus examples, I present the results from a broad empirical investigation of DOI in Bulgarian.

In total, I conducted six acceptability judgment studies, three web-based experiments (a cue validity experiment, a combined acceptability/ reaction time experiment, and a combined visual cueing/ self-paced reading experiment) as well as an event-related potential experiment in order to determine the representation, function and processing of Bulgarian differential object indexing in more detail. In chapter 5, three acceptability judgment studies and one cue validity study investigate the interaction of DOI with animacy and word order and the impact of DOI on role interpretation – determining the role of DOI as an encoding strategy for arguments. Chapter 6 presents evidence from a more direct investigation of the association of DOI with topicality and discourse prominence. Ultimately, in chapter 7, I present the results from two studies focussing on processing aspects of DOI in relation to discourse updating and visual salience as a cross-modal means for centring attention on a particular referent.

In summary, this research develops the idea that differential object indexing in Bulgarian is determined by discourse prominence as well as predictability. By focussing on the sub-components of DOI structures, I point out two different aspects with respect to the linguistic priniciples mentioned a the beginning of this introduction. On the one hand, the contribution of indexing points directly to the association of discourse roles, and this

can be captured by the concept of discourse prominence. I provide empirical evidence in chapter 6 that DOI is indeed more directly related to discourse prominence rather than topicality. Additionally, the results from the experiments presented in chapter 7 highlight some prominence-related processing aspects in more detail, contributing to this general diagnostics.

On the other hand, it will become evident that DOI is clearly related to some particular discourse-related deviances, and I will show in chapter 7 that DOI clearly interacts with discourse-related predictions. This investigation contributes to the idea that predictability should be included as a concept in accounting for any form of special encoding (as pointed out by Haspelmath, 2021a) and hence draws an important link between cognition and linguistic structure. This research thereby opens the floor for a more thorough investigation of prediction-related processes in linguistic structure and processing.

Before I begin with the general overview of previous research and present my own analyses, let me make some general remarks on argument marking strategies and briefly outline the structure of this dissertation.

1.2 Preliminary remarks on argument marking

Before I start my investigation of object reduplication as a type of differential object indexing, a few comments need to be made concerning the levels that are associated with this phenomenon. When dealing with DOI, there are some re-occurring aspects that are relevant for any discussion of it. In many accounts, the short pronoun (clitic) is understood as a type of object agreement, and therefore, DOI is associated with argument marking (this view is present in some generative studies as well as descriptive accounts of Bulgarian, see chapter 2). In other accounts, DOI is described as a topic marker, therefore bearing some relation to information structure (yet technically being a marker of arguments). In more recent accounts, DOI is related to the level of discourse (and I will argue in chapter 3 that this relation directly stems from the pronominal nature of the clitic). Sometimes, these accounts are seen as competing.

However, as will become clear in chapter 2 and 4, none of these accounts is completely correct or wrong. In my analysis, I will show that DOI is indeed a type of agreement marker (but I will use a different terminology, see chapter 3 and 4). Also, DOI is directly concerned with a particular function in discourse. However, some basic insights of these functions were already captured in topicality-based accounts of DOI. I will argue in chapter 2 that the function these accounts describe can better be captured under a discourse prominence framework. In the second part of this book, I will provide empirical evidence for some of these claims.

Most of the issues just mentioned will be discussed in later chapters. However, it is practical to already address some of the general aspects concerning argument marking, information structure, and discourse. I provide a very sketchy overview of these different levels that will serve as a basis for the subsequent discussion of DOI and its function. For now, I stick to the more widely known terminology and refer to the encoding strategies that I discuss in the following as agreement, case, and word order (but see chapter 3 for a more practical terminology in form of comparative concepts). Firstly, I start with a discussion of the three morphosyntactic encoding strategies (and their reflections in Bulgarian) and then discuss associated levels as I envision them for the purpose of this investigation.

The most typical marker associated with arguments is case. However, "[i]t is often assumed and sometimes explicitly stated that both agreement marking and word order constitute viable alternatives to morphological case with respect to some subset of the functions that case marking may fulfil" (Siewierska & Bakker, 2012, p. 290). At first sight, this general observation makes sense if we compare different languages. For example, Russian (and many other Slavic languages) exhibits a rich and unambiguous case system but has a relatively flexible word order. It is often assumed that the flexible word order is possible because of the case marking (but see Thompson, 1977 for examples where order disambiguates the arguments in case of ambiguous marking in Russian). In contrast, English has a comparably strict word order – often explained by the loss of case in this language. German, in contrast, seems to be somewhere in the middle between these two extremes. German has some remains of a case system, as well as agreement for subjects and makes use of a semi-flexible word order.

Similar to English, "Bulgarian has lost its case system except for a residual distinction between subject and direct object in the personal pronouns. ... In addition, the written language distinguishes (is supposed to distinguish) subject and object forms of the masculine singular definite article" (Spencer, 2012, p. 195). The first situation clearly resembles English where traces of the Germanic case distinction can be found on the pronouns (e.g., *his, hers, whose; him, her, whom*). The same situation can be found in Bulgarian, with the exception that Bulgarian has two sets of personal pronouns, namely long (or independent, free-standing) and short (or bound, dependent, clitic) pronouns (see next chapter). The second aspect is highly disputed in Bulgarian linguistics. In grammars of the standard language, it is prescribed that definite masculine referents receive different articles depending on their grammatical function. Note that articles are post-posed in Bulgarian. Masculine subjects ("nominative case") receive the article *-ăt* (or *-jat* after particular consonants), and objects ("non-nominative case") receive the article *-a* (or *-ja*) (for details, see Laskova, 2013). For example, according to the prescribed rule, grammatical function would be distinguished in the following example based on the articles:

(4) Definite articles with masculine referents

Studentăt udi studenta
student-ART.SG.M.NOM hit.PRS.3SG student-ART.SG.M.ACC
'The student hits the student'

There is some criticism of this description. For example, Leafgren (2002, p. 112) cites Hauge (1999, p. 31) who argues that the differentiation of the two forms "is an artificial construct, and is not based upon actual usage in any Bulgarian dialect. It is observed only in writing and in very careful speech. In most other style levels of the spoken language, either the long form or the short form is used in all syntactic positions". In a slightly less drastic manner, Sussex and Cubberley (2006, p. 251) state that the distinction of two article forms for masculine nouns "is not present in all regions or registers". Nevertheless, in the empirical section, to avoid potential confounding with the case expression on masculine nouns, I restrict myself to feminine and neuter nouns when investigating the function of DOI alone.

In contrast to case, differential object indexing as well as verbal inflection (subject

agreement) are elements of the verbal domain. Interestingly, in contrast to the other Slavic languages, Bulgarian (and Macedonian) still preserves a rich verbal morphology with several tense forms and a more complex person marking on the verb. This is in contrast to other Slavic languages that preserved a complex case system but have a reduced verbal system with only a few tense forms and a coincidence of different persons in the same form. In this dissertation, I am not concerned with the interaction of DOI with different tense forms and other parts of the verbal system (e.g., aspect), but future research should address this issue in more detail.[3]

In languages that exhibit two or more of the encoding strategies that I discuss here, they frequently interact in determining the argument structure (see chapter 5 for a discussion of interaction of cues in determining the arguments within the framework of the competition model by MacWhinney et al., 1984). Nevertheless, the dominance of one of them in different languages suggests that agreement and order can indeed serve in lieu of case and fulfil its function of argument marking. In theory, one could make a radical statement and argue that all three are basically argument markers who either act alone or interact (depending on certain diachronic factors) – but with precisely the same function.

In contrast – and this is also what Siewierska and Bakker (2012) suggest –, all three are potentially motivated by different mechanisms (maybe at different levels), but each of their respective functions can serve in determining the arguments, i.e., they facilitate the role interpretation but each from a somewhat different direction. This seems to be a more practical diagnosis since the three can interact in the very same language. Let us consider an example from Bulgarian.

If we assumed that case, agreement, and order are all three just simple argument markers, this would mean that the object argument is marked three times in the following example (5). The object *film* is marked with the (masculine) case marker *-a* for accusatives, cross-referenced by a short pronoun (marked for person and case) and in the typical (post-verbal) position of an object.

(5) Object marking in Bulgarian (BG-Web2012, 412031973)

az šte **go** gledam **filma**, no bez da tărsja
1SG.NOM FUT 3SG.M.ACC watch.PRS.1SG film-ART.SG.M but without COMP search.PRS.1SG
smisăla na života v nego.
meaning-ART.SG.M of life-ART.SG.F in 3SG.M.ACC
'I will watch the movie, but without looking for the meaning of life in it.'

It makes no sense to assume such a redundant marking of the object argument (particularly, when the agent is instantiated by a highly prominent element in form of a 1st person subject pronoun). Therefore, it is more fruitful to assume different underlying functions of the three markers. Siewierska and Bakker (2012) discuss this issue in more detail and I draw from their account in the following. In their view, "[t]he primary function of case marking

[3]Since tense and aspect do not play a role in my analysis, I only use a basic glossing for the Bulgarian examples in this dissertation and classify verbal forms only with respect to their main tense relation (e.g., past tense or present tense) but do not specify the exact type of tense marking (e.g., past perfect) in the examples. Also, I do not specify the morphological status of the verbal inflection in the glosses since this is not relevant for my discussion either.

... is typically seen to be a relation one, namely of denoting the nature of the semantic dependency obtaining between the verb and its less predictable dependents" (Siewierska & Bakker, 2012, p. 291).

In addition to this core function of case, they mention two additional functions, namely the discriminatory or differentiating function (case distinguishes A and P or R) and the "indexing properties of the referents of arguments" (for details of these two functions, see the section on differential object marking in chapter 3). In general, this seems to be driven by the motivation that "[t]he more unpredictable the semantic nature of the dependency relation, the more likely it is to be overtly marked by case" (Siewierska & Bakker, 2012, p. 291). This also points to a notion of predictability that I will elaborate on in chapter 4.

In contrast to case as a "relational encoding strategy", "agreement is an indexing strategy denoting the properties of one of the entities in the agreement relationship" (Siewierska & Bakker, 2012, p. 293). In regard of person agreement, this function is clearly associated with discourse because "[p]erson agreement is thus considered to be primarily a means of keeping track of referents in the discourse via their index of features" (Siewierska & Bakker, 2012, p. 293). They point out that person agreement is used "for highly salient discourse referents, which the speaker assumes to be easily accessible to the addressee" (Siewierska & Bakker, 2012, p. 293). The discourse-related saliency also distinguishes case and agreement because "cognitively salient referents tend to be encoded as arguments rather than as adjuncts, agreement, unlike case marking, is primarily associated with arguments" (Siewierska & Bakker, 2012, p. 293).

The acclaimed core function of order is a bit different because it concerns "the sequencing of information in ways which best reflect the communicative intentions of the speaker and simultaneously enable these intentions to be successfully and speedily processed by the addressee" (Siewierska & Bakker, 2012, p. 294). Therefore, in its core function, order is very different from the other two encoding strategies: "Significantly, unlike case marking or agreement marking, word order does not tend to be used to index the inherent properties of referents, i.e., animacy, humanness, or person. Nor does it tend to single out the P in preference to A or S" (Siewierska & Bakker, 2012, p. 294). Note, however, that these functions may co-occur.

Based on this short overview of the core functions of the three encoding strategies under discussion, it is possible that each of them is associated with a different level. One could say, that case is more directly associated with the argument structure itself since it operates on the level of relations at this structure (e.g., in discriminating the A and P role). In contrast, agreement (when associated with person) is more directly associated with the level of discourse structure, where several referents are tracked in their involvement in an ongoing piece of discourse. In contrast, order is not only related to arguments alone but concerned with the structuring and ordering of information in general, therefore being related directly to information structure.

Hence, in the example given above, the three just align because the interpretations at each level align. This is not the case in the following example (6). Here, there is no case-marking due to the neuter gender of the object. The object pronoun cross-refers to the object and arguably identifies the referent in discourse. Additionally – since the short pronoun in Bulgarian is case-marked and only occurs with objects in this form – it establishes the argument role. Order, in contrast, is non-canonical, i.e., the object is in the sentence-initial

position that is more typically associated with subjects. This particular structure can be considered a topicalization strategy. Here, the three markers do not necessarily point to the same direction.

(6) Pre-verbal object marking in Bulgarian (BG-Web2012, 21497057)

če **Evangelieto go** četat protestantite, a pravoslavnite
COMP gospel-ART.SG.N 3SG.N.ACC read.PRS.3PL protestant-ART.PL but orthodox-ART.PL
go celuvat
3SG.N.ACC kiss.PRS.3PL
'that the protestants read the Gospel and the orthodox kiss it'

It is very tempting to assume a strict distinction between the levels and assign each marker to one of these levels. The assumption of different structures or levels is among the most hotly debated topics in language. There is rarely a linguistic marker or element that can be assigned easily to just one of these levels. It is not necessary (and possible within the limits of this dissertation) to outline the different levels in full detail. Therefore, I only state some very basic aspects of the levels to give a rough orientation for the following chapters.

Argument structure – in its most basic outline – is closely associated with the verb and could therefore be considered a semanto-syntactic level. However, it is well-known that argument identification is also influenced by semantic categories (such as animacy). Quite frequently, a distinction can be seen between grammatical function (e.g., subject and direct object) and thematic role (e.g., agent and patient). Often, argument structure is used as a term to describe the distribution of thematic roles. In this sense, argument structure is more associated with the underlying semantic structure of a verb rather than its overt syntactic realization.

Similarly, there are different views on information structure. For now, I stick to the very basic idea that information structure is associated with information packaging and constitutes the level between syntax and discourse (Erteschik-Shir, 2007). At this level, the referents and information conveyed are structured in a sense that is more easily accessible and processable to the listener. Since language is perceived linearly, it makes sense that order is concerned with the structuring of how information is presented. Sometimes, *information structure* is also used as a term for the elements (i.e., referents) that are currently available for the discourse. This includes referents that are already given because of previous mention, or that are highly accessible and can be used in an event description. However, I rather locate this function at the level of discourse structure and restrict the use of *information structure* to the ordering, grounding, and emphasizing of information to facilite the reconstruction of the event.

Keep in mind in this investigation that I only apply a very simplistic differentiation of levels and that these functions assigned to the encoding strategies are the primary function but do not capture the full variety. For Bulgarian DOI, I will later argue that clitics are primarily person forms and therefore the function has to be searched at the level of discourse (and I will provide empirical evidence for that in chapter 5 and 6). They also carry case and therefore have some more direct relation to argument structure (but I will provide evidence in chapter 4 that this is not central to the core function; yet it contributes to role identification). In addition, there is some alignment with order, but this is due to

some parallel process.

It is not the goal of this dissertation to develop a unitary framework of argument structure, information structure, and discourse structure. Much of the exact relation and interaction of these linguistic levels is a matter of debate (or taste, in some cases). I agree with Jackendoff (2002) that linguistic research has to assume at least some form of these levels to account for the rich structure languages provide. For my purpose, there is no need to outline the exact shape of these levels or discuss the relation more broadly. I assume that there are some representational levels that account for these three aspects (assigning argument roles, structuring information, and keeping track of referents involved in a particular piece of discourse) and I will show that DOI interacts with these levels in one way or the other.

1.3 Organization of the book

Before I begin my analysis of differential object indexing in Bulgarian, let me briefly outline the organization of this book. The dissertation is split into two major parts, one more theoretically oriented first part (chapter 2 to 4) and a highly empirical second part (chapter 5 to 7).

In chapter 2, I provide a short overview of previous accounts on differential object indexing. The phenomenon under discussion in this investigation is mainly known as object reduplication or clitic doubling. Traditionally, research under the former notion was mainly concerned with a more areal-typological assessment of different object reduplication phenomena (in Romance languages, the Balkans, etc.). In contrast, clitic doubling research is more related to the structural and syntactic details of these structures. Both accounts provide insights to the overall distribution and variety. Therefore, I give a general overview of differential object indexing (and related phenomena) in Bulgarian and other languages of the Balkan linguistic league.

In chapter 3, I take another perspective and look at the sub-components of DOI. Firstly, I draw on recent proposals with respect to person forms and case and outline the similarity of object indexing and subject indexing and argue for the idea that both are directly related with discourse roles. In a second step, I focus on the differential nature of DOI. I discuss DOM research in more detail and take up recent accounts that include differential object indexing and outline differences to what is classically known as differential object marking. Particular focus is given on newer DOM accounts that attribute DOM and DOI with functions grounded in information structure and discourse. Also, as I will argue there, any type of differential marking needs to entail some notion of predictability to account for the differential selection of only a sub-group of referents.

In chapter 4, I draw on the insights from the indexing perspective and the DOI account and argue that DOI in Bulgarian can be related more directly to discourse prominence rather than topicality. For this purpose, I discuss a recent concept of discourse prominence and provide initial (literature and corpus-based) evidence that the function of DOI can better be accounted for in terms of discourse prominence and predictability. In this chapter, I develop a definition of DOI in terms of these two principles and outline how I address DOI in Bulgarian from an empirical perspective in the second part of the dissertation.

In chapter 5, I take up the general discussion of DOI in terms of argument marking and look at its role as a cue in role interpretation. I present the results from three acceptability

judgment studies and one web-based cue validity study that focussed on the interaction and correlation with other features that are argued to serve or support role interpretation, especially animacy and word order. The studies in this chapter provide some evidence that DOI is a comparably strong cue in role interpretation that can easily rule out other cues in this respect. Also, a strong interaction with word order is reported that points at some association with information structural processes.

Chapter 6 is directly concerned with topicality and discourse prominence. This chapter provides evidence in favour of my account outlined in chapter 4. I present evidence against the topic marker perspective (acceptability judgment studies 4, 5, and 6) and in favour of the discourse prominence perspective (combined reaction time and acceptability judgment experiment). The first three studies suggest that DOI cannot be (directly) related to the sentence topic (in the sense of aboutness) or to givenness (and thereby indirectly topic). The final experiment in this chapter suggests that DOI is not associated with the most prominent (and discourse-topical) referent but with a second referent that has a medium-level prominence status lower than a competing referent. The evidence presented in this chapter supports the perspective that DOI is more directly concerned with reference tracking in discourse and particularly the discourse status of different referents.

In chapter 7, I shed light on some processing aspects related to differential object indexing. I present the results from an EEG study as well as a combined self-paced-reading/ visual-cueing study. The first experiment looks at the time-course and neurophysiological patterns associated with processing indexing and illustrates the use of DOI for singling out and activating one out of two almost equally ranking referents in an object-prominent structure. This study shows that DOI operates on and can override predictions that are build up at the level of discourse representations and subsequently engenders discourse updating toward a refined discourse structure. In the second experiment, I provide a first attempt to investigate the interplay of visually manipulated salience and DOI as a marker of discourse prominence and show that DOI can take up and affirm the prominence of a referent that was visually brought to a more central position in attention. Both studies indicate the involvement of both prominence-related as well as predictive mechanisms in the processing of differential object indexing.

In chapter 8, I conclude this investigation and summarize the main findings and theoretical aspects of my analysis. I also briefly discuss the notion of prominence and predictability from a more general perspective and discuss limitations of my research as well as potential targets for future research derived from my analysis. I will particularly emphasize that the notion of predictability requires further research, with respect to processing as well as linguistic structure.

2 General description and previous accounts of object reduplication

In this chapter, I want to give a broad overview of previous accounts on object reduplication phenomena in Bulgarian. There are basically two large strands from which these phenomena are traditionally investigated. On the one hand, object reduplication was extensively described in the context of Balkan linguistics. This is due to the fact that all languages of the so-called *Balkan linguistic league* exhibit object reduplication to some extent. On the other hand, object reduplication was broadly investigated in generative grammar under the term of *clitic doubling*.

In the first part of this chapter (section 2.1), I provide a general overview of object reduplication in Bulgarian and briefly discuss different functional explanations for this encoding strategy that were stated in the past. Due to the prominence of object reduplication as a feature of neighbouring languages and shared functional traits of the construction in different languages, I additionally present object reduplication in other languages in section 2.2.

In the second part of this chapter, I illustrate the main accounts on clitic doubling in the generative framework (section 2.3) and point out some similarities with other constructions from a generative perspective (section 2.4), particularly clitic dislocation. Throughout the present chapter, I call the phenomenon either object reduplication or clitic doubling in line with the respective accounts. In the next chapter, I will take up recent proposals to consider object reduplication phenomena as a type of differential object indexing (DOI), and I will outline that this perspective provides new insights into the function and representation of object reduplication.[4]

Research in both directions is very broad and subsumes a large number of different accounts, underlying motivations, and functional claims. In addition, object reduplication phenomena typically exhibit a high degree of variation in the languages that make use of this structure. Therefore, in this chapter, I can only give a very general and rough sketch of previous research and cannot discuss every account in detail. In later parts of my investigation, I will come back to some of the aspects of previous accounts relevant to my analysis.

2.1 The general pattern of Bulgarian object reduplication

2.1.1 Basic structure

Let me start this concise overview with the different forms that object reduplication can assume in Bulgarian. In a very general sense, object reduplication is defined as "the occurrence of a word or word-like unit (clitic, short or weak form pronoun) that has exactly the same grammatical role in a clause as another word, i.e., a clitic and long form of the same oblique personal pronoun or a clitic agreeing in gender, number, and case with a substantival direct or indirect object" (Friedman, 2008, p. 35-36). There are many different aspects that can be addressed in object reduplication research as stated in the introduction to their volume on *Clitic doubling in the Balkan languages* by Kallulli and Tasmowski (2008b, p. 3):

[4] In case of uncertainty, all three terms are more or less perceived of as synonymous when no theory-specific aspect is discussed. Note that neither the use of the term *clitic doubling* nor *object reduplication* is exclusively used by either theoretical account.

> The examination of the clitic doubling phenomenon breaks down into several topics for scrutiny, such as: its extension within and outside the Balkan Sprachbund and the observed variation; its realizational possibilities and the constraints on the argumental status of the associate DP (direct or indirect object), its categorial nature (pronominal or lexical), its semantics (definite, specific, presupposed, or neither) and pragmatics (topic or not, D-linked or not); its temporal and locational genesis, and whether or not influence under language contact can be detected; the relationship between the clitic and its associate, their respective positioning in relation to the governing verb, and the status of the doubled constituent when the latter is not in its canonical position.

I clearly cannot discuss all the issues in this dissertation. In the following, I only address some of the more central aspects mentioned in this quote. In the remainder of the dissertation, I am primarily concerned with functional and discourse-pragmatic aspects.

In a basic sense, OR is a particular means of encoding an object. In the following example (adapted from Guentchéva, 1994, and Hinrichs, 1999a), the different options for expressing a direct object in Bulgarian are provided.

(7) Direct object encoding in Bulgarian

a. Full NP object

Kučeto goni kotkata
dog-ART.SG.N chase.PRS.3SG cat-ART.SG.F
'The dog chases the cat.'

b. Short pronoun (clitic) object

Kučeto ja goni
dog-ART.SG.N 3SG.F.ACC chase.PRS.3SG
'The dog chases her.'

c. Object reduplication/ Differential object indexing

Kučeto **ja** goni **kotkata**
dog-ART.SG.N 3SG.F.ACC chase.PRS.3SG cat-ART.SG.F
'The dog chases the cat.'

The short forms can either represent the full object (as in example 7b) or reduplicate the object instantiated by an NP (as in c). In terms of semantics, the version with a full NP (a) and the reduplicated version (c) basically express the same meaning, but there is an additional – arguably discourse-pragmatic or information structural – layer added to the interpretation in the reduplicated version. In a simple sense, reduplication basically combines the other two encoding options within one sentence. In addition, also long-form pronouns can be reduplicated instead of a nominal phrase (in the same NP position), both without and with a short pronoun. Therefore, for a first basic description, I discuss the short pronouns as well as the type of the NPs that can receive reduplication. In Bulgarian, the short pronouns come in two different sets with forms for accusative and dative case.

For the sake of illustration, these forms are given alongside their long-form counterparts in table 1.[5]

The short pronouns are frequently described as special clitics in the sense of Zwicky (1985). Drawing on his study, Siewierska (2004, p. 26) states that "[s]imple clitics are reduced variants of full forms occurring in the same position as full forms. ... Special clitics, on the other hand, are not just reduced full forms but rather separate allomorphs of full forms displaying their own morpho-syntactic and morphophonological properties".

Bulgarian clitic or short pronouns exhibit a high degree of positional restrictions. In

Table 1

Bulgarian personal pronoun paradigms

Person	Accusative forms		Dative forms	
	long	short	long	short
1SG	mene	me	na mene	mi
2SG	tebe	te	na tebe	ti
3SG.M/N	nego	go	na nego	mu
3SG.F	neja	ja	na neja	ì
1PL	nas	ni	na nas	ni
2PL	vas	vi	na vas	vi
3PL	tjah	gi	na tjah	im

Bulgarian, the short pronouns are primarily pro-clitics. However, because they can never occur in the sentence-initial position (unlike Macedonian, see Tomić, 2008a, 2012) they can also be enclitic. They typically occur pre-verbally (directly in front of the verb) or post-verbally when otherwise they would be the first element of the sentence. In both languages, they are special clitics in this classification. However, as I will point out in the next chapter with reference to Haspelmath (2013, 2019), the classification as short or bound pronoun or clitic does not contribute to the functional understanding of object reduplication phenomena. Therefore, I do not discuss the status of these elements in more detail.

Different nominal or pronominal elements can be reduplicated. In example 7c, a full NP is reduplicated by a short pronoun of the same number and gender as the noun. Additionally, in Bulgarian it is possible to use the same structure with proper nouns as well as full-form, free-standing pronouns. It is possible to use object reduplication with direct and indirect objects.[6].

In the following eight examples (8a-h), each combination of object type, object position, and object form is illustrated. The examples show that direct (example 8 a-d) as well as

[5]Note that the grave accent on the 3SG feminine dative short pronouns is only used for orthographic distinction from the homophonic *i* (trans. 'and').

[6]Note that in Bulgarian datives are marked with the preposition *na* (lit. 'of') as can be seen in the examples 8e-f. In the few examples with indirect objects in this study, I glossed the dative marker as a preposition. The object can thereby appear in different positions in the sentence because the dative interpretation is directly detectable since I only use instances of reduplicated indirect objects in this dissertation

indirect objects (e-h) can be reduplicated, irrespective of the position or the form.[7]

(8) Types of Bulgarian object reduplication

a. Post-verbal direct object NP (example 7c)

kučeto **ja** goni **kotkata**
dog-ART.SG.N 3SG.F.ACC chase.PRS.3SG cat-ART.SG.F
'The dog chases the cat.'

b. Pre-verbal direct object NP (BG-Web2012, 17371642)

cenata **ja** plaštat bălgarite
bill-ART.SG.F 3SG.F.ACC pay.PRS.3PL Bulgarians-ART.PL
'The Bulgarians pay the bill.'

c. Post-verbal pronominal direct object (Hinrichs, 1999b, p. 449)

znam **te** az **tebe**
know.PRS.1SG 2SG.ACC 1SG.NOM 2SG.ACC
'I know you.'

d. Pre-verbal pronominal direct object (BG-Web2012, 379422015)

men **me** smuštava prisăstvieto
1.SG.ACC 1.SG.ACC disturb.PRS.3SG presence-ART.SG.F
'The presence (of a particular person in politics) disturbs me.'

e. Post-verbal indirect object NP (BG-Web2012, 37136414)

mu kazah **na kolegata** če ...
3.SG.M.DAT tell.PST.1SG of colleague-ART.SG.F that
'I told the colleague that ...'

f. Pre-verbal indirect object NP (Laskova, 2013, p. 71)

na njakoj **učasnici** šte **im** dadem specialni nagradi
of somebody participant-PL FUT 3PL.DAT give.PRS.1PL special-PL prize-PL
'We will give special prizes to some participants'

g. Post-verbal pronominal indirect object (SDV16-BG)

toj păk **mi** pusna muhata **na men**
3SG.M.NOM but 1SG.DAT drop.PST.3SG fly-ART.SG.F of 1SG
'He dropped a flie on me (= he persuaded me)'

h. Pre-verbal pronominal indirect object (private chat)

na men lično plana **mi** dopada
to 1SG.DAT personally plan-ART.SG.M 1SG.DAT impress-PRS.3SG
'Me personally, the plan impresses (me).'

[7] In addition to that, also broader constituents (subordinate clauses or – in generative terms – complementizer phrases) can be reduplicated, arguably only as pre-verbal DOI (Krapova & Cinque, 2008, p. 263).

An important observation with respect to Bulgarian object reduplication is the fact that reduplicated objects are typically definite (although examples like 8f challenge this simple association, see below for a discussion). Almost all instances of reduplicated objects are with definite expressions, either in form of inherently definite forms (pronouns or proper nouns) or with common nouns accompanied by the definite article, demonstrative or possessive expressions. However, not all definite expressions receive reduplication (in contrast to Macedonian, see below). In Bulgarian, the use of object reduplication is highly restricted and comparably rare (for instance, in contrast to passives). I will discuss this aspect in the following paragraph and compare the main situations of object reduplication in Bulgarian to the other languages of the Balkan linguistic league.

At this point, I must stress one important aspect for the remainder of the investigation. In the theoretical discussion within the perspective of differential object indexing (chapter 4) and in the subsequent empirical investigations (chapters 5 to 7), I am only concerned with two sub-types from the examples above. I focus on the reduplication of direct objects when they are instantiated in the sentence as full NPs (in post-verbal and pre-verbal order), as in example (8a) and (8b), but I do not investigate reduplication of pronouns or reduplication of indirect objects. Future research has to determine to what extent my analysis is also valid for these types of object reduplication and work out commonalities and differences between them.

2.1.2 Variation and distribution

In a cross-linguistic comparison, object reduplication in "[s]tandard Bulgarian manifests a very weak degree of grammaticalization" (Guentchéva, 2008, p. 203). This is surprising to some extent since the closest-related language to Bulgarian, Macedonian, exhibits the highest degree of grammaticalization of OR in the Balkans, as is pointed out by Tomić (2008a, p. 66):

> Interestingly, while in one of the Balkan Slavic languages, namely Macedonian, they are closest to complete grammaticalization, i.e., to becoming mere case markers which formally distinguish direct and indirect objects from subjects in another Balkan Slavic language, Bulgarian, clitic-doubling is predominantely dependent on discourse factors.

This stark contrast mainly appears at the level of the standard languages. As with other linguistic features, there is a broad continuum within the South-Slavic languages and particularly in the Bulgaro-Macedonian dialectal area. In most western areas of the continuum (western part of the Republic of North Macedonia), basically all definite (and many specific) direct objects as well as basically all specific indirect objects are reduplicated (see Tomić, 2008a, 2012, for a detailed discussion of contexts and Friedman, 2008, for examples of Macedonian object reduplication even with unspecific referents). In contrast, "the conditions for clitic doubling in Bulgarian differ drastically from those in Macedonian – clitic doubling in Bulgarian to a great extent depends on discourse factors, as it does in Modern Greek and Albanian" (Tomić, 2008a, p. 80).

These discourse factors are often taken to be topicality (but I will argue for another underlying discourse factor later in this investigation). Nevertheless, "the interdependence between clitic doubling and topicalization in Bulgarian applies only to the Standard

language and the Eastern dialects on which the Standard was based" (Tomić, 2008a, p. 80). In contrast, the conditions for OR in the Western Bulgarian dialects (spoken in closer proximity to Macedonian) are more comparable to the situation found in Macedonian dialects. However, also in these varieties of Bulgarian, "the role of discourse factors in clitic doubling cannot be discarded" (Tomić, 2008a, p. 81). Similarly, some forms of object reduplication can also be found in South-Eastern Serbian. [8]

It is sometimes argued that in Bulgarian the use of object reduplication is historically avoided or "pushed ... to the colloquial register" in order to imitate the Church Slavonic or Russian model more closely (Friedman, 2008, p. 39, with reference to Lopašov, 1978, who adopted this idea from Orzechowska, 1973). In contrast to this, the Macedonian standard language is based on the Western dialects that largely exhibit object reduplication (Friedman, 2008; Tomić, 2012).

In the Bulgarian normative standard, object reduplication "is not prescriptively required in Bulgarian except with the existential use of *ima/njama* (trans. 'have/NEG.have'), although reduplication is also expected in order to disambiguate case relations" (Friedman, 2008, p. 37 with reference to Stojanov, 1983). In the colloquial language, however, reduplication can be found with different verbs and all types of (definite) noun phrases (as illustrated above).

In general, I share the opinion of Leafgren (2002, p. 110) that reduplication "is not an equal part of the linguistic system of all Bulgarians in all situations". Despite the colloquial flavour of this construction type, object reduplication can be found in all sorts of genres and text types as well as modalities with differing frequencies. Important for our investigation is the general fact that "although not all speakers reduplicate in all types of communication, there is a consistent structural constraint applied when reduplication is in fact employed" (Leafgren, 2002, p. 111).

2.1.3 Obligatory use

In the following, I illustrate the "obligatory" use of object reduplication with particular verb types and then discuss the (acclaimed obligatory) use of OR in interaction with word order because these are instances where object reduplication is arguably triggered by morphosyntactic circumstances, whereas the broader use of it in Bulgarian is clearly driven by pragmatic or discourse factors. I will discuss this below.

Particular verb classes and quantifying expressions. It is important to note that there are some particular sentence-internal or syntactic circumstances that trigger the use of OR, especially the verbal forms for *ima/njama* (have/ NEG-have) and a number of psych verbs. Krapova and Cinque (2008) summarize the situations in which "obligatory" clitic doubling – as they call it – can occur. In their account, object reduplication is obligatory with psych and physical perception verbs (with dative or accusative experiencers), predicates with possessor datives or accusatives, predicates of the *feel-like*-construction, particular modal predicates, or predicates indicating presence or absence (Krapova & Cinque, 2008, p. 267).

[8] For a wider overview of object reduplication in the full South-Slavic continuum from Slovenian to Bulgarian, see Tomić (2008b) and for a discussion of clitic doubling in neighbouring Aromanian and Meglenoromanian languages (Eastern Romance languages spoken in North Macedonia and Albania), see Tomić (2008a) and Friedman (2008).

Most of the examples provided in their account can clearly be associated with a wider concept of psych and perceptions verbs.

The following example (9) illustrates a typical use of OR with perception-oriented verbal meaning ("sth. hurts sb."):

(9) Object reduplication with psych verbs (BG-Web2012, 52584640)

deteto **go** boli koremčeto?
child-ART.SG.N 3SG.N.ACC hurt.PRS.3SG tummy-ART.SG.N
'Does the child have a tummy ache?'

The other large group is OR in combination with the two verb forms for *to have* and *to have not*, as illustrated in the following corpus example.

(10) Object reduplication with *ima* (BG-Web2012, 48059948)

v sajta na inspekcijata **ja** ima
in webpage-ART.SG.M of inspection-ART.SG.F 3SG.F.ACC have.PRS.3SG
deklaracijata
declaration-ART.SG.F
'The declaration is on the webpage of the inspection (office)'

I will not discuss these conditions further, in the same way as I excluded particularly dative or R role arguments from my analysis. Instead, I want to focus on the underlying motivation and function in reduplicating P arguments, a case that seems to be more pragmatically driven. Nevertheless, future research needs to address the relation of this morphosyntactically/semantically driven reduplication and the type of reduplication that I look at in my investigation. Another interacting factor that is potentially more closely related to the function that I want to investigate is the strong interaction of object reduplication and word order.

Interaction with word order. The second aspect that is described as more or less obligatory by Friedman (2008) (see above) is the case when the object appears in a sentence-initial or pre-verbal position. He cites this view from the academy grammar of Bulgarian (Stojanov, 1983). However, Leafgren (2002) challenges this perspective by providing examples for non-reduplicated OVS sentences and sentences where reduplication fails to achieve disambiguation in a non-canonical order.

Furthermore, Dyer (1992) emphasises that different strategies (intonation, passive voice, or reduplication) can be used to mark a sentence-initial object. The idea that object reduplication is mainly triggered by word order alternations is also reflected in one of the earlier accounts that attempted an explanation for this phenomenon in Bulgarian (for instance, Georgieva, 1974, Popov, 1983). I discuss this in slightly more detail below.

Similarly, Guentchéva (2008) argues that word order itself is directly affected by information structure, whereas clitic doubling in particular is linked to the topicality of an object. However, she does not claim that the influence of information structure on reduplication is mediated by word order but rather that word order and reduplication might interact in expressing different degrees of topicalization. This idea is clearly distinct from the basic idea that a particular order alternation directly triggers reduplications. In the later parts

of my dissertation, I will suggest that object reduplication is more directly associated with discourse prominence and reference tracking, whereas topicality is established by order. In a sense, this is an elaboration of the idea brought forward by Guentchéva (1994, 2008).

The main reason to oppose a simple *order-as-cause* perspective is the fact that this does not capture the situation where object reduplication is found in canonical word order. Furthermore, it is simple to find instances of objects in pre-verbal position that are not doubled, as in the following example:

(11) Pre-verbal object without reduplication (BG-Web2012, 129334672)

a părvata si kniga pročita ošte predi da vleze v
and first-ART-SG.F REFL book PRF-read.PST.3SG already before COMP enter.PST.3SG in
klasnata staja.
class-ART-SG.F room
'and she finished (reading) her first book even before entering school.'

Guentchéva (1994) additionally points out that prosody (i.e., stressing the sentence-initial object) can be used to unambiguously mark the referent as the object. In my investigation, I am not concerned with prosody and restrict myself to pure morphosyntactic and pragmatic restrictions of object reduplication. In sum, this is some initial evidence that object reduplication and order alternations should be kept apart in an empirical investigation. Both encoding strategies can interact but are apparently motivated by different underlying factors since both can occur independently of each other. I will come back to this issue at several points throughout my dissertation.

2.1.4 Functional explanations for the optional use

So far, it should be clear that object reduplication is a more or less optional encoding strategy alongside sentences with full NP objects or short pronominal objects. Also, it is clear that Bulgarian object reduplication is most often associated with definite referents. Due to the optionality, there is a large discussion of what triggers the use of reduplicated objects. In the traditional literature on Bulgarian object reduplication, there are four broad suggestions on how to capture and explain the function of this phenomenon (the classification into four accounts and the mentioning of the respective literature associated with each account are mainly taken from Jaeger & Gerassimova, 2002). In the following, I briefly discuss these accounts and present general counter-examples.

Word order marker/ case disambiguation hypothesis. Among the first suggestions was the idea that OR serves as a case disambiguation marker, partly compensating for the loss of case in Bulgarian (brought forward for example in Georgieva, 1974; and also included in the academy grammar of Bulgarian, see Popov, 1983). At the heart of this hypothesis is especially the observation that OR is most frequently found with pre-verbal objects. In the following example (12), the object of the sentence is in the non-canonical first position of the sentence (that is typically reserved for subjects), and the subject of the sentence is in the post-verbal position. In this account, it is argued that the additional appearance of the short pronoun disambiguates the case (or rather thematic role) assignment that could otherwise be confused (neglecting the role of animacy as a potential role-assigning cue here, but see chapter 5).

(12) Pre-verbal object reduplication (BG-Web2012, 172602)

a nakraja **cenata** **ja** plaštat horata
and finally price-ART.SG.F 3SG.ACC pay.PRS.3PL people-ART.SG.F
'And in the end, the people pay the bill.'

However, there are some problems with this account. On the one hand, it only accounts for the reduplication of pre-verbal objects, and there are clear examples in which sentences with object reduplication are still ambiguous (see Leafgren, 1997, p. 124). Similarly, Guentchéva (1994, p. 208) points out that ambiguous referents are highly infrequent, not necessarily justifying the use of a particular marker indicating this particular, rare, case. On the other hand, other cues (e.g., number, gender, or, to lower extents, animacy) can disambiguate between referents, too. In the following example, number agreement would already establish the case relations unambiguously.

(13) Pre-verbal object reduplication (Europarl7_BG, 8753258)

tuk otnovo **smetkata** **ja** plaštat danăkoplatcite
here again bill-ART.SG.F 3SG.ACC pay.PRS.3PL taxpayer-PL-ART.PL
'And again, the taxpayers pay the bill'

The strongest counter-evidence against this perspective is the fact that OR is also typically and frequently found with long-form pronouns that are also marked for case and therefore unambiguous with respect to grammatical function and thematic role (as in examples 8c, d, g and h above). In particular, there is some evidence that the reduplication of long pronoun forms is historically the earlier attested form of object reduplication (see Asenova, 1999). If the short pronoun were a marker of case disambiguation, it would not be necessary with long pronouns.

The case disambiguation view is sometimes related to the general idea that object reduplication is a direct replacement or compensation for the loss of case systems. However, "[i]t does not seem reasonable to say that, for instance, Bulgarian or the Romance languages retain a case system by virtue of the distinctions of 'case' made in their pronominal clitic systems, especially for Macedonian where the pronominal 'clitics' are really verbal affixes" (Spencer, 2012, p. 195). In the previous chapter, I argued that despite their shared traits as argument marking strategies, case and verbal marking (i.e., agreement) should be kept distinct. So far, I have not addressed this issue in detail, but I will come back to it in the next chapter where I draw on the suggestion to give up the distinction of agreement and clitics or short pronouns altogether in an investigation of object reduplication. In my analysis, I will conclude that OR does not take up (the more relational) case-marking function (although it clearly contributes to argument marking as such, see chapter 5) but is concerned with reference tracking.

Definiteness marker hypothesis. Another hypothesis states that object reduplication serves as a definiteness marker, based on the observation that only definite referents can be reduplicated. Among others, this idea is outlined for example in Minčeva (1969) but also in the aforementioned studies by Cyxun (1962) and Georgieva (1974). However, there are two basic arguments against this view. Bulgarian and Macedonian are the only Slavic languages that have developed definite articles. It is not clear why Bulgarian should have developed

an additional definiteness marker, particularly when it is used frequently alongside the definite article. Furthermore, there are examples in which indefinite (but specific) referents receive the additional object marking. In the following example (cited from Friedman, 2008, p. 44, who took it from Guentchéva, 1994, p. 111), the object of the sentence (*a cat*) is indefinite but specific and is reduplicated with the object marker.

(14) Object reduplication with indefinite referents (Guentchéva, 1994, p. 111)

Kučeto **ja** goni **edna kotka**
dog-ART.SG.N 3SG.F.ACC chase.PRS.3SG one cat
'The dog chases a cat.'

Specificity marker hypothesis. The specificity marker hypothesis extends the previous hypothesis and states that object reduplication is used as an overt marker of specificity (rather than definiteness). Avgostina (1997) and Jaeger and Gerassimova (2002) show several examples where unspecific referents can never be doubled in contrast to the aforementioned specific example. For example, if an unspecific expression (for example, "njakoj", trans. 'any' instead of "edin", trans. 'one') is used, object reduplication is not possible. However, this observation is challenged by examples of OR with generic expressions or interrogatives for which the specificity status can at least be debated.

(15) Object reduplication with unspecific referents

a. Object reduplication with generics (Leafgren, 2002, p. 176)

Banan ne običam da **go** jam
banana NEG love.PRS-1SG to 3SG.M.ACC eat.PRS.1SG
'I don't like to eat bananas'

b. Object reduplication with interrogatives

Kogo koj **go** običa?
whom who 3SG.M.ACC love.PRS.3SG
'Who loves whom?'

Some accounts attempted at refining the specificity perspective by stating that only non-generic, unspecific referents cannot be reduplicated (Jaeger & Gerassimova, 2002). However, the function of object reduplication cannot really be explained by this account because it only specifies which types of referents can be marked but does not really state what motivates the use of this phenomenon in which situation (since clearly not all specific referents receive reduplication).

Topic marker hypothesis. The most prominent and most frequently stated account of Bulgarian object reduplication is the idea that it serves as an overt marker of topicality. This view is motivated by the typical correlation of topicality with definiteness or specificity and by the fact that these two categories alone cannot fully account for object reduplication. This idea is brought forward predominantly by Avgustinova and Andreeva (1999), Guentchéva (1994, 2008), Leafgren (1997, 2002), Rudin (1990), and subsequent research that mostly refers to these accounts. A general problem, however, is that topic or topicality is often defined in different ways, and it is arguably hard to empirically test these claims (for a broader discussion of this issue, see chapter 4).

Additionally, there are examples in which another entity is clearly topical (two topics at the same time are often ruled out in topicality theories) or the reduplicated element is focal (with focus and topic being considered mutually exclusive in some accounts). In the following example (16), a particular expression (similar to English *speaking of* or *concerning the question of*) is used that can be interpreted as setting the topic (*processing* in this example). Nevertheless, the (indirect) object of this sentence is reduplicated. (For examples of reduplication with clearly focal elements, see chapter 4.)

(16) Object reduplication alongside an alternative topic (BG-Web2012, 37136414)

ošte kato stana văpros za prepabotkata, **mu** kazah **na**
more like become.PRS.3SG question to processing-ART.SG.F 3.SG.M.DAT tell.PST.1SG of
kolegata če
colleague-ART.SG.F COMP
'Speaking of processing, I told the colleague that [...].'

Examples like these at least challenge a basic description of object reduplication as a "pure", unambiguous and generalized topic marker. Some researchers tried to overcome these limitations by stating a more refined concept of topicality or by identifying a particular function with respect to topicality. Guentchéva (1994, 2008) adopts a notion of topicality that is more related to the discourse roles of the object and the speaker's communicative intention. She still considers object reduplication as a "means for object topicalization" but argues that there is a "tendency of Bulgarian to exploit the property of CD to mark the prominence of a topical object, which in turn provides saliency to the new foregrounded information in the text" (Guentchéva, 2008, p. 217).

A similar notion of topicality was applied in the highly prominent account brought forward by Leafgren (1997, 2002) who argues that OR is used "when the [clause-level] topicality of an object seems less obvious in terms of the discourse structure" (Leafgren, 1997, p. 140). In a very similar vein, Ovcharova (2018) conducted an analysis of pre-verbal object reduplication and identifies "introducing inactive referents" as one of the core functions of (pre-verbal) object reduplication. All three accounts directly refer to a notion of (aboutness) topic associated with discourse salience and provide some more detailed analyses of the association of object reduplication with this aspect of topicality.

In my own account – mainly outlined in chapter 4 –, I directly draw on their insights but give up the notion of topicality in accounting for object reduplication (not for the interaction with order, however). Therefore, I do not further discuss these two accounts here but discuss them in detail later. All in all, my investigation takes the "topic marker hypothesis" as the point of departure for a more functional-typological and discourse-oriented examination of object reduplication under the heading of *differential object indexing*.

Other potential candidates. There are other factors that could be responsible or at least interfere with the use and function of object reduplication in Bulgarian. For instance, there is not much mention in the literature concerning animacy or agentivity features affecting object reduplication in Bulgarian (but these features are well-known to interact with OR in other languages, see Kallulli & Tasmowski, 2008b). Also, instead of topicality other dimensions that are related to information structure or discourse could be relevant here, for example givenness, accessibility, identifiability or discourse prominence. I will

discuss these in chapter 4 in more detail and investigate animacy in chapter 5, the relation of topicality and discourse prominence in chapter 6.

For now it should be clear that most of the previous accounts cannot really explain the motivation or function to use object reduplication. Definiteness or at least specificity is clearly a pre-condition for the use of this structure but seems not to be the main cause. It is possible that definiteness is merely an epiphenomenon of an underlying function associated with object reduplication. I will discuss this issue further in chapter 4. In the following, I want to give a short overview of the variety of object reduplication phenomena found in neighbouring languages.

2.2 Object reduplication in the Balkans and beyond

Object reduplication is not a phenomenon specific to Bulgarian. It is a prominent construction in Southeast European as well as many Romance languages. There is a long-standing debate to what extent object reduplication is cross-linguistically a unitary construction in formal and functional terms, i.e., if the same form is used with the same function in the different languages or if the same form exhibits different functions. In my analysis outlined in chapter 3 and 4, I aim at a more cross-linguistically oriented explanation of object reduplication that goes even beyond the classical concept of object reduplication. In order to motivate the more global analysis, I point out some of the similarities shared by object reduplication in different languages in the following section.

2.2.1 Object reduplication within the Balkan context

In areal typology, the classical Balkans region (or more contemporarily, Southeast Europe) is claimed to constitute a "linguistic league" or "Sprachbund" in which several languages[9] of distinct genealogical origin exhibit certain structural features that are typologically highly comparable (sometimes called "Balkanisms").[10]

Object reduplication was identified as a typical feature of the Balkan languages already by Miklosich (1861) and subsequently discussed by Seliščev (1918, 1925) and Sandfeld (1926, 1930) (see Asenova, 2002, p. 104-105, and Friedman, 2008, p. 38-39, for short discussions of these earlier works). Interestingly, the same phenomena were also described at the same time for Molise Slavic, a language closely related to Croatian but spoken outside the Balkans region in Southern Italy, by Rešetar (1911). Rešetar (1911, p. 233) attributes object reduplication in this South-Slavic language to the influence of the surrounding South Italian dialects.

Similarly, but with a different contact situation, object reduplication in the Balkans is most likely an "areal, contact-induced phenomenon" (Friedman, 2008, p. 37). There is a broad discussion if this phenomena can be attributed to the (earlier) influence of Vulgar Latin in the region (see for example the short discussion in Asenova, 1999, Kallulli &

[9]Typically, Albanian, Bulgarian, Greek, Macedonian and Romanian (as well as minority languages such as Aromanian and to some extent Romani) are considered to be the core members of the Balkan linguistic league, whereas Bosnian-Croatian-Serbian (BCS) and to some extent Slovenian and Hungarian can be considered peripheral members that only share some of the constituting features.

[10]For a general overview of Balkan linguistics, see the classical description by Sandfeld (1926, 1930), more recently, the famous textbook by Asenova (2002) or the handbook by Hinrichs (1999b).

Tasmowski, 2008b). For the sake of brevity, I cannot discuss diachronic aspects in detail in this dissertation.

Nowadays, object reduplication in different languages entails different degrees of grammaticalization with respect to grammatical or pragmatic features that license this structure. Importantly, as Friedman (2008) points out, the degrees of encoding correlate with a areal distribution (in the Balkans) rather than a genealogical one. For example, some of the underlying factors of the reduplication of indirect objects in Macedonian are more similar to the situation found in Albanian than in Bulgarian although Macedonian and Bulgarian are most closely related. In general terms, "object reduplication is more highly grammaticalized in the west Balkans than in the east, and the variation shown by Balkan Slavic, Balkan Romance, and Albanian points to the areality of this feature and southwestern Macedonia as the core zone" (Friedman, 2008, p. 36). In general, one should distinguish the (mostly more strict) pattern found in the standardized languages and the dialectal pattern. Above, I already discussed the main pattern of object reduplication found in Bulgarian and in Macedonian. In the following, I give a very short account of the distribution of object reduplication in the non-Slavic (larger) Balkan languages (in alphabetical order).

In Albanian, indirect objects are more or less always reduplicated, whereas in general only definite direct objects receive the additional marking. However, object reduplication with definite direct objects is sometimes optional in canonical (SVO) word order for direct objects (but not for indirect objects). The same is true with independent (full-form) personal pronouns that are more typically reduplicated in a pre-verbal position (Friedman, 2008; Hinrichs, 1999a). For further details on Albanian OR, see also Kallulli (2008, 2016). Besides the association with the roles of the indirect object and definiteness, there is some indication that object reduplication in Albanian is also associated with a topic-marking function and degrees of explicitness in terms of referential expressions.[11]

In Greek, definite direct and indirect objects can be doubled but obligatory use is restricted to the *all*-quantifier (Friedman, 2008). Long-form pronouns can also be reduplicated (Hinrichs, 1999a). Interestingly, there is some indication that indefinite referents can be reduplicated in Greek when they are either specific, topical or contrastive (Friedman, 2008). For more details on object reduplication in Greek, see Anagnostopoulou (1994),

[11]This function, that fits my analysis conducted in this dissertation, is illustrated in the following example (in shortened form) from Friedman (2008, p. 48-49), in which a referent (*Afërdita Aliu*) is first introduced with a long, descriptive (definite) NP with full name and additional specification of age and origin. In the next sentence, this referent is the patient and used with object reduplication and finally used with the short pronoun in the final part of the last sentence. The decreasing degrees of explicitness are indicated by underlining and OR by bold face in this example. Note that I slightly changed the glossing.

(i) Object reduplication in Albanian (Friedman, 2008, p. 48-49)
Pretext: 'In the center of town, two unknown persons who were speaking Serbian attacked and attempted to kidnap the student Afërdita Aliu (1973) from Old Kaçanik [...]'
Një-r-i nga persona-t e panjohur **e** paska sulmuar ***Afërditë-n*** dhe
one-DEF from persons-DEF PTC.PL unknown 3F.SG.ACC have.ADM attack.PTCP Aferdite-DEF.ACC and
e paska kërcënuar me revole edhe më 17 janar
3F.SG.ACC have.ADM threaten.PTCP with revolver and on 17 january
'One of the unkown persons had attacked Afërdita and threatened her with a revolver also on 17 January.'

Philippaki-Warburton et al. (2004).

Romanian constitutes a particular case among the Balkan languages because in this Romance language the occurrence of object reduplication highly interacts with an adpositional DOM marker (or "flag", see next chapter). OR can be found with pre-verbal objects and some particular contexts without DOM (Hinrichs, 1999a) but in most cases it is determined by the interaction with the DOM marker. This is a particular case because DOM in Romanian depends widely on animacy in interaction with definiteness and object reduplication is thereby (secondarily) affected by animacy as well – in contrast to the other Balkan languages that typically allow for reduplication of animate and inanimate referents. For instance Hill and Mardale (2019, p. 2) explain that "object clitics and the object marking particle [= DOM marker] can alternately or jointly trigger the same effect (i.e., some form of topic reading for a specific noun in object position)" in Romanian. I cannot discuss this further but I discuss DOM and OR from a general perspective in more detail in the following chapter. For more details on object reduplication in Romanian, see Dobrovie-Sorin (1990), Hill and Mardale (2019) and for DOM in Romanian, see Chiriacescu and von Heusinger (2010).

There are clearly some commonalities in the patterns of object reduplication found in the Balkans context but there are also some clear differences (in terms of scope and generalization of using this structure). I cannot discuss the underlying diachronic factors or the detailed synchronic associations in each language in more detail. In my analysis, I aim at a functional explanation of (P) object reduplication in Bulgarian that draws on general functional-typological investigations of person markers (i.e., *indexes*, see next chapter) and their role in discourse. Future research has to show to what extent this analysis can be applied to the other languages as well. Importantly, object reduplication is clearly not limited to the Balkan languages but is also prominent in Romance languages. In my account, I will argue that object reduplication is actually a sub-type of object indexing or object agreement that can be found throughout the world (for typological details, see next chapter). However, for now, I stick to the more classical view treating object reduplication as a typical feature of the Balkans, Romance and few other languages.

2.2.2 Object reduplication beyond the Balkans

In addition to the Balkans, object reduplication is a particularly prominent feature of the Romance languages, analysed in detail for Spanish. Spanish object reduplication is definitely the most widely studied phenomenon of this kind, particularly in the generative framework. However, not unlike the situation found in the Balkans, object reduplication is highly variable in the varieties of Spanish, with a strong difference between Spain and Latin America. In the general (standard) pattern, object reduplication is used with pre-verbal (direct or indirect) objects. For indirect objects, it is generally more frequent with human or animate referents (in combination with the mainly animacy-driven differential object marker *a*) (Batchelor & San José, 2010). In general, it is often stated that "dative doubling is much less restricted than accusative doubling" (Belloro, 2015, p. 8) giving rise to a wider spread and more frequent occurrence of doubling indirect objects.

In contrast, direct objects are only generally reduplicated when they appear as full pronouns (and to some extent with the *all*-quantifier). In contrast to this stronger restriction, Argentine Spanish for instance allows for direct object reduplication in more contexts

(Belloro, 2007, 2015). I do not discuss the broad picture found for Spanish here because this is beyond the scope of this investigation. Interestingly, based on a recent analysis of a (mainly Peninsular Spanish) corpus, García-Miguel (2015, p. 250) states that "clitic doubling is more dependent on information status (topicality and accessibility)" and notes the similarities of his analysis for Peninsular Spanish to the investigation of Argentinian Spanish by Belloro (2007, 2015). Spanish is not the topic of this dissertation but these recent studies clearly are comparable to my own analysis of Bulgarian, despite some differences in the superficial pattern of object reduplication in both languages.

In a more recent diachronic study, Melis (2018) calls object reduplication in Spanish "indexing DOM" (similar to the suggestion to call it DOI by Iemmolo, 2011, that I follow in my analysis) and suggests "that the emergence of indexing DOM in Spanish appears to have involved a notion of topicality, but not one in which animacy was the relevant feature, in contrast to *a*" (Melis, 2018, p. 100). I will not discuss this in more detail here (but see also Gabriel, 2010, for a similar analysis) but in chapter 4 it will become visible that this account is more in line with the analysis that I conduct here with respect to Bulgarian.

It is sometimes suggested that Semitic languages are another language family that exhibits object reduplication to larger extents. However, when including Semitic languages in this consideration the boundary to object agreement as a more widely used linguistic pattern is clearly crossed (as noted by Anagnostopoulou, 2017, as well; see also the classical discussion of "grammatical" vs. "anaphoric" agreement in Bantu by Bresnan & McHombo, 1987).

In the next chapter, I will take up recent accounts that widely challenge the perspective to distinguish object reduplication from object agreement. Also, in the short sketch of generative accounts below, I present some studies that already suggested a unitary treatment of reduplication and agreement. Also, as was implied already, object reduplication is an instance of differential object marking (as noted by Melis, 2018). I also elaborate on this idea further in the next chapter. However, also generative accounts already made this suggestion before (see below).

2.2.3 One form, different functions?

So far, I have provided an overview of object reduplication in Bulgarian and pointed out some features of this phenomenon in Balkan and Romance languages. As is clear from this description, object reduplication is a linguistic encoding strategy with a huge variation between and within the languages that exhibit these forms. Within the Balkan languages but also for example within Spanish, there is a large dialectal difference concerning the use of these forms. Many languages also have more restrictive norms in terms of the standard language in comparison to the colloquial style. Most likely, this also translates to different usages and frequencies in different registers, genres, and text types. There is probably also a correlation with modality in terms of spoken or written language (although the boundaries are blurring with the increasing digitalization and, nowadays, the forms can be found more frequently in web-based corpora). In my evaluation of object reduplication, I acknowledge the variety associated with this phenomenon but follow the idea stated by Leafgren (2002, p. 111) that irrespective of the variation "there is a consistent structural constraint applied when reduplication is in fact employed".

Most of the accounts outlined above investigated object reduplication in the different

languages within these individual languages. Therefore, they focussed on more or less language-particular functions of object reduplication in the different languages (but, of course, jointly assume a shared, contact-induced historical motivation in developing this strategy). At some points, I mentioned some studies from different languages that pointed in the same direction when it comes to identifying a more general, underlying motivation for this structure (typically, in terms of information structure or discourse). Additionally, most of these studies consider object reduplication as a phenomenon *sui generis*. From an areal-typological perspective, this view makes sense when it is about investigating the general patterns, structural similarities, and joint diachronic motivations of these structures in languages that are located in close proximity and that are known to have been engaged in a tight contact situation in the past.

In my own analysis, however, I try to address object reduplication in Bulgarian from another perspective, namely by thinking about this structure from a more global typological perspective because I am convinced that such an approach can shed additional light on the function associated with reduplication. Before I finally start with my own analysis, I sketch out the main approaches to object reduplication from a generative perspective. As I have said before, generative grammar accounts have been highly productive in investigating clitic doubling phenomena. Clitic doubling accounts attempt to identify highly detailed formal descriptions of this structure. Thereby, they uncovered a number of structural or formal differences between what was previously treated as one construction class. In particular, some of the structures that are very similar at the superficial layer turned out to exhibit different syntactic behaviours and – even more relevant for my discussion – exhibit different functions in the respective linguistic system.

2.3 Generative accounts of clitic doubling

2.3.1 The concept of clitic doubling

Clitics in the languages discussed so far are actually a peculiar case for syntactic theories. On the one hand, they typically have some form of nominal inflectional morphology (e.g., case and gender), on the other hand they show a clear resemblance with affixal or agreement elements (e.g., rigid order, constraints imposed by the verbal host; see Belloro, 2007 for a broader discussion of nominal and affixal aspects of clitics). Therefore, the syntactic representation of these elements is highly debated, especially in the context of clitic doubling.

In the following, I only provide a very general and rough description of clitic doubling research in the generative framework. I am not concerned with the syntactic representation or modelling of object reduplication in my analysis and only provide a glimpse into the generative research here.[12]

Similarly to the general definition of object reduplication, clitic doubling can be defined as "a construction in which a clitic co-occurs with a full DP in argument position form-

[12]For a further introduction to these accounts, I refer the reader to Anagnostopoulou (2017) for a general overview of clitic doubling research, Kallulli and Tasmowski (2008b) for an introduction to clitic doubling research in the Balkans and the other articles in the same volume (Kallulli & Tasmowski, 2008a) as well as Franks and Rudin (2005, 2006), Harizanov (2014), Krapova and Cinque (2008), Radeva-Bork (2010) for some generative accounts of clitic doubling in Bulgarian.

ing a discontinuous constituent with it" (Anagnostopoulou, 2017, p. 520). Kallulli and Tasmowski (2008b, p. 1) further specify that "clitic doubling involves the doubling (or 'reduplication') of a verbal argument (henceforth: the associate) inside the same propositional structure". In terms of generative grammar, the associate can either be a full pronoun or a non-pronominal referring expression (both carrying the same phi-features and case features like the clitic) or a complementizer phrases (with singular neuter accusative clitics) (Kallulli & Tasmowski, 2008b).

At the superficial level, clitic doubling is the same as object reduplication and I do not provide new examples here (note, however, that I will present some accounts below subdividing object reduplication into distinct types of clitic doubling and clitic dislocation). Clitic doubling is primarily argued to be a feature of Romance, Balkan and – sometimes mentioned – Semitic languages indicating that it is typically considered distinct from object agreement in other languages.

The investigation of clitic doubling has always been related to the general investigation of clitics in a generative framework. An important issue in these frameworks is "the question of whether clitics move to their surface position from an argument position or whether they are base-generated in their surface position, functioning as agreement markers of sorts" (Anagnostopoulou, 2017, p. 520-521).

Different accounts evolved throughout time either supporting the one or the other perspective. Also, there is a constant change associated with the progression of generative main theories (mirroring the gradual shift from the "Government and Binding (GB)" framework to the more recent "Minimalist Program (MP)" framework. In the following, I shortly illustrate the main accounts on clitic doubling that reflect this historical shift (see Anagnostopoulou, 2017, for details).

2.3.2 Different accounts of clitic doubling

Movement hypothesis. According to Anagnostopoulou (2017), the main discussion in early GB resolved around the issue if clitics (in general) are base-generated or moved to their respective position. The early movement hypothesis (Kayne, 1975, 1989) of clitics and cliticization is actually not capturing clitic doubling. In simple words, these accounts argued that clitics are generated in their canonical position (i.e., the position of their respective verbal argument) and then are subsequently moved to another position. This basic idea is illustrated in example 17a (*t* indicating the locus of generation). The impossibility of co-occurrence of the clitic and the object (in French, see 17b) is taken as evidence for this diagnostics.

(17) Illustration of clitic movement

a. Object pronoun in French (Anagnostopoulou, 2017, p. 530)

Je le_i vois t_i
1SG 3SG.M.ACC see.PRS.1SG
'I see him.'

b. Ungrammatical doubling in French

*Je le_i vois $Jean_i$
1SG 3SG.M.ACC see.PRS.1SG John

c. Grammatical doubling in Rioplatense Spanish (Jaeggli, 1986, p. 32)

Lo$_i$ vimos a *Juan*$_i$
3SG.M.ACC see.PRS.1PL John
'We saw John.'

The "discovery" of clitic doubling in some dialects of Spanish (example 17c) challenged this perspective because "Kayne's major argument for a movement approach to cliticization, namely the complementarity between clitics and full NPs" (Anagnostopoulou, 2017, p. 631) is violated by the double occurrence of the short pronoun and a long pronoun or full NP. One possible attempt to resolve this analysis with clitic doubling is the claim that this is an instance of dislocation (where a co-nominal or associate is also allowed in French). However, dislocation and doubling are typically distinguished (see below).

The following three (broad) accounts directly attempt to capture clitic doubling in a syntactic framework. See figure 1 for an illustration of the syntactic representation of the three accounts (with the syntactic trees taken from Anagnostopoulou, 2017).

Base-generation hypothesis. In the base-generation account (e.g., Borer, 1984, Jaeggli, 1982, 1986, Rivas, 1977, Strozer, 1976) it is argued that clitics are generated as affixal or inflectional elements attached to its verbal host (in the surface position), constitute a part of the (verbal) head and that they basically absorb the case feature of the head. As was pointed out above, the existence of clitic doubling in some languages is taken as evidence for a base-generation account of clitics in general. This account raised some questions concerning the relation of the associate and the clitic in terms of thematic role and case and – most importantly – which parameter (in the sense of "Principles & Parameters") triggers the use of clitic doubling in the respective languages (in contrast to other languages with clitics but without clitic doubling).

One prominent parameter discussed in the Romance languages became known as *Kayne's generalization* that states that "an object NP may be doubled only if it is preceded by a special preposition" (Anagnostopoulou, 2017, p. 534). The parameters discussed are the aforementioned (animacy-related) *a*-marker for Spanish and the *pe*-marker for Romanian (but also the object marker *šel* in Hebrew). Despite the fact that these DOM markers interact frequently with CD (especially in Romanian) it is not true that clitic doubling only occurs when the marker is present (particularly for direct objects). There are clear examples of CD for these languages without the DOM marker and none of the other Balkan languages has CD dependent on a prepositional case marker (Kallulli & Tasmowski, 2008b). Even more, in Bulgarian, CD is sometimes used as compensation when the dative-marking *na*-marker is not used, see Vakareliyska (1994, 2002).

This issue opened a wider discussion concerning the underlying parameter(s) for clitic doubling and the idea that semantic features (animacy, specificity, definiteness, familiarity etc.) are conditioning clitic doubling rather than an overt instantiation of another marker (Anagnostopoulou, 2017). Although this perspective was initially still associated with the base-generation account, this shift in focus also inspired alternative suggestions how to capture clitic doubling in terms of the syntactic representation. Also, the focus on interpretational effects of clitic doubling enabled subsequent research uncovering similarities of CD to other constructions, such as scrambling, participle agreement, or case (Anagnostopoulou, 2017). Particularly influential is the idea that clitic doubling and scrambling

correspond to each other in terms of syntax (Anagnostopoulou, 1994; Sportiche, 1996) as I will describe below. More profound analytical tools of the late GB and early MP allowed for a reconciliation of base-generation and movement accounts as included in the following two accounts (see Anagnostopoulou, 2017, for more details).

Determiner head hypothesis. In the determiner head hypothesis, brought forward by Torrego (1995), Uriagereka (1995), and related studies, it is argued that clitics are basically determiners, i.e., heads of a determiner phrase (DP) (the extended projection of N) that can undergo movement to their surface position. The doubled NP (i.e., the associate) is thereby located in the specifier position of the DP. With respect to the presence or absence of clitic doubling, "Uriagereka argues that in some languages, determiners are strong enough to head such complex DPs and in others not: this determines availability of clitic doubling" (Anagnostopoulou, 2017, p. 523).

The idea that clitics are types of determiners is also supported by the historical evidence that clitics in Romance languages typically derive from demonstratives (i.e., determiners). However, this account can explain the position or movement of clitics only with additional assumptions. Also, the diachronic association of clitics and demonstratives does not necessarily hold in all languages with clitic doubling.

Inspired by this account, Franks and Rudin (2005, 2006) postulate a K(ase) phrase for Slavic languages that can include a DP as specifier and a clitic as the head K. In this account, clitic doubling is the case when "K has an overt DP complement. Obligatory CD is accounted for by movement of the associate: when DP moves through SpecKP, this triggers Spec-head agreement, instantiated as an overt clitic pronoun (Franks & Rudin, 2006, p. 8). Therefore, clitic doubling is primarily seens as a agreement relation caused by the behaviour of the associate. For a more detailed summary of this account and a discussion of previous accounts, see Radeva-Bork (2012).

Clitic voice hypothesis. Another line of studies brought forward the idea that clitics are basically functional heads heading their own projection ("clitic voice") in the domain of the IP (i.e., the extended projection of V) (Sportiche, 1996). In other words, the determiner head hypothesis treats clitics as part of the nominal system, whereas the clitic voice perspective locates them in the verbal-inflectional domain. In more detail, overt or covert XP* projections are argued to move to XP^ and there is a specifier-head relation between the clitic and the XP*. Movement is triggered by a particular feature *f* in this account (Sportiche, 1996).

An advantage of this account is that it can be used to account for different construction types as instances of XP movement. Undoubled clitics (as in French) are described as having a covert XP* realization but an overt clitic that is realized by overtly or covertly moving the XP. In contrast, clitic doubling is characterized by both an overt XP* and an overt clitic that is covertly moved. Interestingly, this account also captures scrambling phenomena in German and Dutch but I cannot discuss this issue further (see Sportiche, 1996, for the initial suggestion and Alexiadou & Anagnostopoulou, 1997, for a discussion and refinement of this approach). A disadvantage of this account is the fact that another additional functional category is needed.

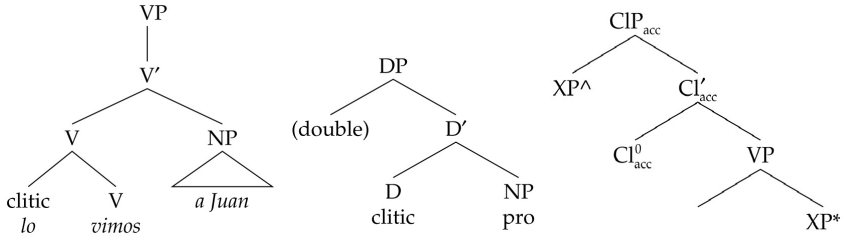
This account is also adapted for Bulgarian. It is argued that clitics are heads of a clitic projection in the left periphery (i.e., they are base-generated relatively high) by Dimitrova-Vulchanova and Giusti (1998). This is in difference to Sportiche (1996)'s account who

assumes a relatively lower locus of generation (see Dimitrova-Vulchanova & Vulchanov, 2008, for a more detailed discussion of differences and similarities of the two accounts). With respect to interpretational features, Dimitrova-Vulchanova and Vulchanov (2008, p. 118) assume "that argument clitics adjoin to the head of a high functional projection ... immediately below C^0 which hosts an Information structure feature" and "for the cases of doubling, we assume that it is the doubled XP that raises to SpecFP, again for Information structure reasons" (Dimitrova-Vulchanova & Vulchanov, 2008, p. 119). These accounts basically combined base-generation (specified at different layers, however) and feature-based movement. Importantly, short pronoun objects (without doubling) are argued to be motivated by discourse factors in the account, clitic doubling is argued to be driven by information structure.

Figure 1

Different syntactic representations of clitic doubling (Anagnostopoulou, 2017)

(a) Base-generation *(b) Determiner-head* *(c) Clitic voice*



Other accounts. Importantly, most of the accounts outlined above implicitly treated clitic doubling as a uniform construction. In contrast, "there is a current trend for fragmentation: clitics are argued to have a different syntax across languages and constructions" (Anagnostopoulou, 2017, p. 523).

Some accounts even distinguish different forms of clitic doubling (with different syntactic representations) in the same language. For instance, Bleam (1999) describes indirect object clitics as agreement markers in the same way like inflectional endings (i.e., part of the verbal domain), whereas she endorses the perspective that accusative clitics are determiners.

In contrast to the other accounts mentioned for Bulgarian, Harizanov (2014) rejects the association of clitic doubling with agreement and rather attempts at a (minimalist) description of it in terms of A-movement of pronominal elements. Harizanov (2014, p. 1079) argues that "movement creates two occurrences of object and it is left to the morphophonological component to determine their pronunciation" and that "clitic doubling is an interface phenomenon which emerges as the result of the interaction between A-movement and a certain kind head of complex head formation, two independently motivated mechanisms of the syntactic and morphophonological components of grammar".

In addition, there are also syntactic accounts of clitic doubling within other schools or tradition. For example, Spanish doubling is captured in a *Roles and references (RRG)* framework by Belloro (2007, 2015), and Bulgarian clitic doubling is described in a *Lexical-Functional framework (LFG)* by Jaeger (2003, 2004), Jaeger and Gerassimova (2002). For a

Head-driven Phrase Structure Grammar (HPSG) description of Bulgarian clitics and word order in Bulgarian, see Avgostina (1997).

2.4 Clitic doubling and related constructions

2.4.1 Clitic doubling and clitic dislocation

It was often stated that there is a certain similarity of clitic doubling and (clitic) dislocation phenomena. The difference between the two, especially with respect to their syntactic behaviour, plays a prominent role in generative research. At the core is the question "whether CLLD results from fronting of a clitic doubled DP to a position in the left periphery of the clause" (Anagnostopoulou, 2017, p. 524).

In general, dislocation and doubling are typically distinguished based on prosody. In doubling constructions, there is typically no intonational break between the associate and the co-referring prononominal element. Besides that, both are often claimed to exhibit different syntactic behaviours and to be influenced by different information structural processes (Anagnostopoulou, 2017; Martínez-Ferreiro et al., 2017).

Based on the general idea that there is a prosodic break (or a comma indicating such a break), the following example would constitute an instance of dislocation in Bulgarian and not an instance of clitic doubling or object reduplication.

(18) Dislocation in Bulgarian (BG-Web2012, 113658763)

Strahotni filmčeta, mnogo gi običam!
terrific-PL movie-DIM-ART.PL much 3PL.ACC love.PRS.1SG
'Terrific movies, I love them very much.'

However, for dislocation it is argued that "CLLD is seen to represent a distinct construction type, different from 'true' CD. Other constructions such as Clitic Right Dislocation (CLRD), Hanging Topic and Focus Movement have been introduced to describe construction types that share some properties with CLLD and CD but yet represent different constructions" (Radeva-Bork, 2010, p. 90).

In a similar vein, a more general classification was suggested. In some accounts, clitic dislocation is equated with dislocation in other languges, with the difference that a clitic serves as the resumptive pronoun. However, there are also suggestions to distinguish clitic dislocation from what would be traditionally described as dislocation.

López (2016) distinguishes H-type and D-type dislocation based on the structural attachment of the dislocated element to the clause. Clitic dislocation is considered to be an instance of D-type dislocation because it exhibits a closer connection in terms of syntactic dependency between the dislocated element and the clitic (shown via island and reconstruction effects). Sometimes the resumptive element in H-type dislocation is considered to by a empty category whereas D-type dislocation is constituted of a full copy of the dislocated element.

The aforementioned examples of pre-verbal OR would be interpreted as CLLD. In contrast, in cases where the dislocated element and the clitic are only loosely connected (but do not agree in terms of case) this would be an instance of H-type dislocation. This contrast is illustrated in the following two examples.

(19) Types of dislocation in Bulgarian (Laskova, 2013, p. 71)

a. (D-type) CLLD

Na mene mi se struva, če...
to 1SG.DAT 1SG.DAT REFL seem.PRS.3SG that
'To me, it appears that...'

b. (H-type) HTLD

Az mi se struva, če ...
1SG.NOM 1SG.DAT REFL seem.PRS.3SG that
'Well, I, to me it appears that...'

In general, CLLD typically shows island sensitivity and connectivity effects in contrast to HTLD (Anagnostopoulou, 2017, see Krapova & Cinque, 2008, for Bulgarian CLLD). For a detailed account distinguishing the aforementioned sub-types of dislocations contrasted with clitic doubling, see Krapova and Cinque (2008). In their account, "clitic reduplication" is used as a cover term for doubling and dislocation structures and they discuss different factors primarily motivating either use. Also, sometimes, syntactic differences of CLLD and CLRD are discussed (e.g., Krapova, 2002, Krapova & Cinque, 2006, 2008, for Bulgarian) but I will not discuss this in more detail.

The distinction of CD and CLLD is discussed by Anagnostopoulou (1994, 2017). She considers clitic doubling a type of nominal agreement morpheme on the verb with a doubled DP in complement position of the verb and a chain for case checking between the clitic and the DP. In contrast, CLLD is considered a topic marker with a full DP generate in the IP adjunct and an operator-variable chain expressing the topichood (Anagnostopoulou, 1994, 2017). The presence of the clitic is argued to be obligatory in true CLLD (in contrast to CD). Traditionally, it was agued that CLLD is not sensitive to Kayne's generalization (but as was said before, this is also the case for some instances of CD). Also, as was said before, in some languages (esp. in the Balkans) CD is also not subject to Kayne's generalization. CLLD is argued to be present also in many languages without CD (e.g., Italian). However, this does not really hold when considering South Italian dialects that also exhibit CD. Therefore, none of these "tests" is fully valid to keep CLLD and CD apart.

Even more complicated is the distinction of CLRD and CD because they virtually look alike in most cases (except when there is a clearly expressed prosodic boundary). It is widely debated if the two constitute distinct categories in their own right or if they are basically the same. Anagnostopoulou (2017) distinguishes them based on the intonational argument, the subjectivity to Kayne's generalization and the claim that some languages exhibit only CLRD – with the same problems being encountered as for CLLD. Krapova and Cinque (2008) distinguish CLRD and CD based on the predicate involved and some order-related tests. Nevertheless, what they keep distinguished would clearly be described as unitary clitic doubling or object reduplication in most accounts and does not really provide a reliable way to structurally distinguish the two.

Interestingly, none of the arguments directly supports a clear-cut boundary between clitic doubling and clitic dislocation (except for the prosodic break argument). Apparently it is easier to distinguish different types of dislocation on syntactic grounds than clearly distinguishing CD and clitic/ D-type dislocation. Intriguingly, potential differences in the

functional components and with respect to interpretative effects do not seem to have played a prominent role for this issue although they might prove to be a better way to distinguish dislocation structures from reduplication.[13]

With respect to the investigation of object reduplication in Bulgarian it seems that the terms *CD*, *CLRD* and *CLLD* are often only used in a descriptive sense. Functions are sometimes associated with either of them but the differences in syntactic terms are not emphasized to be of large relevance in terms of interpretative effects. With respect to the functional association of CLLD and CD in Bulgarian, Guentchéva (1994) associates both constructions with slightly different degrees of object topicality. However, the difference between CD and CLLD is often neglected in object reduplication research in the Balkan linguistics context and both are treated as belonging to one and the same group of reduplication phenomena. Instead, what would be described as CLLD is still considered an instance of CD with order alternations:

> The label 'clitic left dislocation' might be adequate for languages in which the occurrence of the clitic is contingent on the occurrence of the topic in the Left Periphery, but it is not for languages, such as Macedonian, where clitic doubling is not contingent on the position of the object in the clause. (Tomić, 2008a, p. 66-67)

For Bulgarian this makes sense as well because clitic doubling can be used with different word orders and not only a left-peripheral or right-peripheral position. In my analysis, I will argue that object reduplication or clitic doubling fulfils a function that is distinct from the order alternation. Therefore, in my account moving an object to the pre-verbal position can be accompanied by clitic doubling (or not) but this does not constitute a specific construction *sui generis* according to my analysis but rather a combination or interaction of two encoding strategies. In order to avoid misinterpretations based on terminology, I stick to the somewhat more neutral terms *preverbal* and *postverbal* DOI. Nevertheless, I will come back to dislocation at several points in my investigation and discuss some of the similarities of dislocation and reduplication.

2.4.2 Clitic doubling and object agreement

Another issue that plays a central role is the question as to what extent clitic doubling is a construction *sui generis*, a case-related phenomenon or a type of agreement similar to other syntactic agreement phenomena. In my account, clitic doubling is indeed a type of agreement, also in the generative sense. In one of the base-generation accounts it was stated that "[c]oncerning the nature of clitics, Borer proposed that they are parts of the heads to which they attach, in particular they are inflectional elements spelling out (and absorbing) the Case features of the heads. In this sense, Borer was the first to suggest that clitics are (special kinds of) agreement markers" (Anagnostopoulou, 2017, p. 538). Similarly, Bleam

[13]Note that there are some generative accounts postulating a number of different (information-structure related) projections within and above the left periphery that I cannot discuss here (see for instance, Cinque, 1997, Rizzi, 1997). These accounts at least offer a way to capture different interpretative associations of dislocation and doubling in a formal way. However, these *cartographic* approaches are rather dispreferred from the perspective of the current minimalist program because they do not capture information structural processes (and clitic doubling) in an elegant way.

(1999) explicitly describes indirect object clitics as agreement markers in the same way like inflectional endings whereas she endorses the perspective that accusative clitics are determiners.

Primarily based on Albanian and Greek data, Kallulli (2016, p. 166) argues that "clitic doubling is always agreement with a topic (object) DP" and an instance of differential object marking. Interestingly, this discussion also plays a role in LFG theories and I will discuss this issue further in chapter 3 with respect to the DOM account brought forward by Dalrymple and Nikolaeva (2011).

Also, with respect to Bulgarian, the idea was adopted that object clitics are "cross-reference markers" of the object in the same way as verbal inflection is a "cross-reference marker" of subjects, relating object clitics with agreement (see Stanchev, 2010, on this issue). Nevertheless, Stanchev (2010) assumes that pragmatically they serve as object-topicalization markers. Note, however, that there are also attempts to explain clitic doubling without reference to agreement (see above, for instance, Harizanov, 2014). In the following chapter, I will discuss in more detail the association of agreement and object reduplication by adopting the concept of *index* (Haspelmath, 2013).

2.5 Chapter conclusion

2.5.1 Different forms, different functions?

The short overview of formal approaches to clitic doubling illustrated different attempts to capture the syntactic representation of clitic doubling and their (formal) distinction from dislocation phenomena. More broadly, clitic doubling research suggests that there are potentially different features triggering clitic doubling in different languages. This last aspect is central to the understanding of object reduplication but sometimes investigated in less detail in syntactic accounts. Kallulli and Tasmowski (2008b, p. 10) emphasize the importance but challenges with the underlying feature:

> One of the most perplexing aspects of clitic doubling is the fact that across languages, doubling clitics affect interpretation in ways subject to various idiosyncratic constraints that make it very hard, if not altogether impossible, to define their function in a unitary manner. To illustrate, early generative (and non-generative) studies described clitic doubling as sensitive to the feature humanness in Rumanian and animacy in Spanish (Borer, 1984; Dobrovie-Sorin, 1990; Jaeggli, 1986), a view that was already untenable for particular varieties of Romance ... and also for the languages of the Balkan Sprachbund at large. With the latter coming into the focus of research on the topic, other semantic properties such as prominence, specificity, presuppositionality, familiarity, definiteness and topicality have increasingly been scrutinized as to their relevance for the phenomenon of clitic doubling.

With respect to Bulgarian, Guentchéva (2008, p. 216) stresses with respect to the studies described under the topicality perspective in the previous section that "[a]lthough current analyses clearly converge on the claim that CD of fronted objects has a topic-marking function ... and that topicality is a determining factor in CD phenomena, there have been very few studies devoted to the relationship with information structure".

Similarly, in another (generatively oriented) study it is emphasized that "conditions, such as predicate choice are relevant but not sufficient factors for the occurrence of CD, and that the interaction of clitic doubling with constituent order and information structure needs to be highlighted" (Radeva-Bork, 2012, p. 165).

Radeva-Bork addresses this issue from the perspective of acquisition. She shows that Bulgarian clitics bear some object agreement properties in terms of diachronic, developmental and syntactic behaviour and argues that clitic doubling in Bulgarian can be motivated by three different mechanisms. In her analysis, clitic doubling is either motivated by word order alternations, topicality or in the particular context with specific psych verbs (see above).

In my investigation, I am neither concerned with acquisition nor with the exact syntactic representation of object reduplication. Also I exclude psych verbs, indirect objects and long pronouns from my analysis. Rather, but in line with the research orientation on order and information structure outlined by Radeva-Bork (2012), I want to take a closer look at the functional representation and interaction of DOI and try to determine if word order and DOI interact.

Moreover, I will provide some empirical evidence that the first two types of Bulgarian object indexing discussed in this chapter are actually related by showing that it is order that makes an information structural contribution in the sense of topic, whereas DOI is concerned with a slightly different function (both in pre- and post-verbal DOI).

It was already suggested in non-generative research presented in the first part of this chapter, that it is not topicality *per se* that is responsible for licensing object reduplication but some more specific function. Similarly, despite the frequent association of the functional feature being topicality in Bulgarian, also some formally oriented accounts express some intuition that suggest an underlying mechanism of object reduplication in Bulgarian related to a more particular discourse function.

For instance, Petkova Schick (2000, p. 474) states that "[a] more elaborate analysis, however, points to one very essential property of the anaphorical clitic pronouns in Bulgarian: relating to the referential properties of DPs, they signal in a consistent way that a new interpretational perspective is introduced in which the referentially specific doubled object phrase is presupposed in the discourse to be a given entity".

These suggestions inspire the perspective that I take in this dissertation. I shortly motivate this shift from a slightly broader perspective in the final section of this chapter.

2.5.2 Different forms, one function?

In a highly oversimplified way, I summarized classical Balkan linguistics approaches as capturing object reduplication more or less with the perspective of treating it as "one form with different functions". Object reduplication as such is treated as one construction type, irrespective of order alternations or other intervening factors (e.g., DOM markers or case).

In contrast, generative research clearly identified different sub-types of doubling and dislocation constructions that can be kept apart at least on syntactic grounds. In a way, these accounts emphasize that "different (sub-) forms" can exhibit "different functions" and seek the underlying justification in syntax (however, acknowledging the influence of other levels, including information structure).

I definitely did injustice to the richness and variety of different object reduplication and clitic doubling approaches by only providing a very rough overview of them. Both accounts provide many insights into the large variation of forms, functions, and behaviours associated with object reduplication phenomena in different languages. However, Balkan linguistic accounts of object reduplication do not clearly motivate how the functional association with information structure comes into being in such constructions. Generative research, on the other side, accounts for the formal association but does not specify the functional component in detail and does not really look at the interaction with non-syntactic levels.

In this dissertation, I investigate object reduplication in Bulgarian from a more functional-typologically oriented as well as a psycholinguistic perspective in order to shed more light on the functional component. The relevance of focussing on this issue is also emphasized by Franck (2018, p. 14) who states that

> [p]sycholinguists interested in syntactic encoding face two major questions. Firstly, how can we characterize the syntactic representations underlying the sentences that speakers build? ... Secondly, how can we characterize the processes that deal with these representations? This question relates to the identification of the functional components involved in syntactic encoding, and the relationships between them, that is, relations between lexical and syntactic processes, and between syntactic and nonsyntactic levels of representation.

Therefore, a psycholinguistic investigation of object reduplication requires more cognitively oriented accounts of representation that capture the functional components more closely and that allow for a more systematic operationalization in order to investigate processing. Object reduplication is a particularly interesting candidate for such an endeavour because it clearly goes beyond a purely syntactic perspective due to its association with other linguistic levels, particularly information structure and discourse.

In addition, clitic doubling bears some clear resemblance to (or, as I will argue, is an instance of) object agreement (or object indexing) that is directly associated with discourse functions. This association is also evaluated in some more formally oriented accounts with reference to the notion of *d-linking* (Pesetsky, 1989), for example, as summarized by Martínez-Ferreiro et al. (2017, p. 460) who state that

> [m]ost of the elements required to produce or comprehend linguistic output are fully processed within the sentence boundaries. However, a certain subset of elements requires crossing this boundary in order to be fully interpreted, since they need to be linked to their referent/s. These elements, which include (among others) tense, clitic pronouns and certain types of wh-words, are referred to as 'discourse linked'.

For object reduplication in the Balkans it has often been stated that different levels of topicality play a role in accounting for the function and that these different types or degrees of topicality correspond "to the degree to which the referent of an expression is supposed to actually be activated in the hearer's mind" (Kallulli & Tasmowski, 2008b, p. 13). In the following chapter, I will argue that the intuition expressed in the association with *d*-linking

and degrees of topicality can be better accounted for by a more recent concept of *discourse prominence* (von Heusinger & Schumacher, 2019).

However, I do not postulate discourse prominence as just another potential feature underlying object reduplication but rather want to develop this perspective by taking a closer look at the ingredients involved in object reduplication. Importantly, I believe that the association with discourse that is indicated by many previous accounts is not secondarily acquired or attributed to a construction type "object reduplication" but rather that it directly derives from the usage of a short pronoun form as part of this structure. In addition, I believe that the differential usage of object reduplication also reflects a functional component that is not by chance but directly related to the interplay of discourse roles, objecthood, and the short pronoun form.

I will outline this idea in more detail in the following chapter. I will start my argumentation with highlighting the similarities of object reduplication and subject agreement and particularly their joint association with different referential expressions that are used to encode different degrees of explicitness based on the activation of a referent in discourse. I will then draw on a recent typological account (Haspelmath, 2013, 2019) treating agreement markers and short pronouns alike as person forms associated with discourse. Then, I discuss DOM research in some more detail, focussing particularly on recent accounts of the notion of *differential object indexing* (Iemmolo, 2011; Schikowski & Iemmolo, 2015).

After having established the perspective that object reduplication in Bulgarian is a type of differential object indexing, I will ultimately discuss the reasons why DOI is more directly related to the discourse prominence of referents (in the sense of Himmelmann & Primus, 2015 and von Heusinger & Schumacher, 2019) rather than being a topic marker as previously suggested. I will also focus on the association of pre-verbal and post-verbal DOI and the contribution of order as a topic-marker in the former case. In the remainder of the book, I will provide empirical evidence that support my analysis.

In a way, one could say that I try to associate "different forms with different functions", but I address the question of forms and function from different perspectives than many of the previous accounts. I do not look at object reduplication as one form as such but rather highlight the contribution of the sub-components (indexing, differential marking, interaction with order). I do not state a function in terms of clearly circumscribed grammatical categories (e.g., definiteness) but rather seek the function at a more abstract level, namely with respect to the influence of discourse prominence (reflected in the use of indexing) and predictability (reflected in the differential encoding). To some extent, this provides a new perspective on object reduplication. Nevertheless, many of the ideas are implicitly or explicitly present in some of the previous accounts as mentioned above.

3 The concept of differential object indexing

In the previous chapter, I gave a broad overview of object reduplication phenomena in Bulgarian and beyond. I mainly focussed on the form and variety of these constructions and provided an initial overview of the acclaimed functions. Additionally, I presented a rough description of different generative accounts – capturing the phenomena under discussion with the concept of *clitic doubling*. Analyses of this kind provided many insights into the syntactic and structural nature of this encoding strategy. In most accounts, the whole structure was seen as a construction *sui generis* and less focus was placed on the sub-components that make up object reduplication.

In this chapter, I follow another approach and start out with a dissection of the ingredients involved in these constructions. Firstly, I will focus on some general observations concerning the commonalities of object reduplication and subject agreement in Bulgarian and then discuss them under the comparative concept of *indexing* – accounting for both of them in a systematic way.

In section 3.2, I focus on the second central aspect of object reduplication, namely differential marking. I will then show that object reduplication is an instance of differential object indexing. At the end of this chapter, I point out some of the similarities and differences of differential object indexing with other forms of differential object marking and dislocation (section 3.3). In the following chapter, I focus on the function of differential object indexing in Bulgarian and argue that the functional components directly derive from the association with indexing and differential marking.

3.1 Person marking and indexing

3.1.1 Basic observations

Object reduplication always consists of an object nominal entity (NP or independent pronoun; P or R argument etc.) and a short (dependent, clitic) pronoun. In the following (and the remainder of this dissertation), I restrict the discussion to objects that are associated with the P argument role and – as I said before – do not discuss R arguments further. In Bulgarian, the short pronoun is marked for person, case, gender, and number – agreeing with the respective nominal entity. However, these are not all ingredients that characterize these constructions. Typically, only some objects are marked or cross-referenced by the short pronoun. There is some categorical split alongside certain parameters, arguably related to the core function. Therefore, object reduplication or clitic doubling is technically an instance of differential marking (this is also acknowledged in some generative studies, e.g., Kallulli, 2016).

In the following, I want to take a closer look at the contribution of the short pronoun and the differential marking. I begin with a very general observation. For this purpose, let me shortly quote another example (see example 20) for object reduplication in Bulgarian, once again taken from Ruiz Zafón (2001b). Here, one protagonist offers his unconditional support to another protagonist and emphasizes his intention with a figure of speech. In his utterance, a (fictional) person is introduced with an indefinite reference, then this referent is indirectly taken up by a definite reference (*the name* = *his name*), and then the person is instantiated again with a nominal phrase cross-referenced by a short pronoun.

(20) Context: Fermin offering his unconditional support (SDV11-BG)

za vas, gospodin Sempere, čovek ubivam, ako trjabva. Samo mi
for 2.PL.ACC mister Sempere man kill.PRS.1SG if must only 1SG.ACC
kažete imeto i šte **go** likvidiram **toja** **tip**
tell.PRS.2PL name-ART.SG.N and FUT 3SG.M.ACC execute.PRS.1SG DEM.SG.M guy
'For you, Mr. Sempere, I kill a man if necessary. Just tell me the name and I'll execute the guy.'

Generally speaking, the pronouns are basically person forms – irrespective of the additional marking for case in Bulgarian object pronouns. There are other (non-pronominal) elements in this example that are also associated with person, such as the verbal inflection *-(a)m* indicating the first person subject. In constrast to the object pronoun, this person marking is obligatory. The inflection ending basically connects to a particular discourse role and adds an additional association with the agent (via agreement).

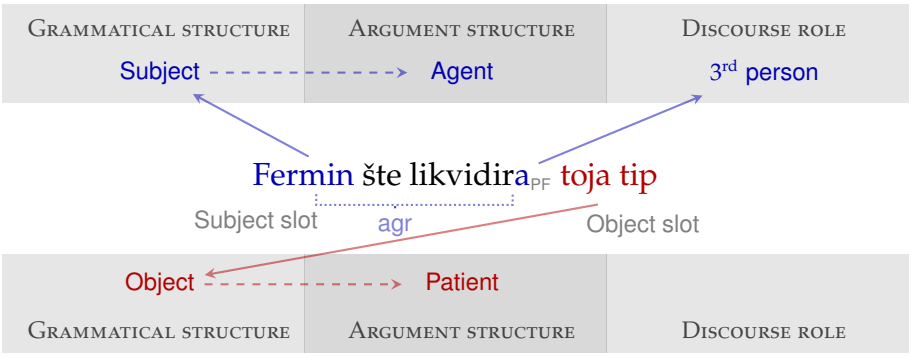
To emphasize this further, let me change the example a little bit. In the following version (21), there is a subject instantiated by a personal name, a verbal inflection agreeing with this subject, and an NP object without additional marking.[14]

(21) **Fermin** šte likvidir**a** toja tip
Fermin FUT execute.PRS.3SG DEM.SG.M guy
'Fermin will execute the guy.'

In this sentence, several associations are made to argument structure, grammatical structure, and discourse structure. The exact description and analysis of these levels is beyond the scope of this investigation, but I present a very simple sketch of how the involved levels might be associated with such a sentence (see figure 2).

Figure 2

Schematic illustration of example 21



[14]Note that in this example the subject and its corresponding inflection are set in bold face for illustration. In all the other examples of this dissertation the two elements of object reduplication are indicated with bold face.

This schematic illustration only loosely captures the acclaimed primary associations of the markers (as discussed in the introduction of this dissertation) and does not depict all the corresponding relations between levels. In particular, no direct association between the discourse role, the thematic role, and the actual NP is drawn in this figure and the following ones. Nevertheless, these illustrations highlight the main points with respect to the examples.

In example (21), we could imagine the association roughly like this: The subject slot is associated with the A argument role, whereas the person form (PF) points to the discourse role of the referent associated with the argument. In addition, the position in the subject slot (due to order constraints) also supports the A interpretation. Furthermore, there is obligatory agreement between the subject NP and the verbal inflection strengthening the association of this referent with the agent role.

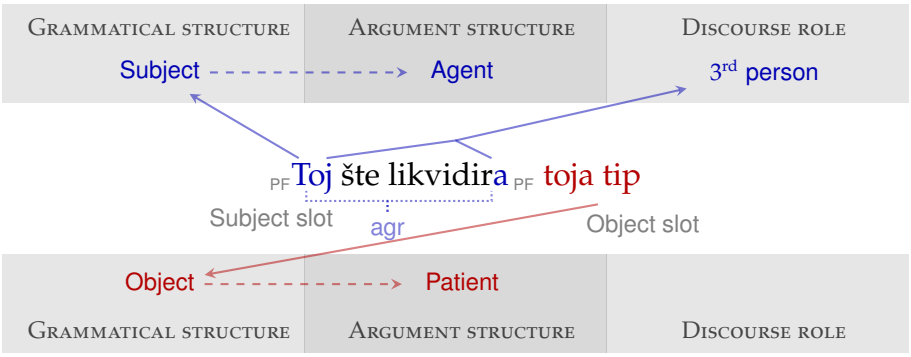
Alternatively, the subject could also be instantiated by a subject pronoun when the reference is highly accessible. Here, the connection to the discourse role is directly achieved by this person form. The (obligatory) use of the verbal inflection strengthens this connection via agreement. This is probably necessary to ensure reference tracking (of highly accessible elements).

(22) **Toj** šte likvidir**a** **toja** **tip**
3SG.NOM FUT execute.PRS.3SG DEM.SG.M guy
'He will execute the guy.'

The associated relations would look a bit different since the pronominal element also refers more directly to the discourse role (but also fills the subject slot and is associated with the A argument), as illustrated in figure 3.

Figure 3

Schematic illustration of example 22



Just as it is the case for subjects, the object can also be instantiated by a pronoun in Bulgarian (see example 23). Unlike for subjects, short or long pronouns can be used, i.e., there are two alternating sets to present objects as pronouns (however, similarly, subjects can be instantiated by the pronoun or by the inflection ending alone, without stating the subject overtly as NP or long pronoun, see example (24). Here, the pronominal serves as

a person form in replacement of the nominal form. In the following example, the object is directly given as a pronoun expressing person and being marked for case. The subject is expressed by the pronoun and the verbal inflection.

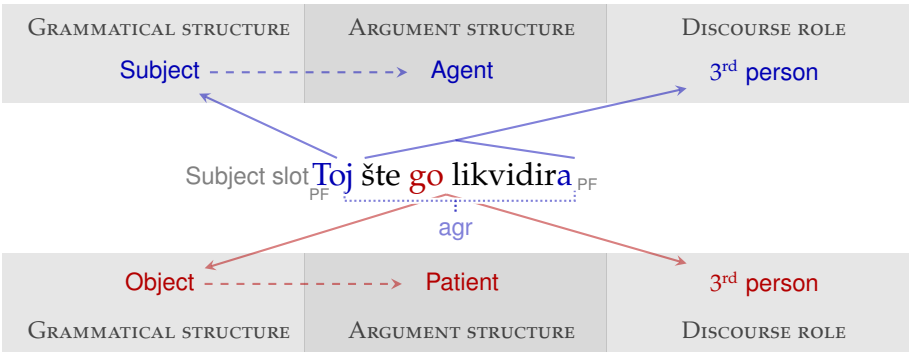
(23) **Toj** šte **go** likvidir**a**
3SG.NOM FUT 3SG.M.ACC execute.PRS.3SG
'He will execute him.'

(24) šte **go** likvidir**a**
FUT 3SG.M.ACC execute.PRS.3SG
'He will execute him.'

Example (23) is captured in figure (4). Here it is particularly visible that the short object pronoun establishes a similar connection as the verbal inflection of the subject.

Figure 4

Schematic illustration of example 23



The last examples highlight one important observation. In terms of function (and reduction in form), verbal inflection for subjects and short clitic pronouns for objects are very similar. There is basically only a difference in the boundedness of the respective person form to the verb, but the function is very much the same. Of course, the overt case marking at the subject pronoun adds an additional layer. However, unlike for objects, there is no paradigmatic opposition at the verbal suffix position, so there is arguably no need for additional case marking.

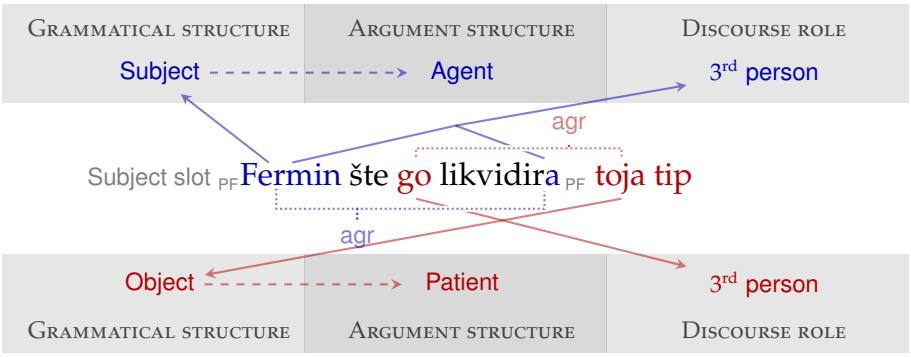
The observation that subjects and verbal inflection behave very similar to objects and short pronouns is even more striking when accounting for object reduplication (as in the original version of the example). Here, the short pronoun is used as a person form additionally instantiating the object and adding an agreement relation as well. This is very similar to the situation where a subject element is cross-referenced by the verbal inflection (and in agreement with it). To highlight these similarities, both types of cross-referencing appear in bold face (subjects in blue, objects in red) in the following example:

(25) **Fermin** šte **go** likvidir**a** **toja** **tip**
Fermin FUT 3SG.M.ACC execute.PRS.3SG DEM.SG.M guy
'Fermin will execute the guy'

The parallel structure of associations with different levels is also visible when applying the illustration sketch as before (see figure 5). Both NPs are associated with their respective grammatical function slots and establish a connection to their thematic role via this position and agreement. In addition, both are overtly connected to the discourse representation via the person forms.

Figure 5

Schematic illustration of example 25



It is striking that short object pronouns behave like inflection endings for subjects in this regard. They are both types of person forms and co-refer to an entity present in the sentence. There are two differences, however. Verbal inflection is not marked for case and obligatory for subjects in Bulgarian – unlike object pronouns. This similarity – in structure and form – is taken as a starting point for the present chapter.

I discuss a recent proposal claiming that these forms (subject verbal affixes and object clitics) can be accounted for by a unitary framework, namely *indexing* (Haspelmath, 2013). This account primarily focusses on the role as person forms and provides insights into the function of indexing in relation to discourse.

In terms of function, the presence of a subject inflection ending establishes an (additional) association with a particular discourse role. Additionally, the agreement strengthens the association of the subject with the A argument role. Presumably, this marking is obligatory due to the prominent role of the A argument. For objects, there is no such additional association necessary. Objects are frequently determined by position alone and maybe by being the non-agent. However, in the case of optional object marking, it might be the case that the same strategy is mimicked to establish a relation with the discourse role and an additional association with the argument role by agreement.

One important difference between the two encoding strategies in Bulgarian is the fact that verbal inflections (subject indexes) are obligatory, whereas object pronouns (object indexes) depend on particular contexts. In chapter 4, I will discuss differential marking in more detail after presenting the unitary indexing framework. There, I will put particular

emphasis on the recent concept of *differential object indexing (DOI)* (Iemmolo, 2011). After this part, it should be clear that object reduplication (or clitic doubling) is an instances of differential object indexing. This newer perspective is directly informed by typological insights and allows for more generalizable analyses of the structures under discussion.

However, indexing and differential marking are not just some new labels in structural terms. These two aspects directly inform the understanding of the function of DOI. On the one hand, there should be some association with differential marking, also in the form of differential case marking. This is to be expected since object clitics are case-marked. On the other hand, there should be some stronger association with the role of person forms (reference tracking in discourse) that contribute to the function of DOI.

In addition, it will turn out that differential marking hinges on some notion of predictability and future research needs to include a systematic perspective of this principle in accounting for differential marking systems. In contrast to the current aspirations to develop a consistent concept of prominence in language, there is currently no unitary prediction framework available in the field of language sciences. Therefore, the identification and analysis of predictability remains sketchy.

Let me shortly summarize the next steps. In section 3.1, I broadly discuss the notion of index and the claim that indexes are cross-linguistically associated with a role of reference tracking in discourse. In the second step (section 3.2), I largely focus on the differential aspect of DOI. I take up recent suggestions assigning discourse a particular role in accounting for differential object marking (in general). This is particularly true with respect to DOI where reference tracking is the underlying function of the relevant marker. In detail, I will discuss the more classical accounts assigning topicality a central role in differential object marking (in DOM research in general as well as for Bulgarian DOI in particular).

I elaborate on this perspective in chapter 4 where I argue that topicality is not sufficient to account for DOI in Bulgarian. In contrast, I elaborate on preliminary (implicit) suggestions from the previous research and suggest that the notion of *discourse prominence* is a better-suited concept to account for Bulgarian DOI. Implicitly, I assume that the discourse prominence account might capture DOI in other languages (or maybe even globally, at least at an early stage in DOI systems) as well. For the sake of brevity, I will not elaborate on this further and restrict my discussion to Bulgarian.

In addition, I focus on a second aspect that has not yet been addressed in great detail in DOM research. DOM is not only associated with the level of discourse but also hinges on a certain level of (un)predictability that determines the differential nature of the marker under investigation. The following discussion provides the theoretical and conceptual basis for my own analysis and empirical investigation in the following chapters.

3.1.2 Indexing: A unitary comparative concept

Preliminaries. I pointed out above that verbal inflection affixes and short clitic pronouns share some commonalities in behaviour and function. Both are person forms or express person as their main function. In terms of general function, "the grammatical category of person embraces the discourse role of speaker, referred to as the first person; the discourse role of hearer, referred to as the second person; and the other, i.e., the non-

speaker and non-hearer, referred to as the third person." (Siewierska, 2011, p. 322).[15] At a conceptual level, she argues that person forms are involved in co-reference relationship with a discourse referent (represented at the discourse level) (Siewierska, 2011).

In addition to this core function, person forms are often aligned with number, gender and – in some languages – case (Siewierska, 2004). As has been said before, this is the case with Bulgarian object pronouns which are also marked for case, gender, and number whereas verbal inflection is only marked for person and number (and gender in the case of the perfect *l*-participles).

With respect to person forms, independent (full) forms and dependent (bound) forms can be distinguished. Independent forms are typically treated as separate words and can be stressed. The most typical case are independent pronouns that can stand for another nominal element or represent a locuphoric form (i.e., the interlocutors) in the sentence. In contrast, dependent forms are typically unstressed and entail a certain degree of morphological or phonological attachment to another element.

It is possible to classify the bound elements even more finely (into weak, clitic, bound, zero), but the sub-distinction is often complicated (see Siewierska, 2004, for a number of tests distinguishing different types of bound person forms). Nevertheless, all bound elements are rather comparable in terms of the associated function because they share the commonality that they "restate or replicate the person ... but are not referential expressions in their own right" and "have an association with core argument functions but are not arguments themselves" (Siewierska, 2011, p. 332).

In a strict morphological sense, subject verbal inflections in Bulgarian are affixes, whereas objects can only be instantiated or marked additionally by clitics. However, there are good arguments for taking them together when they are associated with a person-marking function. In that sense, a comparative concept is applied that is practical to our functional account (but ignores other constitutional differences – such as phonotactics – that are assumed not to be relevant for determining the function).

Comparative concepts are descriptive tools that serve as a basis for cross-linguistic comparisons and subsequent investigations of the function (Croft, 2019; Haspelmath, 2010). These concepts are a sort of generalization for the sake of analysis, irrespective of the actual construction in a given language. In general, it is possible to apply comparative concepts that combine formal and functional properties (Haspelmath, 2010).

A second aspect concerns the relation between the bound form and a potential co-occurring element. If such a co-occurring element (in form of a nominal entity) exists, the two elements exhibit an agreement relation. This is particularly noteworthy because agreement is associated with grammatical role (Bickel, 2011). Therefore, a bound form can express an additional meaning with respect to grammatical roles in addition to discourse role. In the case of Bulgarian, this association is directly available due to the additional marking for case (in addition to number and gender) on the object clitics (however, subject agreement is obligatorily present as well in the agreement association between a subject and an inflectional ending).

[15] There is some debate to what extent the 3rd person (also called allophoric form) can be treated alongside the 1st and the 2nd (locuphoric forms) because – in contrast to the other forms – the referential interpretation of the 3rd person mainly depends on the previous discourse. However, I follow Siewierska and treat them basically alike for the purpose of our investigation (but see Siewierska, 2004, for a short overview of this discussion).

Definition. In the following, I present the concept that captures bound person forms in a unitary way, namely *indexing*, a term that Haspelmath (2013, p. 199) adopted from Lazard (1998). This summary of the basic principles of indexing mainly follows the original article on indexing by Haspelmath (2013) and the recent outline on flagging (Haspelmath, 2019).

At the core of the indexing account is the (aforementioned) problem of distinguishing bound person forms as either affixal (agreement) or clitic person forms (pronouns). Haspelmath notes that there is a large (but – in his opinion – redundant) debate in linguistics concerning the status of these elements. Quite often, an exact classification into either of the concepts is not really useful, since they are both functionally person forms. He rejects the subdivision and suggests the general concept of *index*. Haspelmath (2019, p. 96) defines a person index as

> a bound form denoting a speech role or a highly accessible third person referent that occurs on a verb (or in second position) to indicate a verb's argument, or on a noun to indicate its possessor.

In this dissertation, I am not dealing with the last-mentioned case of indexing with respect to possession because I am concerned with argument marking in the verbal domain.[16] When dealing with person forms, there are two main types, namely "real" pronouns (free forms) – i.e., pronominal elements that can truly stand for a nominal – and indexes (clitics and affixes). Indexes can be distinguished from free forms, especially in the case of person forms: "if a person form cannot be used on its own or contrastively, it is a bound person form" (Haspelmath, 2013, p. 201). These forms can appear on the verb , the noun (possessors) or on an adposition (complement).

In his account, indexes are "phenomena *sui generis*" and they are directly associated with the category of person. Therefore, the term *pronoun* is not really acceptable for indexes since they do not stand in replacement of a noun (unlike independent pronouns). Instead, they are attached to the verb, are related to the verb's argument, and "in most cases, they can co-occur with the nominal (a *co-nominal*) with the same reference and role in the same clause" (Haspelmath, 2013, p. 201).

Haspelmath (2013) also rejects the notion of *agreement* as a comparative concept to account for indexes by stating that "agreement is generally thought of as an asymmetrical kind of category-form covariation (the form of the target depends on the category of the controller), and in most uses of person forms, there is no controller (at least no controller of the person category) present" (Haspelmath, 2013, p. 201). The unitary account of indexing allows for more generalizable analyses of verbal inflection and object reduplication phenomena. Interestingly, there are some differences within the category of indexing, as I will point out in the following.

Types of indexing. Languages differ with respect to the scope of arguments that receive indexing (none, some, all) and with respect to the obligatoriness of the co-nominal (obligatory, optional, impossible). Some indexes are associated only with subjects or A

[16] It is, however, noteworthy that the short object pronouns in Bulgarian can be used for a particular type of possession realization (with close family members etc.).

arguments, whereas other types of indexing mark objects or P or R arguments.[17] In line with the aims of my investigation, I restrict myself to A and P indexing in the following.

For an illustration of A and P indexing, see the following example from Tawala, an Oceanic language that has both options at its disposal (the association of the co-nominal with the respective index is marked in colours):

(26) Subject and object/A and P indexing in Tawala (Oceanic) (Ezard, 1997, p. 99)

kedewa kamkam iunihi
dog chicken 3SG.A-kill-3PL.P
'A dog killed the chickens.'

In order to state a short typological overview, let me draw on the sample on person marking with 378 languages from the *World atlas of language structure (WALS)* (Dryer & Haspelmath, 2013) (for more details on the WALS, see below). In this sample, the majority of languages marks A and P arguments (193 languages or 51.06 %), irrespective of the question if the marking is asymmetrical (i.e., differential argument indexing). The second largest strategy are languages with no person marking in form of indexes or case (82 languages or 21.69 %).

Among the languages that mark only one argument, agent marking (19.31 %) is much more frequent than P marking (24 languages or 6.35 %), the latter being comparably rare in general (as stated several times by Anna Siewierska, e.g., Siewierska, 2011). Unfortunately, no information on differential marking is provided in this sample. In terms of alignment, according to the WALS, 212 out of 380 (55.79 %) verbal person marking systems are accusative-aligned.

The second aspect concerns the obligatoriness of a co-nominal. As I have said before, an important difference between indexes and pronouns is the possibility to co-occur with a nominal entity or full pronoun. In these cases, the index is *co-nominated*. Both the index and its co-nominal must be part of the same narrow clause in order to rule out dislocation (Haspelmath, 2013, p. 206). Languages with indexing differ to the extent that co-nomination is possible.

In some languages, the presence of a co-nominal is obligatory. Haspelmath calls these cases *gramm-indexes*. An example is the obligatory subject indexing with co-nominals in German or English (at least for the 3rd person, see example 27 below). In general, gramm-indexing (i.e., the use of gramm-indexes) is very rare (but prominent in Europe, at least with subject indexes). In contrast – according to Siewierska (1999) –, gramm-indexing with object indexes does not exist in the languages of the world.

[17] Based on the association with a particular set of arguments, indexes can be identified as belonging to different *index-sets*. Index-sets are similar to the idea of different case forms (note, however, that they do not need to carry case-marking necessarily). Therefore, one could say, that (obligatory) subject indexes in Bulgarian belong to a "nominative index-set",

whereas object indexes either belong to a "accusative index set" or "dative index set" (Haspelmath, 2013, p. 204).

In descriptive terms, clitics are indeed described as "accusative clitics" or "dative clitics", but verbal inflection is typically not described in terms of case (e.g., Radeva, 2003, on Bulgarian). However, since subject indexes are always used obligatorily with the subject, this usage is acceptable.

(27) a. Subject indexing in English

Peter always sings in the bath.

b. Subject indexing in German

ich singe.
1SG sing.PRS-1SG
'I sing/ I am singing.'

In other languages, indexes can never co-occur with a co-nominal. Haspelmath calls these *pro-indexes* since they behave like pronouns in the sense that they can stand for a noun (however, neither in the NP position nor with the same behaviour as nouns or pronouns). An example for this is Arabic (taken from Haspelmath, 2013, p. 208), where the pro-index *-hu* replaces the nominal *l-kalb-a*.

(28) Pro-indexing in Standard Arabic (Haspelmath, 2013, p. 208)

a. Full NP object

Ra'ay-tu l-kalb-a
see.PRF-1SG.SBJ DEF-dog-ACC
'I saw the dog.'

b. Object pro-index

Ra'ay-tu-hu
see.PRF-1SG.SBJ-3SG.M.OBJ
'I saw it.'

The most interesting case for my investigation are indexes that are optionally cross-referenced by a co-nominal. This is called *cross-index* by Haspelmath and was previously also called *ambiguous agreement markers* by Siewierska (1999). Apparently, cross-indexing is the most frequent type of indexing that can be found cross-linguistically. Cross-indexing can occur with subjects as well as objects.

For example, in Teiwa (an Alor-Pantar language, spoken in East Timor), objects are typically cross-indexed when they are animate (for a finer description of this indexing system, see Klamer & Kratochvíl, 2018). Subjects – in contrast – are always expressed as NP or pronoun but not as index.

(29) Animacy-condition indexing in Teiwa (Oceanic) (Klamer & Kratochvíl, 2018, p. 79)

a. Inanimate object without index

Aga' usan kamar gom ma mai
all lift room inside come keep
'Pick up all (of it) and keep (it) inside the room'

b. Animate object with cross-index

Xa'a ma **ha-gas.qai** **ga**-mai
this come 2SG.POSS-younger.sister 3SG-keep.for
'Keep this for your younger sister'

In other languages, however, subject as well as object arguments can be cross-indexed. For instance, this is the case in Bulgarian as well as Spanish. Although subject indexes are obligatory in these languages, co-nomination is not. As I pointed out in the beginning of this chapter, this situation is comparable for objects when the short pronoun in object reduplication is treated as an object index. In the following, all the options of subject and object indexing are given (based on the examples from section 3.1.1).

(30) Indexing in Bulgarian

a. Obligatory subject index

likvidira
execute.PRS.3SG
'He executes'

b. Obligatory subject index with co-nominal

Toj/ Fermin likvidira
3SG/ Fermin execute.PRS.3SG
'He/ Fermin executes'

c. Object index

Fermin go likvidira
Fermin 3SG.M.ACC execute.PRS.3SG
'Fermin executes him'

d. Object NP

Fermin likvidira toja tip
Fermin execute.PRS.3SG DEM.SG.M guy
'Fermin executes the guy.'

e. Object index with co-nominal

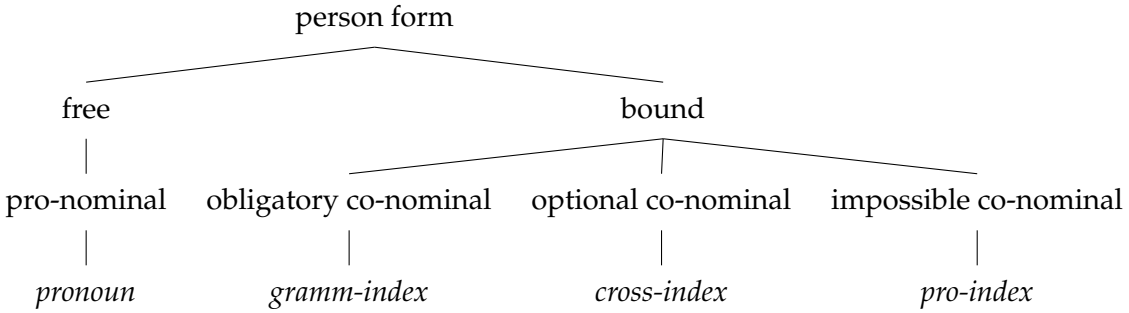
Fermin go likvidir**a** **toja** **tip**
Fermin 3SG.M.ACC execute.PRS.3SG DEM.SG.M guy
'Fermin executes the guy'

In (a) only a subject index is present. This subject index can optionally be co-nominated with a full pronoun or NP (b). The same is true for the object index. It might either stand alone (c) or with a co-nominal (e). The only difference between subjects and objects is that objects can also stand alone as a full NP or pronoun without an index (d). This is the particular case in differential indexing systems where the object NP and the object index can either stand alone or jointly be used as a cross-index. In any case, differential object indexing is a sub-type of cross-indexing. Obligatoriness of the co-nominal provides a means to classify different indexing systems. The classification of indexes by Haspelmath is summarized in figure 6.

It would be interesting to analyse the underlying factors triggering different types of co-nomination cross-linguistically, but in this dissertation I am concerned with the particular situation that cross-indexing is applied in Bulgarian to mark objects in particular conditions. Here, it could be interesting to further investigate whether the motivation

Figure 6

Types of person forms and indexes (Haspelmath, 2013, 2019, p. 208)



behind co-nominated subject indexes is related to co-nominated object indexes. As visible in the examples, both grammatical functions have a similar set of forms at their disposal. Future research should further focus on the different forms of cross-indexing with co-nominals within Bulgarian (and other languages, such as Spanish) and on the different forms of indexing from a cross-linguistic perspective to determine commonalities and differences and identify potential shared underlying mechanisms that help to shape this pattern. Additional evidence in this direction can be drawn from diachronic research, as I will briefly point out in the following.

A short note on diachrony. I am convinced that the understanding of indexing systems can shed light on the functional motivation for different indexing types, especially since gramm-indexing does not exist for objects. This is particularly true for the association of indexing with reference tracking.

Additional evidence for this general association of indexing with discourse roles stems from the diachrony of indexing systems. I will not focus on diachrony in great detail, but I would like to point out some basic insights that are informative to my discussion.

The general idea that agreement markers arise from independent pronouns goes back to Givón (1971). This was extended to a grammaticalization path from demonstratives to zero endings, here adapted from van Gelderen (2011):

> demonstratives → independent person pronoun → clitic pronoun → affixal agreement → zero

Note that this path is sometimes described as being a bit different for 1st and 2nd person pronouns that more often derive from nouns (van Gelderen, 2011). This path is typically oriented towards subject pronouns and subject indexing. Implicitly, it is assumed that this path also accounts for object indexing or at least occurs in a similar way (see van Gelderen, 2011, for detailed examples, including differential object indexing in Spanish and Macedonian as examples for the intermediate stage).

In contrast, Haig (2018) argues that the grammaticalisation paths for subject indexes and object indexes are different. He argues that object indexing typically gets stuck at the stage of differential object indexing. In his account, DOI is "an attractor state for object agreement generally" (Haig, 2018, p. 805). He provides examples of the opposite path in

some Iranian languages where an object agreement marker is "de-inflectionalized" to the level of differential object indexing.

The question if indexing for subjects and for objects develops in a unitary way is also related to the function indexing has. Givón (1976) argued that agreement markers develop from resumptive pronouns in topic-shifting constructions that dislocate a nominal and topical entity and co-refer to it via a pronoun in the clause. He argued that this subsequently leads to the generalization to use attached pronouns in the clause to mark the topical element (this also could explain why subjects are more frequently found with indexing).

In contrast, Ariel (1990) rejects this process and suggests that the level of attachment (from pronoun to agreement) is rather associated with different levels of accessibility. This particularly accounts for languages that have different options at their disposal at the same time (as in Bulgarian, see above). Depending on the mental accessibility of a particular discourse referent, speakers can decide to use different degrees of explicit marking to account for that.

My analysis of DOI bears some resemblance with this discussion, particularly with respect to the accessibility account (see section 4.1). Future research should address this issue in more detail from a diachronic perspective (see also van Gelderen, 2011, for more proposals with respect to grammaticalization).

Haig (2018) does not intend a general explanation of the grammaticalization of indexing either. He focusses on the question why object indexing in particular gets stuck at the stage of differential marking. He gives a provisional answer in his study based on

> the relative informativeness of the category of person in the subject role, when compared to the object role. In actual usage, objects are naturally associated with the third person, rendering person a relatively uninformative category for objects in comparison with subjects (Haig, 2018, p. 814).

One could say that person is not necessary to determine objects in many cases (i.e., an association with the discourse role does not need to be established overtly). Therefore, it is necessary to ask in which particular situation this additional person marking is needed. I agree with him on the fact that answers to these question can be found in a more thorough analysis of the differential aspect. Therefore, I discuss differential marking in more detail in section 3.2.

3.1.3 Crosslinguistic pattern of argument encoding

Before I discuss differential object indexing from the general perspective of differential object marking, there is one issue left that needs to be addressed beforehand. Besides indexing, there are other encoding strategies that can be used to mark arguments by morphological means, namely case and adposition.[18] Case and adposition can also be

[18]Note that I exclude word order as another means or argument marking at this point because "its basic function is taken to be the sequencing of information in ways which best reflect the communicative intentions of the speaker and simultaneously enable these intentions to be successfully and speedily processed by the addressee" (Siewierska & Bakker, 2012, p. 194) (but see this article for a more in-depth discussion of the relation of order, agreement, and case as argument marking strategies).

captured together by a comparative concept. I briefly outline this concept in the following and then discuss the cross-linguistic distribution of the different argument encoding strategies. By illustrating the typological findings on indexing, I want to show that object indexing in languages that were formerly described as exhibiting object reduplication are cross-linguistically not rare or special and that explanations of object reduplication should also consider the function of object indexing in a wider context.

The concept of flagging. In a similar way as for clitics and affixes, there is no need to distinguish between affixes and adpositions in functional terms. Therefore, they can be captured with one unitary concept as well, namely *flagging*. Haspelmath (2019, p. 96) defines flagging as

> a bound form that occurs on a nominal and that indicates the semantic or syntactic role of the nominal with respect to a verb (in a clause) or with respect to a possessed noun (in a complex nominal).

It is directly visible here that flagging and indexing are different in the sense that the former is more directly associated with the semantic or syntactic role, whereas indexing is associated with speech roles in discourse. Remember that I already gave some indication for this in chapter 2 (for case and agreement). The comparative concepts flagging and indexing reinforce this view. Bulgarian object indexes are primarily marked for person and secondarily for case.

The concept of indexing and flagging bears some resemblance with the concept of *head* and *dependent marking* suggested by Nichols (1986). Haspelmath (2019) discusses the relation of this terminology to the previous terminology in detail. The head/dependent marking concept is more directly related to the syntatic relations that are reflected in the morphosyntactic marking. In this account, the verb is typically the head of the clause, whereas arguments of the verb are the dependents. Nichols (1986) suggests that languages can be classified into being (more dominantly) head-marking or dependent-marking (depending on the main locus of relational marking). This general typology is highly debated (e.g., see Haspelmath, 2019, for a more detailed critique). Haspelmath (2019, p. 108) acknowledges that one of the two strategies may be more prominent in a given language, but there is no need for an overall classification into one or the other.

In contrast to the perspective that I discussed in section 1.2 and in this section on indexing, the head and dependent perspective emphasizes the involvement of these different encoding strategies for argument marking more strongly. In general, this is a valid approach that provides some insights for role interpretation. Nevertheless, considering the core function of indexing (in contrast to flagging) provides more adequate means to account for differential indexing – as will become clear in the remainder of the present and the following chapter. Even more, there is some evidence that head and dependent marking (in the special form of flagging and indexing) are by no means equally exchangeable encoding strategies (and may even co-occur).

Already before the concept of indexing and flagging came into being in the sense outlined above, Siewierska and Bakker (2012, p. 293) noted (with reference to Croft, 1988, 2003) that "[w]hereas case marking is primarily a relational encoding strategy denoting the relation holding between two entities, agreement is an indexing strategy denoting the properties of one of the entities in the agreement relationship". In other words, flagging

distinguishes between two arguments in terms of their thematic role, and indexing rather differentiates between different discourse roles via person. The latter may contribute to the former (this is also reflected in some of my empirical studies, see chapter 6), but it does not shed light on the reasons why object indexing operates in a differential way. To conclude this short introduction to flagging, I give a very short typological overview of both marking types in the following.

Distribution of indexing and flagging. Since flagging and indexing are both equally concerned with argument marking and can be both found in the form of differential marking, it is interesting to take a look at their cross-linguistic distribution. For this purpose, I searched two databases for respective data-points. In general, flagging and indexing are not mutually exclusive. This supports the perspective that they have two different underlying motivations.

The aforementioned *World atlas of language structure (WALS)* (Dryer & Haspelmath, 2013) is a database of structural properties of languages. The data points for each language are based on reference grammars and comparable descriptive material. Similarly, the *Atlas of pidgin and creole language structures online (APICS)* (Michaelis et al., 2013) is a comparable database for pidgin and creole languages.

Flagging in the strict sense of the concept is not included in the WALS. Instead, the broader concept of head and dependent marking (or "marking locus in the clause") is used to capture different types of P marking in the world's languages (Nichols & Bickel, 2013). Haspelmath (2019, p. 102) argues that the head and dependent marking concept used in the WALS is narrower than in the original article introducing the concept (Nichols, 1986) and therefore corresponds more closely to indexing and flagging. Indexing itself is also captured in the form of person markers (A and P) (Siewierska, 2013). Therefore, I take these two features together to present a rough overview of P flagging and indexing.

Combining these two features leads to a sample of 175 languages. Unfortunately, there is some disagreement on the classification of indexing. For example, Egyptian Arabic was classified as carrying no P marking by Nichols and Bickel (2013) but as indexing A and P by Siewierska (2013). I only want to give a very general overview of the distribution of P flagging and indexing and therefore could not check all these ambiguous cases in detail. For simplicity, only consistent cases are included here, leading to a sample of 136 languages.

No such problem was encountered with the APICS since flagging ("marking of patient noun phrases") and indexing ("special dependent person forms") are included in these data and classified by the same author. Therefore, for creoles and pidgins, I use the full set of languages for which these data points are available ($n = 75$).

In table 2, the overall distribution of my small sample is given (together with some exemplary languages) and in figure 7 and 8 the distributions for P marking are given (for all the languages and for languages with A indexing, respectively.)

The two samples are not utterly large and do not allow for statistical analyses. Nevertheless, a few insights can be drawn from this overview. Indexing in general is comparably frequent – with A indexing being a bit more common than P indexing. In my WALS sample, 107 languages (78.68 %) are described as having A indexing (irrespective of the occurence of flagging or P indexing) whereas 80 languages (58.82 %) are claimed to have P indexing (with only 1 language in this sample having only P indexing). More languages

have P indexing without P flagging (37.49 %) than P flagging without P indexing (25.74 %), whereas 21.32 % of the languages have having both P encoding strategies and only 15.44 % languages have no P marking. This distribution is also illustrated in the first chart in figure 7.

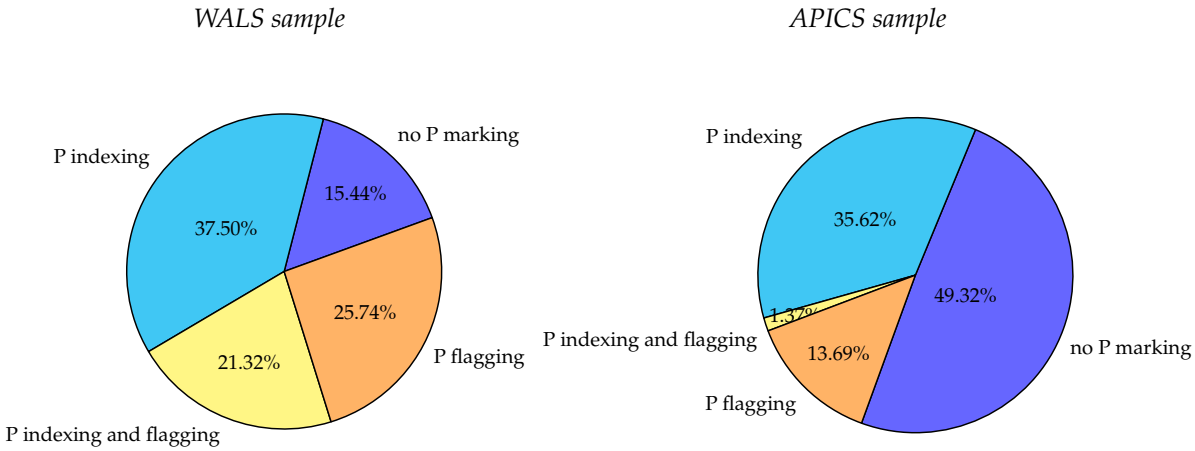
Table 2

Crosslinguistic distribution of indexing and flagging

P marking?	A index?	*n*	%	example	*n*	%	creole
none	no	9	6.62	Vietnamese	19	26.03	Bislama
none	yes	12	8.82	French	17	23.29	Lingala
index	no	1	0.74	Timbira	1	1.37	Bahamian Creole
index	yes	50	36.76	Swahili	25	34.25	Papiamentu
flag	no	19	13.98	Japanese	10	13.69	Afrikaans
flag	yes	16	11.76	Russian	0	0	–
both	no	0	0	–	0	0	–
both	yes	29	21.32	Spanish	1	1.37	Michif
total		136	100		73	100	

Figure 7

Crosslinguistic distribution of P marking

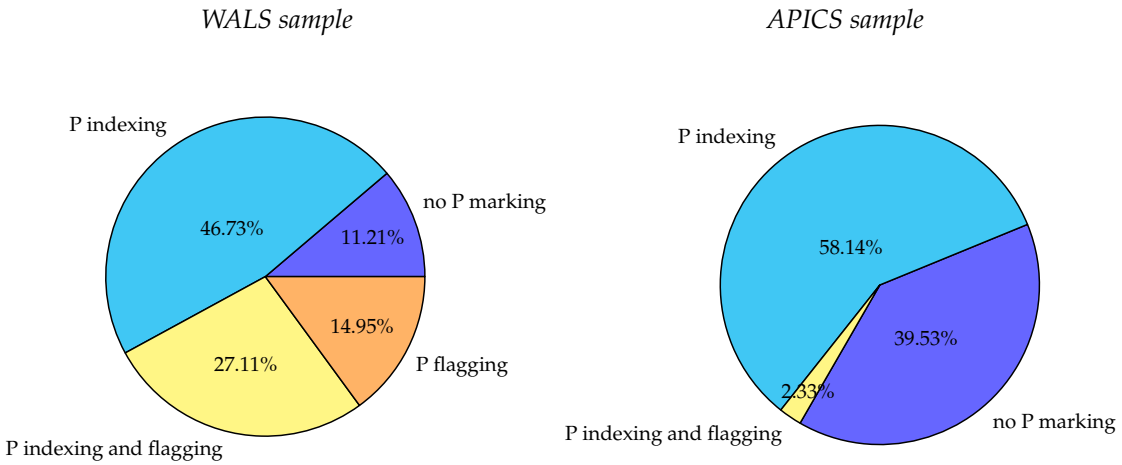


From the languages with A index (n = 80), 62.5 % have P indexing as well and 36.25 % have P indexing and flagging. In this sub-sample, only 20 % have P flagging but no P indexing (see the second chart in figure 8). Apparently, there is a strong correlation of A indexing and P indexing.

For creoles and pidgins, the situation is a bit different. Half of the creoles in this sample have no patient marking (49.32 %). In the remaining languages (with P marking), P indexing (35.62 %) is much more frequent than flagging (13.69 %) or using both encoding

Figure 8

Distribution of P marking in languages with A indexing



strategies (see the first chart in figure 8). Interestingly, 58.14 % creoles and pidgins have A indexing (and the majority of them also P indexing, see the second chart in figure 8). This short overview suggests that P indexing depends on A indexing since it typically does not occur alone and is more frequently found with A indexing than P flagging. P flagging, in comparison, seems to be more independent of indexing since it develops more typically without indexing in creole languages.

In general, flags are most often P argument markers whereas, indexing is more frequently found with A arguments and with P more often used differentially.[19] It is important to note that no information on differential marking is included in this analysis. Only the absolute availability of flags and indexes is evaluated here – irrespective of the question if the marking depends on differential aspects.[20]

Grammaticalization, obligatoriness and differential marking. To sum up, I want to emphasis some general aspects of P indexing. Despite the lower frequency of this encoding strategy in widely investigated languages, P indexing can be found frequently in the languages of the world. P indexing typically occurs in the form of cross-indexes, i.e., it optionally occurs with a co-nominal. More commonly, P indexing seems to select particular co-nominals, hence is differential. There is also some diachronic tendency for object indexing to plateau at the level of differential marking. In contrast to flagging – that is directly associated with P marking –, indexing is more prominently found with A arguments.

In this dissertation, I cannot provide a full overview and explanation for the underlying factors of P indexing or object indexing in general. I am only concerned with DOI in Bulgarian and its motivating factors. I believe that these typological insights combined

[19] Interestingly, there is also some evidence that the course of acquisition is different for indexing and flagging (Kail & Charvillat, 1988).

[20] Note, however, that the APICS included information on differential marking for flagging that I did not include in this short overview.

with a more thorough discussion of the differential aspect are a good starting point for new analyses. At first sight, it appears to me that object indexing mimics subject indexing. If we assume that subject indexing is motivated by the prominent or accessible role of A arguments, we could assume that object indexing comes into place when a P (or R argument) has an untypical (higher) prominence position. There are three theoretical options how this could be the case:

- when a highly prominent referent serves as the P referent (i.e., indexing is used to disambiguate A and P due to the similar rank of the two)
- when a not (anymore) prominent referent serving as P needs to be promoted to a higher prominence position (e.g., to make it licensable for other operations, e.g., topic)
- when a strong deviance of a formerly established prominence ranking is caused by a P (i.e., DOI serves as an attention cue indicating a shift or promotion)

I will discuss precisely this issue in the following and also in the empirical part of this book. I will show that the concept of discourse prominence captures the role of DOI in Bulgarian much better than topicality and – in addition – that a notion of predictability is crucial to capture this differential marking strategy.

3.2 Differential object marking: From semantic properties to discourse

3.2.1 General description of differential marking

The second central aspect of the phenomenon under discussion – beside the involvement of person-marking argument indexes – is the differential part. Before I finally discuss the function of DOI in Bulgarian, I would like to take a look at differential marking from a broader perspective. For this purpose, I state some general aspects of the notion of differential marking and present the main accounts of DOM research in this section. The discussion of different DOM accounts is important because DOI is not only a differential marker but rather the consideration of DOI broadened the scope and underlying assumptions in DOM research.

Considering DOI on par with classical DOM shows the need for a general concept that captures differential marking but allows for a distinct treatment of the marker used to differentially encode a linguistic element. The line of research conducted on DOM in general is also informative of the investigations that need to be conducted on DOI. I outline these aspects in detail in this section because my empirical investigation draws on many insights from this perspective.

In a very basic sense, there are two broad coding strategies in language. On the one hand, a clear difference in meaning can be expressed by a particular encoding (e.g., singular versus plural). Haspelmath calls this coding "simple meaning pairs" for situations "where the construction types in opposition are two contrasting grammatical meanings for which the wider grammatical context or lexical subclasses are not immediately relevant" (Haspelmath, 2021a, p. 615).

On the other hand, "differential coding" captures markers (and their absence) when no difference in meaning itself is expressed by the marker. This is the case when a "single grammatical meaning is coded differently in different grammatical contexts or in different

lexical subclasses " (Haspelmath, 2021a, p. 615). In my investigation, I am concerned with differential coding that depends mostly on a particular grammatical context.[21]

For some reason, only a subclass of arguments requires the additional meaning. In Haspelmath's view, "in a differential-coding pair, we are dealing with a USUAL ASSOCIATION of a grammatical meaning with a grammatical context or a lexical subclass. The claim is that such usual associations need less coding than unusual associations" (Haspelmath, 2021a, p. 616). In a basic sense, there is an acclaimed association with P arguments being typically inanimate, often indefinite, and non-topical – in contrast to agents who are typically animate, definite, and topical.

Despite the fact that Ps can, of course, also be definite and animate, there "is a strong tendency for the information flow from A to P to correlate with an information flow from more to less animate and from more to less definite" (Comrie, 1989, p. 128). If a particular patient deviates from this general expectation, this provides an instance of a particular grammatical context, and additional marking in the sense of differential coding becomes more likely. This is the basic observation with respect to differential object marking. However, the picture is a bit more complicated as will become clear in the following.

The concept of DOM (Bossong, 1982, 1985) and DAM (Witzlack-Makarevich & Seržant, 2018). The concept of *differential marking* – in its special form of differential object marking – is 40 years old and can also be considered a comparative concept in the sense outlined above (Kabatek et al., 2021). Bossong (1982) introduced the concept of differential object marking (DOM) (and not Bossong, 1985, as is occasionally stated in the literature).[22] In later years, the concept was generalized to all types of arguments (as *differential argument marking (DAM)*), including agents.[23] Bossong (1982) is primarily concerned with the emergence of new case paradigms in the context of markedness but captures already much of later DOM research in its basic essence.

Bossong identifies markers of argument roles on the noun ("nominal marking") and on the verb ("verbal marking") – corresponding to flagging and indexing. Both types of marking are aligned with an argument hierarchy ("Hierarchie der Aktantenfunktion"), however in reverse order. Nominal marking typically follows a hierarchy from oblique case over indirect object to direct objects (with the former being more commonly marked by flags), whereas verbal marking aligns with a reverse hierarchy from subjects over direct objects to indirect objects and oblique case (with subjects more typically marked with indexes) (Bossong, 1982, p. 22). This basic observation is in line with the general typological picture presented above.

Bossong (1982) notes that the cut-off point for marking does not necessarily fall between two grammatical functions (e.g., subject vs direct object) but may also lie within one of these functions alongside certain parameters. In these cases, the marking is differential because it differentiates within a grammatical function. In his paper, he mainly identifies splits

[21] However, as I have said said in the previous chapter, there are some lexical classes closely associated with DOI in Bulgarian, e.g., psych verbs. Similarly, the remaining case marking – i.e., flagging – of masculine nouns is a type of differential coding with a particular lexical class.

[22] Bossong (1985) builds on that initial article, repeats most of it in the introduction, and then applies it to an in-depth analysis of Iranian languages. Since the central aspects are already outlined in Bossong (1982), I focus on this source in the following.

[23] Note that differential agent or subject marking has already been investigated before Bossong's landmarking paper under the cover of *split*, e.g., in Silverstein (1976).

alongside semantic features within the category of (direct) objects (that are in the middle of the hierarchy) and calls this particular situation *differential object marking*. He makes the observation that this phenomenon is actually very frequent and widely attested in some language families, e.g., Turkic (see Johanson, 2021, for details).

Bossong (1982, p. 26) already notices that there are two types of semantic features that can serve as a cut-off point for differential marking. On the one hand, inherent features ("Inhärenzmerkmale") of a noun (most typically: animacy) can serve as the category alongside which direct objects are differentiated. On the other hand, a split can occur across a referentiality scale ("Referenzmerkmale"), with definiteness being the most prominent category (although he also acknowledges that there are more complex ones as well). He assumes that these categories are used because they can be related to some form of anthropocentric categorization of the world in the sense that animate and definite entities typically act upon inanimate (and indefinite) ones. In terms of linguistic encoding, this can be seen in a typical flow in terms of information or action from A to P.[24]

In contrast to much of the subsequent DOM research, he does not only discuss differential object flagging (i.e., case or adposition marking) but also differential marking with means of person indexes. In particular, he discusses differential flagging and indexing in Romance languages since this family entails both encoding strategies.[25] He argues that the differentiation with verbal marking takes place alongside a theme/rheme (hence, topic/comment) distinction, hence is associated with information structure. In his view, object NPs are typically associated with a non-topical interpretation, whereas pronominal objects are associated with a topical interpretation (Bossong, 1982, see particularly p. 44). Implicitly, this is in line with my view that the index itself contributes some of the function by its association with discourse (see below in more detail). He also argues that this explains the obligatory use of subject indexing since agents are more frequently topics. This points in direction of my idea that object indexing mimics subject indexing in some respect.[26]

Later research showed that the simple association of differential flagging with animacy and differential indexing with topicality is a bit too oversimplified, but the article provided a first attempt in capturing differential marking. Additionally, in subsequent research, it became clear that such systematic splits alongside certain parameters occur much more systematically in the languages of the world and are neither restricted to semantic features nor (direct) objects.

[24] Additionally, in terms of a diachronic explanation, he brings forward the idea that DOM is compensating for a previous loss of (classical) case and is a new expression of the respective object role. For some efficiency reasons, this new case needs not to emerge for all objects but only for those that are marked because they bear some resemblance with subjects in terms of "inherent", "referential", or "pragmatic" properties (Bossong, 1982, p. 29).

[25] He states that there is a general pattern in Romance that indirect objects are typically case-marked, whereas subjects never receive case. Direct objects are sometimes marked. In some languages (French and Italian), there is a split between indirect objects and direct objects, whereas in other languages (Spanish, Romanian) the split occurs within direct objects. An interesting observation is that – except for Romanian –, if direct objects are marked, the same preposition is used that is also used for marking indirect objects. Additionally, some Romance languages use verbal marking for direct and/or indirect objects.

[26] A special case is French, where subjects are sometimes differentially marked (with an additional resumptive pronoun) in topicalization structures. Note, however, that this is the type of dislocation that Haspelmath (2019) excludes from his indexing/ co-nomination concept.

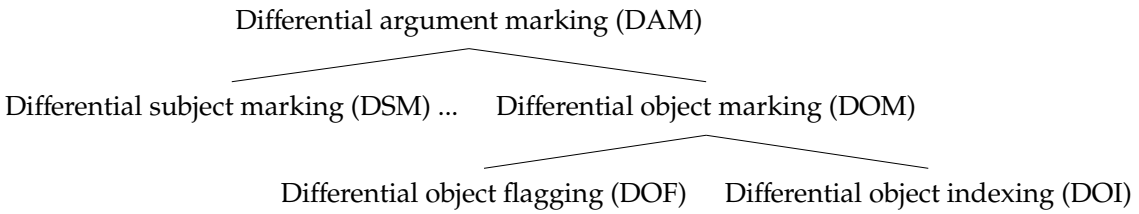
Types of DAM and DOM systems. In a very broad sense, differential argument marking can be defined as "[a]ny kind of situation where an argument of a predicate bearing the same generalized semantic argument role may be coded in different ways, depending on factors other than the argument role itself, and which is not licensed by diathesis alternations" (Witzlack-Makarevich & Seržant, 2018, p. 3). In its broadest formulation, a category (e.g., patient objects) is sub-divided cognitively alongside certain properties or features, these features necessarily being represented in the mind – irrespective of the question if they are semantically motivated or highly discourse-conditioned.

Bossong (1982) already discussed the two main dimensions of DAM systems, namely the argument role or grammatical function that is split by differential marking and the encoding strategy that is used as a marker. On the first axis, DAM systems are classified according to which argument role (agent, patient, recipient) or grammatical function (subject, direct object, indirect object) is differentially marked (i.e., within which of these a split takes place). A general distinction can be drawn between differential subject marking (DSM) and differential object marking (DOM) systems. The other axis concerns the marker that is used to mark the argument in a differential way.

Following the broad perspective from the previous section, there are only two options, either flagging (case and adposition) or indexing (affix and clitic). Following Haspelmath (2013, 2019), the exact sub-division of an index or flag is irrelevant to our investigation.[27] The general pattern is summarized in figure 9.

Figure 9

Types of differential argument marking



Note that I use *differential object marking* explicitly as a cover term for all types of differentially marking objects. Traditionally, DOM is used as a term for what I call *differential object flagging (DOF)* here because it is the logical counter-term to differential object indexing as suggested by Iemmolo and Klumpp (2014) and further outlined in Schikowski (2013). Therefore, when I refer to DOM, I mean both encoding strategies if not specified otherwise. In a similar way, Melis (2018) used the terms *flagging DOM* and *indexing DOM* to avoid confusion. But since I am more centrally concerned with DOI, I stick to this terminology.

DOF covers well-known examples such as Spanish *a*-marking (see example 31 where

[27] Differential subject marking (DSM) can be sub-divided into differential A marking and differential S marking if these two roles are distinguished (in ergative systems), but this is not relevant for our discussion. Similarly, one could subdivide objects if only one of the object types or associated argument roles was concerned (but since I limit my discussion to P arguments as prototypical objects, there is no need to overcomplicate things).

animate referents are marked) or Mandarin *ba*-marking (Peyraube & Wiebusch, 2020), whereas DOI is used to described cases of object agreement, object reduplication, or clitic doubling phenomena. Note that some languages use DOI and DOF at the same time, sometimes called *double marking languages*. This would be the case for Spanish and to some extent Bulgarian.

In the following example (31), DOF is exemplified. Note in the example that *the employee* could also be used without the *a*-marking when it is not specific and not definite, indicating that animacy is not the sole parameter determining Spanish DOF.

(31) Illustration of Spanish differential object flagging (Comrie, 1989, p. 134)

a. Inanimate referent

el director busca el carro/ un carro
ART.SG.M manager search-PRS.3SG ART.SG.M car/ ART.SG.M car
'The manager is looking for the car/ a car'

b. Animate referent

el director busca al empleado/ a un
ART.SG.M manager search-PRS.3SG PREP-ART.SG.M clerk/ PREP ART.SG.M
eampleado
clerk
'The manager is looking for the clerk/ a clerk'

So far, only a formal distinction of different DAM systems has been presented, but already in the short discussion of Bossong's work, it became clear that there is potentially also a functional difference in using either DOI or DOF. This is actually a matter of debate as I will show in the following.

3.2.2 Different accounts of differential object marking

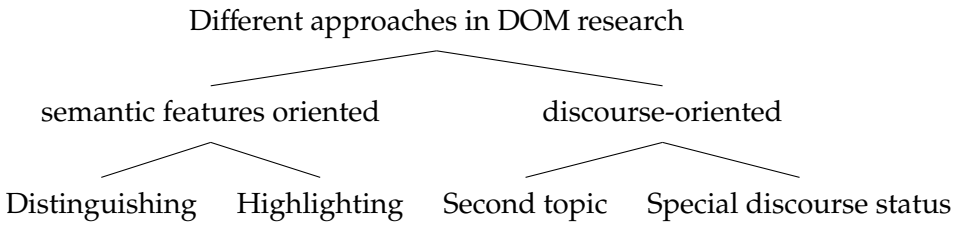
In the last decades, four broad approaches to the investigation of DOM phenomena emerged. These accounts can be subdivided in two large groups depending on the question if they identify the split rather alongside semantic or pragmatic categories, the latter being subdivided into information structure or discourse-oriented accounts. The classification into distinct accounts follows the description by Schikowski and Iemmolo (2015) and is sketched in figure 10.[28]

An important observation is the fact that the first two ("semantic") accounts mainly focussed on differential object flagging. Often, DOI was ignored in these analyses, or it was implicitly assumed that the description for DOF also accounts for DOI. This is a central drop-back considering the fact that already in his first study on DOM, Bossong (1982) discussed potential functional differences between DOF and DOI (see above). In contrast, the accounts emphasizing information structure and discourse include DOI in their discussion.

[28] For an alternative classification into three waves, see Kabatek et al. (2021). In this second classification, my own analysis would be part of the third wave (but outside Romance linguistics).

Figure 10

Different approaches to DOM



It is tempting to overgeneralize this observation and claim that DOF is associated primarily with semantic features, whereas DOI is associated with pragmatic features. This could be explained by the functional difference of flagging and indexing as pointed out by Haspelmath (2013, 2019) and would be in line with the basic observations stated by Bossong (1982, 1985). Unfortunately, things are not that easy, and there are two aspects confounding such a simple classification. On the one hand, sometimes indexes may also receive case-marking (as is the case for Bulgarian). On the other hand, there are some DOF systems that seem to be aligned with topicality, whereas some DOI systems are sensitive to semantic features (as is also the case for Bulgarian, where definiteness is a pre-condition for DOI).[29]

I believe that this issue could be resolved by distinguishing an underlying core function that motivates a particular DOM mechanisms (particularly at earlier stages of grammaticalization) and potential confounds or epiphenomenal features (in the consecutive development). For example, I will suggest later in this dissertation that definiteness is an epiphenomenon of a discourse-based function of DOI in Bulgarian but not the decisive functional motivation for this construction.

Such systems with primary discourse-based functions may overgeneralize to a more overt association of DOI with a semantic feature (e.g., the fixed association of definiteness and DOI in Macedonian). However, it is beyond the goal to prove these tentative suggestions. Additional – and particularly diachronic – research is needed to address this issue in more detail. I am primarily concerned with the synchronic function of Bulgarian DOI, and at least for this language, a discourse-oriented account seems to capture the situation more profoundly as I will argue in the next section in more detail. For now, I restrict myself to a more general description of DOM research.

Distinguishing account (Aissen, 2003; Bossong, 1982, 1985, 1998; Comrie, 1989). The first account is directly related to Bossong (1982, 1985). It makes some underlying assumptions of markedness and assumes a certain prototypicality (in terms of features) of arguments. It is claimed that patients who entail some or all features that are prototypically associated with agents (animacy and definiteness) receive additional marking because they are the marked form. Hence, the split takes place between marked and unmarked (i.e., prototypical) patient objects. In this account, it is emphasized that DOM serves to correctly assess the roles of A and P when both A and P share the same or similar semantic

[29] Nonetheless, definiteness can also be considered a discourse marking property.

properties. DOM is thereby conceptualized as a "syntagmatic opposition between As and Ps" (Schikowski & Iemmolo, 2015).

This view was systematized with respect to argument roles by Comrie (1989). He also argues for an information flow from A to P that is correlated with the flow from animate to inanimate or definite to indefinite. He affirms that deviations from this pattern lead to additional marking and discusses in this context both special verb forms that indicate the deviation and differential marking (of A or P). He states that there is either the option to mark Ps high in animacy, high in definiteness, or As low in animacy. The 4th logical option – marking As low in definiteness – is not attested according to him. He suggests that this is probably the case because this option is avoided in favour of other stuctures, e.g., passives, see Comrie (1989, p. 130). In some languages, a combination of parameters underlies DOM (e.g., in Hindi *ko*-marking). Interestingly, he emphasizes that the marking of A or P is determined independently (either on A or P or both). The marking or features of the other role are not relevant in direct comparison.

In a sense, it appears as if a particular argument (e.g., P) is not compared directly to a particular A in the same sentence but rather compared to a prototypical (virtual) A or P argument. Additionally, Comrie acknowledges that there are not necessarily strict thresholds for the split to occur but that speakers "use the special marker only if there is a likelihood of confusion between A and P; the assessment of likelihood of confusion is left to the speaker in the particular context" (Comrie, 1989, p. 130). This is the first rough formulation of the idea that DOM systems might depend on some level of (assessed) (un)predictability of the argument that potentially receives marking. I will further elaborate on this idea below. A second important observation by Comrie (1989) is that animacy and definiteness are not necessarily clear-cut categories for differentiation and that finer nuances can be found. In other words, these two semantic features are neither unique nor unitary parameters motivating DOM.

Among the most central and well-known studies on DOM research is Aissen (2003). She particularly focusses on the semantic features associated with DOM and – extending previous research – discusses mixed animacy and definiteness marking ("two-dimensional DOM" in her article). She adopts an optimality theory framework with the motivation to cover insights from generative grammar (e.g., the discussion on the syntactic status of indefinites) as well as the functional-typological view (prominence hierarchy). She elaborates on the idea that markedness is the underlying source of DOM systems by emphasizing the interplay of the two principles iconicity and economy. Iconicity captures the idea that more marked objects (in terms of parameters) receive additional marking, whereas the economy principle pressures the system to avoid unnecessary marking. She argues for a "harmonic alignment" of these principles that lead to specific constraints imposed on the particular DOM system.[30]

Aissen (2003) discusses the relational scale (scale of grammatical functions, from subject to object), the animacy scale (human > animate > inanimate), and the definiteness scale (personal pronoun > proper name > definite NP > indefinite specific NP > non-specific NP). Unlike Comrie, she restricts her discussion to grammatical function ignoring thematic

[30] Aissen adopted the concept of "harmonic alignment" from a phonological optimality theory approach (A. Prince & Smolensky, 1993) modelling constraints that capture the paired alignment of an element on different scales.

roles. In her account, harmonic alignment is basically the combination of these scales that leads to constraints with respect to the markedness of elements (e.g., if an element on the left is marked then the element on the right is marked as well, but not vice versa). These constraints are language-specific, as she points out: "languages vary with respect to the 'cut-off' point" (Aissen, 2003, p. 437).

She also uses a notion of prominence in her account by assuming that animacy and definiteness jointly contribute to the prominence of an object, but this general notion of prominence of an argument is less systematic than the prominence concept I use in the next section. The level of prominence is claimed to correlate with the level of marking with prominent objects receiving the additional marking. She associates the constraints directly with this notion of prominence and states that "there is no way that a less prominent object can be case-marked if more prominent ones are not case-marked" (Aissen, 2003, p. 449). This general prominence constraint could also explain why P indexing almost always follows A indexing, irrespective of the concept of prominence that is used here. She also acknowledges that definiteness is associated with the role of a referent in discourse (e.g., the speech roles fixed by the speech situation; definite descriptions depending on previous discourse). This is a reflection of the broader form-function-mapping with respect to referential expressions that I will discuss in more detail in chapter 4.[31]

Besides the theoretical account, Aissen (2003) also discusses many empirical examples for definiteness-driven DOM, animacy-DOM, and two-dimensional DOM (i.e., DOM determined by both categories). For the two-dimensional DOM, she combines the two scales into one matrix. Here, the distribution of DOM can be assessed from top (human pronoun) to bottom (inanimate non-specific NP), the higher ones outranking the lower ones. DOM systems are captured as zones in this matrix. Interestingly, she also mentions "differentially marked object agreement" (hence DOI) as well as object shifts as another form of differential marking and claims that her account is also applicable for these encoding strategy but leaves this issue to future research.

A problem with the account by Aissen (2003) is the somewhat confusing application of markedness and prominence. She claims that marked elements receive the additional morphological marking. Additionally, it is stated that the most prominent object receives marking. However, based on the prominence scale combining animacy and definiteness, agents or subjects are typically considered ranging at the higher end of prominence, however, this is the unmarked situation. Furthermore, in terms of grammatical marking, agents tend to receive less marking. Objects, in contrast, are marked when they are ranked higher on the prominence scale. It does not seem to be practical to apply both concepts at the same time. This leads to correct but confusing statements such as "the high prominence which motivates DOM for objects is exactly the prominence which is unmarked for subjects" (Aissen, 2003, p. 437). Therefore, prominence and markedness are clustered diametrically

[31]Note, however, that in Aissen's account, DOM is motivated by the "grammatical" definiteness at the level of morphosyntax, hence, DOM is claimed to interact with the grammatically encoded marking of this category rather than the underlying discourse-based principle (see Lyons, 1999, on the difference of definiteness as a grammatical and as a semanto-pragmatic category). This is different from the more recent perspective that DOM is directly related to discourse itself (and particularly the notion of DOI being directly related to the activation (prominence) of referents in discourse that I will outline below. Of course, it is also possible to reconcile these views by understanding definiteness as a mediator of discourse prominence/ activation on differential marking (in DOM systems where definiteness does play a role).

toward each other for As and Ps or subjects and objects. In doing so, it is less clear which of these two mechanisms is more centrally motivating differential marking, if one is mediating the other, or if maybe only one of them is sufficient to account for DOM.[32] In contrast to Comrie (1986), she also misses the important aspect that the cut-off point within animacy or definiteness may not be as strict as her account suggests but rather depends on some evaluation of the situation as untypical or unpredictable on the side of the speaker.

More generally, the disambiguation account is widely limited to animacy and definiteness. In the following, we will see that other dimensions may also shape DOM systems. Additionally, the account does not clearly identify reasons why agent-like patients need to be distinguished in a systematic way. It neither accounts for the large variety of DOM systems nor does it capture the subject evaluation present in many DOM systems. However, it has provided the important insight that there might be some association with Ps that exhibit specific features. However, there is the suggestion that DOM is less active in distinguishing Ps from As but rather highlights the patient-untypical features of a particular P. This perspective is expressed in the following account.

Highlighting account (Hopper & Thompson, 1980; Næss, 2004, 2007). In some aspects, this account is similar to the first one with respect to the properties that are involved. However, here, it is argued that DOM serves to highlight salient semantic (and pragmatic) properties of the referents or arguments, such as animacy, definiteness, or the degree of affectedness. In this respect, DOM reflects a "paradigmatic differentiation among Ps" (Schikowski & Iemmolo, 2015) – irrespective of the relationship with A. This account is also called *coding* or *indexing perspective* because "marking is taken to signal specific semantic and/or pragmatic properties of the relevant argument, rather than a particular relation between one argument and another" (Dalrymple & Nikolaeva, 2011, p. 5). To avoid confusion, I stick to the term *highlighting*. This account is mainly outlined in Hopper and Thompson (1980) and Næss (2004, 2007).

Hopper and Thompson (1980) are concerned with the interaction (or transmission) of A to P in an event (in the sense of transitivity) in general and identify a number of features (components) that are characteristic of transitivity (such as agency, affectedness, and individuation). Individuation subsumes several aspects that distinguish agents from patients (e.g., animacy, singularity, referentiality). They assume that the transfer is easier (or more completely affected) the more individuated an object is, as follows from their "transitivity hypothesis" (Hopper & Thompson, 1980, p. 255).

In their analysis, elements that are more individuated receive the special marking in DOM: "it seems to us that the tendency to mark just definite/animate O's reflects the purer object-ness of such O's, and simultaneously marks the higher Transitivity of the clause as a whole"(Hopper & Thompson, 1980, p. 291). In other words, a highly individuated object is ideal in terms of transitivity, and this aspect is highlighted by the additional marking.[33]

[32] In subsequent linguistic research, there is much criticism of the concept of markedness (Haspelmath, 2006), and also the notion of prominence can be considered in a more systematic way (see next section) leading to somewhat different consequences. Importantly, there are also cases where neither the most prominent nor the least prominent element receives marking (see below).

[33] This approach is similar in terms of the semantic categories typically involved, but the underlying conceptualization is clearly different. Hopper and Thompson (1980) see individuation and ultimately the transitivity relation of the elements at the core of DOM. Note, in addition, that DOM is just one of several encoding strategies that they discuss.

Relevant for my discussion is how they locate their perspective with respect to the other accounts. They do not fully reject the idea of distinguishing between subject and object (or A and P) but state that the aspect of distinguishing "has been overemphasized" (Hopper & Thompson, 1980, p. 291). They stress out the importance of the "indexing" (i.e., highlighting) function "which indicates that a certain NP is 'an O', and which only incidentally serves to contrast that O with another NP which is a subject or has some other NP role" (Hopper & Thompson, 1980, p. 291). In that sense, it is less about comparing the A and P in a given transitive event but about contrasting the particular NP that is serving as a P with other potential NPs that could serve in the same role.

Interestingly, they also point to the direction of ultimately grounding the motivation for DOM at the level of discourse (prominence) – as I will argue below – by stating that "the explanation for the salience of THESE PARTICULAR FEATURES is to be found in discourse" (Hopper & Thompson, 1980, p. 294). They elaborate on this some more and also subtly address the idea that DOM comes into existence because there is some level of deviance (or unpredictability) from preferred patterns by giving the following explanation of these mechanisms:

> Users of a language are constantly required to design their utterances in accord with their communicative goals and with their perception of their listeners' needs. Yet, in any speaking situation, some parts of what is said are more relevant than others. (Hopper & Thompson, 1980, p. 280)

According to Dalrymple and Nikolaeva (2011), the account by Hopper and Thompson (1980) treats DOM as a means to signal high transitivity and does not focus on the deviation from a transitive prototype. It is less clear to me why such a situation should be highlighted when other markers (animacy, definite article) already sufficiently establish individuation. It appears that the notion of deviation from a preferred pattern must be included in any account of DOM, and this is less the case in Hopper and Thompson (1980).

Næss (2004, 2007) attempts at reconciling the distinguishing perspective and the highlighting account by overcoming some of the limitations of the previous descriptions. She takes a notion of individuation that is mainly concerned with animacy and definiteness as a starting point of her DOM analysis. However, she questions both the validity of the explanations brought forward by Aissen (2003) (and Comrie, 1989) as well as Hopper and Thompson (1980) of the phenomenon by claiming that affectedness is not really captured in both accounts but contributes strongly to DOM.

Affectedness is a "property which is almost universally ascribed to direct objects" if they are "somehow affected by the verbal action" (Næss, 2004, p. 1191). Affectedness correlates with individuation, and a high level at this property leads to the encoding of an argument as direct object. That is, affectedness or individuation lead to the identification of an argument as (direct) object rather than evaluating an object in terms of its degree of individuation. Therefore, she goes beyond the analysis by Hopper and Thompson (1980) and claims that "clauses that do not have two fairly highly individuated arguments are less likely to be encoded as transitives, and so to have a direct object at all" (Næss, 2004, p. 1191).

The perspective that objects high in individuation are marked as such by DOM is problematic since individuation directly touches on the status as direct object itself. A

stark contrast to Ps with low individuation leads to their non-identification as (direct) objects in this view. She argues that the account of Hopper and Thompson (1980) would have to assume that typical objects are highly affected but lowly individuated at the same time and that these objects – redundantly – receive morphological marking because they are prototypical, hence "unmarked members of their class" (Næss, 2004, p. 1192). Here, she identifies the notion of markedness as the source of the problem (see also Haspelmath, 2006, in this regard).

I agree with her critique that there is only a fuzzy distinction between semantic and formal markedness, particularly when the former is derived from the latter, and that it is far from clear how to relate the two as well as how to relate markedness and a semantic category (Næss, 2004, see p. 1195).[34] In contrast to the binary notion of markedness, prominence in the recent sense allows for a more flexible capturing of different rankings and also entails dynamicity and context-dependency in its definition (Himmelmann & Primus, 2015, see) – as I will discuss in more detail below.

Næss (2004, p. 1202) also rejects the usage of individuation and suggests that "what is being marked by the accusative case is not a high degree of individuation, but a high degree of affectedness" (however, acknowledging that affectedness correlates with individuation). The conceptual opposite of affectedness in her approach is volition which she generalizes to control. Affectedness and control are the two opposite ends of how an event is described, but a particular argument can also entail elements of both. This idea is clearly related to the idea of prototypical thematic roles that are characterized by prototypical features. Agents are characterized by high control and low affectedness, whereas patients or objects are typically with low control and high affectedness. She argues that deviations from this pattern lead to additional marking. In accusative systems, (potentially) low affectedness triggers DOM, whereas in ergative systems, low control leads to special subject marking.

The studies by Næss (2004, 2007) are basically an attempt to formulate a more systematic perspective on the underlying mechanisms of DOM but is not completely distinct from what was claimed before. Interestingly, she also relates affectedness to salience (in the sense of more easily perceptible dimension relevant to human cognition) and mentions the example of Dolakha Newari (Tibeto-Burman) where human patients receive case-marking depending on the giveness or accessibility and, similarly, non-human animates Ps get marked when they are "more saliently affected". Unfortunately, she does not continue in the direction of information structure or prominence, although this example clearly points in this direction, and also does not discuss indexing.

In a simplified manner, one could say that the distinguishing account departs from the notion of a prototypical P (or A), whereas the highlighting accounts take a prototypical transitive event/ transitivity as basic hypothesis (the latter subsuming the former).[35] Yet,

[34] Additionally, she argues that markedness relations (at least in the sense of inclusive asymmetries) are not flexible with respect to context, hence cannot change by context. This is contrary to what is often observed in DOM systems. Therefore, she argues that it is not about markedness between elements (e.g., subject and object as a polar opposition) but rather about relations "with respect to other types" of the same role (e.g., other objects as an inclusive asymmetry). This is a more flexible application of markedness from which follows that "it is marked for objects to be definite, while it is marked for subjects to be indefinite" (Næss, 2004, p. 1199). I will argue below that such binary classifications are not well-suited for the investigation of DOM.

[35] Although the two last-mentioned accounts shift the focus to the event description, they miss to look at verbal features (tense, aspect, mood) as potential mediators or confounds of differential marking although this

both accounts mentioned so far basically predict a comparable pattern and are only distinct with regard to the underlying motivation (as expected, since individuation entails prominence in the sense of definiteness and animacy). Therefore, they are not really distinct in their motivation (see also the critique by Dalrymple & Nikolaeva, 2011, in a similar direction).

A very simple problem with both approaches is that they draw on a very limited set of categories (ultimately, animacy, and definiteness) and that much variation in DOM systems is not captured by these (Dalrymple & Nikolaeva, 2011; Schikowski & Iemmolo, 2015). Therefore, the other two accounts that I will present now approach DOM systems from a different level than semantics (in a wide sense). The first account approaches it from the direction of information structure (particularly topicality), the second from discourse.

Secondary topic account (Dalrymple & Nikolaeva, 2011; Nikolaeva, 1999, 2001). Dalrymple and Nikolaeva (2011), Nikolaeva (1999, 2001) went into another direction and shifted the focus in DOM-research to information structure and particularly topicality as an alternative source for this encoding strategy. Hence, they locate the underlying mechanism in a different area. They adopt a Lexical-Functional-Grammar (LFG) approach to capture the syntactic and representational side of the phenomena.

In addition to the idea to address DOM phenomena from a completely different level, they are among the first to explicitly address differential object agreement (hence, DOI) as a type of differential marking alongside differential object flagging. They acknowledge that there might be diachronic and synchronic differences between differential indexing versus flagging but highlight the commonalities between the two and use a combined notion of differential object marking in their analysis. It is important to note, however, that they make a distinction between agreement ("grammatical agreement") and pronoun incorporation ("anaphoric agreement" in their words, including object reduplication phenomena) and, unfortunately, exclude "anaphoric agreement" from their discussion (Dalrymple & Nikolaeva, 2011, p. 39). They explicitly refer to Bulgarian as an instance of the latter.[36] Their account provides a means to describe the difference between pronominal indexing and affixal indexing in more detail. However, with reference to Haspelmath (2013, 2019), these are all instances of the comparative concept of indexing. The more fine-grained analysis in the LFG framework is not incompatible with the notion of DOI, irrespective of the underlying form that can be used in differential marking (this is also acknowledged in Bresnan et al., 2016).

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clearly influences affectedness and transitivity.

[36]The reasons for this are found in the theoretical account they draw on. In LFG, a difference is made between *agreement* and *pronoun incorporation* based on syntactic and morphological grounds. The main difference is the level of boundedness as well as some syntactic behaviour (for a detailed description, see Bresnan et al., 2016). In pronoun incorporation, the index is a "bound morpheme that specifies a complete pronominal f-structure" (Bresnan et al., 2016, p. 151). The f-structure (functional specification) entails semantic features, binding features, as well as case and agreement features (agreement subsuming the features person, number, and gender). For pronominal elements, the core semantic feature is that it is "uniquely individuated with each instantiation" (Bresnan et al., 2016, p. 152). In contrast, agreement is argued to carry only a subset of the features of pronouns (the agreement features and case). These two are opposite points of a continuum, and Bresnan et al. (2016) argue that many languages are in a transitional state between the two. In this state of transition, the semantic and binding features become optional. They argue that their account also captures more fine-grained transitions by capturing the loss of single feature categories. I do not go further into the technical details here.

I argue that it is fruitful to make a finer distinction between the type of encoding (flagging versus indexing) to capture DOM systems in a more profound way. Similarly, it might turn out to be even more fruitful to also consider sub-types of these encodings (e.g., affixal versus pronominal indexing).

At this point, it seems to be sufficient to investigate DOI phenomena under this common cover term (including agreement, clitic doubling/ pronoun incorporation etc). Therefore, I pressume that the analysis by Dalrymple and Nikolaeva (2011) is also valid for object reduplication. Future research will show if the structural difference is indeed also reflected in functional differences. We could imagine that DOI systems that still use pronominal forms (with all features in the sense of LFG) as an index are still more closely related to discourse factors just because the pronominal source of these features is still transparent to the speakers.[37] Such a view could explain the situation in Bulgarian, Spanish, and similar object reduplication languages.

In the following description of Dalrymple and Nikolaeva (2011)'s account[38], reference is only made to agreement, but I implicitly assume that their main findings also hold for object reduplication (and future research will show if there are differences reflected in function). The basic observation is the case of differential object agreement in Ostyak (see example 32).

(32) Object indexing in Ostyak (Dalrymple & Nikolaeva, 2011, p. 14)

a. Context (Topic): What did he do to <u>this reindeer</u>?

tam kalaŋ we:l-**s**-əlli
DEM reindeer kill-PST-OBJ-3SG
'He killed this reindeer.'

b. Context (Focus): <u>Which reindeer</u> did he kill?

tam kalaŋ we:l-əlli
DEM reindeer kill-PST-3SG
'He killed this reindeer.'

According to the two authors, this split is completely independent of animacy or definiteness but depends on the topicality of the elements as induced by the context question. Since topicality plays a central role in their account I would like to discuss their notion of topicality in more detail. In a general sense, they describe topicality like this:

> Following Lambrecht (1994) and others, we understand topicality as a pragmatic relation that holds between a referent and the proposition expressed by

[37] We could also imagine a grammaticalization path where increasing levels of structural integration correlate with increasing levels of functional narrowing. Hence, the path *pronoun → clitic → affix* could correlate with the path *discourse factors → (IS factors →) semantic category (e.g., definiteness) → fully obligatory to a grammatical function or thematic role*. Note that these claims only make sense for a grammaticalization path from actual pronominal elements to affixes and this does not necessarily directly apply to other structural sources.

[38] In their extensive volume, Dalrymple and Nikolaeva (2011) draw on initial ideas (and fieldwork) brought forward already in two articles (Nikolaeva, 1999, 2001) on object agreement in Ostyak (an Uralic language, spoken in Siberia) and the role of (secondary) topic in this agreement system. My discussion of their approach mainly draws on the large volume that summarizes their account.

> an utterance: topicality has to do with the construal of the referent as pragmatically salient, so that the assertion is made about this referent. Topicality is not an inherent property of a referent, and although it correlates with the role played by the referent in the preceding discourse, the correlation is imperfect. It cannot be unambiguously established on the basis of the referential features of the object either; rather, it depends on the speakers assessment of its saliency within a given communicative context...(Dalrymple & Nikolaeva, 2011, p. 14)

This description is different from "classical" topic accounts (following the central study by Reinhart, 1981) because they relate topicality more directly to salience (an association that was also mentioned by Næss, 2004, 2007). They follow the notion of information structure by Lambrecht (1994) as being related to the "mental representation of discourse referents and states of affairs that the speaker and the addresse have in their minds" (Dalrymple & Nikolaeva, 2011, p. 46). They also refer to de Swart (2007) who distinguishes "semantic prominence" (animacy and definiteness, prominence as in Aissen, 2003) and "discourse prominence", "which reflects the status of an argument in discourse, such as its specificity" (de Swart, 2007, p. 145). I discuss prominence in more detail in the next section. Dalrymple and Nikolaeva (2011) are primarily concerned with discourse prominence but argue that

> [t]he notion of discourse prominence seems to be comparable with our notion of topicality; however, de Swart does not provide a detailed characterisation of discourse prominence, noting only that semantic prominence influences discourse prominence because an inherently prominent element is more likely to be topical. (Dalrymple & Nikolaeva, 2011, p. 15)

Unfortunately, they do not elaborate on the concept of discourse prominence but rather stick to their notion of topicality.

The problem here is clearly the vague definition of discourse prominence at that time. This is even more confusing since they clearly relate to a broader concept located at the level of discourse as reflected also in the following statement: "Topicality depends on the speaker's construal of the situation within the given communicative context, rather than on the noun phrase's referential properties, and relies on the speaker's assumptions about the addressee's state of interest with respect to a referent" (Dalrymple & Nikolaeva, 2011, p. 50). This is also distinct from the notion of *topic-worthiness* (Comrie, 2003) which is more related to semantic features (animacy, definiteness, here in line with the previous DOM accounts called "prominence" features) that contribute to the topicality of a certain NP. There is not necessarily a total overlap of topic-worthy NPs and the actual topic.

A major contribution in their account is that DOM does not have to align with the topic-worthiness in the sense of a property but rather with the topicality, hence based on the role a referent plays in discourse. This is quite distinct from previous accounts and opens a new perspective (that I elaborate on further).[39]

However, Dalrymple and Nikolaeva (2011) do not support the associated notion by Erteschik-Shir (2007) who relates this *singling out* to the cognitive notion of attention.

[39]They also relate their notion of topic to the concept of *link* by Vallduví and Engdahl (1996) that establishes the entity that is singled out to refer to or provide more information to (with a certain notion of switching to an existing referent, with reference to Erteschik-Shir, 2007).

Instead, they focus on the "aboutness relation between a referent and a proposition". They assume that "[t]his relation holds if the speaker assumes that the addressee considers a referent salient enough to be a potential locus of predication about which the assertion can be made" (Dalrymple & Nikolaeva, 2011, p. 49). In that sense, topicality evaluates if the referent is in the "centre of current interest".

Despite this underlying assumption of topicality, they understand topic as a grammar phenomenon (not as a "continuous discourse notion"). They also avoid a discussion of the difference of sentence topic and discourse topic. Yet, they describe topicality as "a relational category rather than a property (unlike animacy or definiteness) , that is determined by the speaker's assessment of its relative saliency" (Dalrymple & Nikolaeva, 2011, p. 219). In their account, DOM serves as a means to distinguish topical objects from non-topical ones by highlighting the similarity between subjects (typical topics) and topical objects.

In general, their notion of topicality is a bit fuzzy in some regards since they still strongly stick to the level of grammar but realise that DOM is apparently influenced by a higher level. In the next section, I argue that this problem can be overcome by adopting the notion of discourse prominence rather than topicality to capture these phenomena. In the remainder of this dissertation, I will provide empirical evidence that this can explain at least the situation in Bulgarian.

This is even more so because they do not only use a notion of (simple) topicality but rather suggest a notion of secondary topic, arguing that a sentence can have several topics and it is most often the subject that is the primary topic. Again, this concept of topic(s) is related to salience: "an utterance with a primary and secondary topic conveys a relation that holds between two salient participants" (Dalrymple & Nikolaeva, 2011, p. 126). They account for another referent than the subject to be topical at the same time. Dalrymple and Nikolaeva (2011, p. 57) explicitly state that

> secondary topic is associated with a topicality or saliency presupposition, just like the primary topic, but it is less pragmatically salient for the speaker than the primary topic. The secondary topic stands in a certain pragmatically presupposed relation to the primary topic; therefore, it cannot appear when there is no primary topic, though the reverse is not true.

It is not clear why they stick to the concept of topicality although their description clearly indicates an association with discourse prominence. Their approach is an attempt to capture that there is a certain ranking among several referents that are (almost) equally accessible in a piece of discourse. This view can be easily resolved by the newer concept of prominence (see next section) that captures the ranking of all potential referents involved in a piece of discourse (see also Bárány, 2014, for criticism on their idea to assume a second topic). In general, I assume that assigning a category all the time is less efficient than keeping track of the prominence statuses of different referents dynamically and that there is no need for the categorical distinction between topics and less topic or non-topic. Of course, an alternative way to look at this situation is to claim that there typically is a discourse topic that does not need to overlap with the sentence topic in each sentence. I will elaborate on that in the next section.

Coming back to DOM in Dalrymple and Nikolaeva (2011), they argue that DOM is the grammatical expression of the role of secondary topic. They discuss several examples

where (particularly agreement) object marking is associated with a (secondarily) topical object.[40] In example (32) above, they would argue that the primary topic is the subject instantiated by a highly explicit form (the subject agreement marker), whereas the object – that is also given as an NP – is additionally marked by the object agreement marker to highlight that it is the secondary topic of this sentence (in this case, because it was given in the context question). This is similar to my general observation that DOI seems to mimic subject agreement in some regard.

They particularly argue for the secondary topic role because they assume that subject is typically the primary topic. Again, it is unfortunate that they still try to save the concept of topicality for no clear reasons here. As I have said before, Dalrymple and Nikolaeva (2011) did not include cases of "pronominal" object agreement, hence object reduplication in their analysis based on the assumptions from LFG.

Nevertheless, their account can be applied for such cases as the following example from Bulgarian illustrates. In a similar way as in their example, one could argue that example (2) – stated again as example (33) here – adds information about the speaker. We could easily ask a context sentence probing for the object (e.g., "What did you love, when you were younger?"). Along these lines, one could assume that the speaker is topical, whereas *these films* are secondary topic.

(33) Context: Forum comment on a movie review article (BG-Web2012, 113659249)

tolkova **gi** običah **tezi** **filmčeta**, kato bjah
so_much 3PL.ACC love.PST.1SG DEM.PL film-DIM-ART.PL when be.PST.1SG
po-malka.
COMPAR-little.F
'I loved these films, when I was younger'

Interestingly, they make an observation regarding the association of subjects and objects. They mention the claim by Croft (1991) who "observes that subjects are typified by 'high topicality', while 'medium topicality' is characteristic of objects" (Dalrymple & Nikolaeva, 2011, p. 125).[41] Keeping in mind that they primarily are occupied with differential indexing rather than flagging this could point at the contribution of the index in giving rise to the association with topicality (or discourse prominence).

I basically agree with their analysis (at least for agreement patterns, hence DOI) but I will argue in the chapter that their notion of topic can easily be replaced by a systematic concept of discourse prominence – capturing the ranking of different referents in a more dynamic and flexible way. It is absolutely not clear if this account also accounts for differential object flagging. An important backdrop of this account is the persistence on using the notion of topicality. This is clearly misleading since they obviously do not have topic in a classical information structure sense in mind but rather a notion that is more closely associated with the level of discourse.

[40] Interestingly, there are also instances with DOF marking secondary topics, for instance in Mongolian. However, with reference to Guntsetseg (2009), they argue that "the decisive factor determining DOM in Mongolian is discourse prominence, in the sense of topicality (Dalrymple & Nikolaeva, 2011, p. 153). This again shows that their concept of (secondary) topic should be reformulated in terms of prominence.

[41] Remember, that indexing is also more typical with subjects and only secondarily developed with objects.

(Special) discourse status account (Schikowski, 2013). The previous account was among the first to acknowledge differential marking with indexing in a direct way. In the final account that I present here, this is equally central as in the account by Dalrymple and Nikolaeva (2011). Iemmolo (2011) introduced the term *differential object indexing* and the account is based on two dissertations (Iemmolo, 2011; Schikowski, 2013) and subsequent work (Iemmolo & Klumpp, 2014; Schikowski & Iemmolo, 2015). In line with Haspelmath (2013), they do not make a distinction between affixal and pronominal indexing. Particularly in a working paper (Schikowski & Iemmolo, 2015), they elaborated on their ideas systematically and try to identify commonalities and differences between DOF and DOI. The following summary of their account draws on this working paper. Although these authors use the term DOI, they still use DOM as a term for what I call differential object flagging (in line with their DOI term).

In addition to a summary of their investigations of DOF in Chintang and DOI in Nepali, they also compare a convenience sample of 127 languages with DOM (127 DOF, 42 DOI) with respect to the main parameters topicality, animacy and definiteness.[42] Based on their sample, they argue that neither the distinguishing account nor the highlighting account (including Dalrymple & Nikolaeva, 2011 in their opinion) does sufficiently capture the data in their sample.

In general, they argue that disambiguation of As and Ps does not really play a role in most cases because many systems with overt (case) marking of A and P have DOM. Additionally, there is no clear reason why differential marking is more frequent with Ps than As if it were to distinguish the two. They conclude that, frequently, a mix of semantic features and a certain notion of topicality motivates DOM systems. In contrast to previous accounts, however, they do not agree with the underlying explanations in previous accounts. Rather, the underlying motivation of DOM systems lies at the level of discourse. They claim that "that the link between DOM/DOI and the semantic and information structural properties we have discussed so far is motivated by the functions these constructions perform in discourse" (Schikowski & Iemmolo, 2015, p. 26). This perspective can capture the role of definitness (and topicality) found in many systems. Due to the more frequent co-occurrence of topic with human or animate and particularly definite Ps, DOM systems might overgeneralize ("conventionalise") to this (semantic) category.

By this, Schikowski and Iemmolo (2015, p. 26) challenge previous accounts and state that

> contrary to what has been assumed in the literature, DOM [=DOF] and DOI systems do not primarily arise from the need to distinguish between the two arguments of a transitive clause or to indicate a high degree of animacy or affectedness of the P referent per se. Rather, they reflect the special status of certain Ps in discourse.

They also identify differences between DOM and DOI that are directly related to their functional grounding in discourse. Although flagging is more directly concerned with the

[42] For DOF, they argue that topicality is the main parameter in 64 % of the languages with DOF systems, followed by dislocation (45 %), animacy (34 %) and definiteness (1 %) (note that some languages have two main parameters). For DOI, topicality was also the main parameter in the majority of languages (58 %), now followed by animacy (41 %) and definiteness (2 %).

semantic or syntactic role, the matching of role-associated features seems to be motivated by discourse as well: "DOM [=DOF] in general seems to be associated with Ps featuring properties which are not expected in this role because they are rarely associated with it in discourse ..." (Schikowski & Iemmolo, 2015, p. 27). Because of this rarity, there is an "unexpectedness of animate, definite, topical Ps in discourse". Interestingly, they also stress that "unexpectedness" is not a property of these Ps but rather reflects the fact that "it is up to the speaker to construe a given referent in P position as 'important' enough to be overtly marked" (Schikowski & Iemmolo, 2015, p. 27).

Ultimately, this is rooted in patterns that are built up via frequency: "DOM [=DOF] is a special type of case marking and therefore intimately linked to properties of the role P – in particular, DOM is associated with Ps with properties that are unexpected because of their low frequency in all Ps." (Schikowski & Iemmolo, 2015, p. 28). Because of this, there is often a notion of discontinuity or shift associated with the occurrence of differential object flagging. This might be the case because there is a referent serving as an untypical patient. In contrast to this, DOI is more directly influenced by the function of indexing in general: "DOI is a special type of agreement and is therefore primarily concerned with reference tracking" (Schikowski & Iemmolo, 2015, p. 28).

Furthermore, they explicitly state that DOI is more directly related to accessibility because it is "a device for encoding highly accessible referents, thus constituting a reference-tracking strategy ..." (Iemmolo, 2012, p. 199). In the next section, I will argue that this can be better captured by the concept of discourse prominence rather than accessibility. Although they locate both encoding strategies at the level of discourse, they associate the two with somewhat different relations: "This difference also matches the different macro-functions of DOM and DOI: referents have a plethora of properties that may serve as the basis for unexpectedness, whereas the trackability of referents depends on their accessibility" (Schikowski & Iemmolo, 2015, p. 28).

In a simple sense, one could say that DOF is more directly related to "unexpectedness" of certain role properties in discourse, whereas DOI is directly related to the accessibility (prominence) of a referent in discourse. In its core, I totally agree with their analysis since this is directly in line with the general difference of flagging (or case) and indexing (or agreement) as stated before by others. Therefore, Schikowski and Iemmolo (2015) provide a logical, typologically oriented account of differential marking. However, I do not agree with them on the role of predictability and prominence. Or, at least, I would like to suggest that their account can be generalized some more.

On the one hand, one could argue that the different properties and their occurrence in discourse with DOF can also be accounted for by a more refined notion of prominence. On the other hand, this helps bridge the gap to the classical DOM approaches but also allows for new insights if we apply a more systematic account of prominence (in the sense of Himmelmann & Primus, 2015). For an application of prominence to the situation in differential object flagging with respect to this recent notion, see for instance Cassarà and Mürmann (2021), Heredero (2021). For a similar shift from topicality to discourse prominence in the diachronic development of Spanish, see Melis (2021).

It might turn out that prominence as such is a powerful tool to account for differential marking even if different domains or properties are involved. Maybe it might be possible to generally state that less prominent elements are promoted in their prominence status

and this is marked. However, I am not concerned with differential flagging in my analysis. In some cases, however, a dynamic ranking in terms of prominence is reduced to a simpler categorical split. For instance, Schikowski (2013) also discusses the role of referential hierarchies for DOF (in Nepali). For his case, he mentions a particular problem with these hierarchies that probably counts for other DOM systems as well: "most relevant variables are either categorical without any possibility of ranking values ... or even binary so that the distinction becomes irrelevant" (Schikowski, 2013, p. 240). This is true for the concept of topicality. A refined concept of prominence, in contrast, captures the ranking in a more dynamic way (see next section).

With respect to DOI, I think that there is also a notion of predictability involved because I believe that this is what motivates differential marking of either kind. Only if there is some feeling or evaluation on the side of the speaker that something is atypical about a referent in a particular role or at a particular prominence level the differential marking is motivated (remember, however, that of course DOM system may overgeneralize to a particular property, this is only the idea for the core function). In other words, DOM systems are similar in that they contain some evaluation of predictability of a particular element in a particular role but they are distinct at which level they primarily operate – reflected in the source. That this may overlap can be clearly seen in mixed DOM-DOI systems (double-differential marking in a sense).

Despite the shared traits, it is important to note that it might never be possible to describe one unitary explanation for all DOM systems: "*the* function of DOM may not exist" (Schikowski, 2013, p. 240). Therefore, prominence and predictability should rather be seen as underlying principles that shape differential marking (and affecting its processing) with different superficial outcomes in specific languages. Nevertheless, there are three important insights that can be drawn from this last account. In general, DOM seems to

- be triggered primarily at the level of discourse
- entail a notion of relative (un)predictability
- depend to some extent on the subjective evaluation (i.e., there are fuzzy edges around a prototypical core function)

I address these aspects in more detail in the following chapters. I will present some natural examples from a Bulgarian corpus highlighting these aspects in more detail in chapter 4. There, it will become clear that the main reasoning in Schikowski and Iemmolo (2015) applies at least to Bulgarian DOI. Before I finally discuss topicality and prominence in more detail in the next section, let me just address some final issues with respect to differential marking.

3.3 Differential object indexing and related constructions

In the last account, it became evident that differential object indexing is a particular encoding strategy that exhibits specific functional purposes that can be directly related to indexing in general with respect to its function in discourse. To conclude this general theoretical discussion of indexing and differential marking, I will briefly emphasize the central features that keep DOI and DOF apart and then discuss DOI with respect to dislocation, because both structures share many formal and functional features.

3.3.1 Core features of DOI and DOF

As was argued throughout this section, it is far from clear if DOF and DOI have the same underlying function, if they are triggered by different functions depending on the marker type, or if they are motivated by the principles prominence and predictability in a unitary way. It is not the goal of this chapter (or the whole dissertation) to investigate this issue. Nevertheless, in order to understand the concept of differential object indexing in more detail, it is practical to point out some of its core features in direct comparison with differential object flagging. For this purpose, the main aspects are summarized in the following table.

Table 3

Differences between DOM and DOF (based on Schikowski & Iemmolo, 2015)

	DOF	DOI
Domain/ dependency	nominal/ dependent marking (Nichols, 1986)	verbal/ head marking (Nichols, 1986)
Structural source	flags: indicating the semantic or syntactic role of the nominal (Haspelmath, 2019)	index: denoting a speech role or a highly accessible third person referent (Haspelmath, 2013, 2019)
Diachronic sources	adpositions, (semi-auxiliary) adverbials, articles, demonstrative pronouns (Kulikov, 2006)	independent pronouns, auxiliaries, pronominal possessive clitics, nominal markers (Seržant, 2021)
Functional aspect (related to source)	associated with Ps featuring properties (e.g., animate, definite, topical) not expected in this role in discourse (because of low relative frequency)	primarily concerned with reference tracking in discourse, esp. in case of potential uncertainty, related to activation and accessibility
Information structural/ discourse structural association	shifting/ contrasting (topic), often in combination with dislocation, topic position or other topicalization	continuity of highly accessible referents, that are otherwise marked with zero anaphora or continuity marker

I discussed the domain and structural source in detail above. In chapter 4, I will discuss the functional aspect and particularly the association with information structure and discourse but restrict this discussion to DOI in line with the aims of this investigation. Another aspect related to distinguishing DOF and DOI is the diachronic aspect. As was suggested already in the overview – and in line with the discussion of flagging and indexing – there are different underlying sources of DOF and DOI in diachrony. I cannot discuss this issue in much detail, but I state some of the general facts.

In general, flags are often derived from adpositions, (semi-auxiliary) adverbial articles, or demonstrative pronouns (Kulikov, 2006). In contrast, indexes typically derive from independent pronouns, auxiliaries, pronominal possessive clitics, or nominal markers (Seržant,

2021) (see also the short note on diachrony in the previous section on indexing). Arguably, at the emergence of DOF or DOI, the use of different markers may lead to different functional motivations (at least early in grammaticalization). Naturally, in the course of grammaticalization of DOM there can be some overgeneralization to more fixed categories or properties. Danon (2006, p. 1005) points out that "DOM might initially arise out of functional factors, and later, as grammaticalisation proceeds, become syntactically governed".

An obvious example is the difference between Bulgarian and Macedonian. Despite their close proximity in structure and genesis, Bulgarian DOI is highly pragmatic and less fixed in terms of a category – with definiteness only serving as a pre-condition but not as a fixed parameter. In contrast, basically all definite objects are cross-indexed in Macedonian. Here, the grammaticalization path correlates with the topographic variation from east to west. More systematic research on the different stages on the grammaticalization path of DOF and DOI is needed.

3.3.2 DOI and dislocation

I discussed some of the syntactical differences between clitic doubling and (clitic) dislocation in the part on generative approaches. I want to come back to this issue here because the distinction of DOI and dislocation is highly relevant for my empirical investigation. Also, as argued by Schikowski and Iemmolo (2015), DOF is often found in combination with dislocation (whereas DOI, of course, is not due to the structural similarity or even relatedness of DOI and some forms of dislocation). Iemmolo (2012) cites an example from Vázquez Rojas Maldonado (2010) of the Mexican isolated language Purepecha:

(34) DOM in Purepecha (Vázquez Rojas Maldonado, 2010)

a. Optional DOM in canonical order

Pedru míti-h-ti eski Juano kaká-ka má tsúntsu-(ni)
Pedro know-PFV-3SG.IND that Juan break-3SG-SBJ one pot(-DOM)
'Pedro knows that Juan broke a pot.'

b. Obligatory DOM with dislocation

Má tsúntsu-*(ni) Pedru míti-h-ti eski Juanu kaká-ka
one pot-DOM Pedro know-PFV-3SG.IND that Juan break-3SG-SBJ
'One pot, Pedro knows that Juan broke (it)'.

Interestingly, in Purepecha no resumptive pronoun is needed in dislocation. In contrast, dislocation in Spanish is accompanied by the same sort of object indexes that are also used in DOI. It seems that flagging and cross-indexing are equally feasible in marking objects that are fronted (either within or without the clause). Of course, DOM and DOI may also both occur with dislocated objects, as in Spanish (the DOM marker is indicated in blue):

(35) DOM and DOI in Spanish dislocation (SVD26-BG)

A la Jesusa la confundían mucho conmigo en el pueblo
to ART.SG.F Jesusa 3SG.F.ACC confuse-PST.3PL often with-1SG.ACC in ART.SG.M village
'Jesusa was often mistaken for me in the village.'

In this case, DOM is not associated with the fronting but rather with animacy whereas DOI is associated with the fronting (and arguably information structure). This can be seen in the following alternation where the flagging of a dislocated NP is optional (without flag being an instance of nominativus pendens or hanging nominative).

(36) Transformation of example 35

(A) **la** **Jesusa,** muchas vezes **la** confundían conmigo
(to) ART.SG.F Jesusa many times 3SG.F.ACC confuse-PST.3PL often with-1SG.ACC
'Jesusa, she was often mistaken for me.'

Interestingly, in the case of dislocation without flagging, the index is not serving as a cross-indexing in the strict sense because it is the element that establishes the argument in the sentence. Without the object index, the argument role of *Jesusa* would not have been established as patient, since the dislocated element is not marked. Here, the pronoun is arguably a resumptive pronoun that serves as a pro-index with all the argument roles. This observation is highly relevant because it points to the dual function of object pronouns in Spanish (and also in Bulgarian). Here, they may work as pro-indexes alone, as resumptive (pro-)indexes in dislocation, and as cross-indexes in DOI with co-nominals.

Remember that in generative accounts, a distinction is made between clitic doubling, clitic topicalization, and clitic (left) dislocation (see chapter 2 for details and tests to keep them apart) and additionally other accounts distinguish clitic dislocation from "real" dislocation. The question is if the last two uses are related structurally, diachronically, and functionally. There are two opposing views in the literature on this issue. On the one side, dislocation is directly related to indexing and considered as step in a grammaticalization path towards cross-indexing in the following form:

> pro-index → resumptive pro-index (dislocation) → cross-index in object fronting (topicalization) → cross-index in canonical

On the other side, dislocation is treated as a construction in its own right. It is noteworthy that these two opposing views do not correlate with a particular school or field in linguistics. To the contrary, such different views also exist within typology for example.

Dislocation in general is defined in terms of the dislocated element. Lambrecht (2001, p. 1050) defines dislocation as

> a sentence structure in which a referential constituent which could function as an argument or an adjunct within a predicate-argument structure occurs instead outside the boundaries of the clause containing the predicate, either to its left ... or to its right ... .

In his account, dislocation is characterized by the "extra-clausal position of a constituent", a "possible alternative intra-clausal position", "pronominal coindexation" (in the sense of resumption) and most often "special prosody". Dislocation structures can be distinguished with respect to the position of the dislocated element and the type of the resumptive element. Dislocated elements may appear at the left of the clause (left dislocation) or at the right (right dislocation). The resumptive element can be a free personal

pronoun, both types of indexes (clitic and affix), a null element and, – in particular cases – a possessive pronoun or affix (Lambrecht, 2001).

Interestingly, the different forms of dislocation are associated with slightly different functions – in addition to some syntactic differences that I do not discuss here. Both are associated with topicality in his account. Lambrecht (2001, p. 1074) points out that left dislocation is typically associated with topic shift or contrastive topic ("announcement or establishment of a new topic relation"), whereas right dislocation is associated with "continuation or maintenance of an already established relation". He emphasises that both relations are associated with referents that are salient to some extent:

> Notice that announcing a new topic for some predication via LD is not equivalent to introducing a new referent into a discourse. As we saw, for a predication to be construed as a comment about an entity, this entity must be discourse-salient, i. e. it must already be a potential topic. (Lambrecht, 2001, p. 1074)

In other words, dislocation operates on salient referents, however, in two different ways.[43] Hence, the difference in position of the dislocated element is highly relevant to the function. This resembles to some extent the findings that I present in chapter 6 of this dissertation for Bulgarian pre-verbal versus post-verbal DOI. I will argue there that it is basically order that is associated with topic whereas the cross-index is associated with the reference tracking in discourse. Such an explanation could also account for the types of dislocation. It is important to note that Lambrecht assumes accessibility (or salience) to be a necessary factor in dislocation but claims that topicality is the underlying mechanisms as the following quote makes clear:

> While different accessibility states can influence the choice of LD vs. RD, accessibility is only a necessary precondition for use of a dislocation construction; it is not the factor determining this choice. A referent with the same accessibility

[43] To illustrate the last-mentioned points, Lambrecht (2001, p. 1074) presents the following, natural example from French taken from an earlier study (Lambrecht, 1987).

(i) Dislocation in French (Lambrecht, 1987, 2001)
Context: A husband and his wife at the dinner table. The husband looks at the food on his plate.

a. Continuation uttered by the husband (right dislocation)

Ça n'a pas de goût, ce poulet
DEM NEG-have.PRS.3SG NEG of taste DEM chicken
'It has no taste, this chicken.'

b. Continuation uttered by the wife (left dislocation)

Le veau, c'est pire
ART veal DEM-be.PRS.3SG worse
'Veal (it) is worse.'

Lambrecht (2001, p. 1074) argues that

> [i]n the husbands remark, RD is appropriate because the chicken on the plate counts as an already ratified topic of conversation, given its pragmatic salience in the discourse setting. ... In the wifes reply, the topic is shifted from the specific chicken on the plate to the generic topic veal.

> state may receive either LD or RD coding, depending on the degree of topicality it has in the discourse situation (Lambrecht, 2001, p. 1075).

It is also interesting to see the clear similarity between left dislocation and DOM and right dislocation and DOI here as will become visible from the nice summary of the new discourse approach to DOM:

> As discussed in Iemmolo (2011), DOM and DOI systems are governed by the very same parameters and both tend to appear with topical objects. The role of topicality, however, is different in the two constructions. DOM is primarily a means of indicating topic discontinuities ... while DOI is a means of maintaining topic continuity throughout the discourse. ... DOI is instead a device for encoding highly accessible referents, thus constituting a reference-tracking strategy ... (Iemmolo, 2012, p. 199-200)

At least for DOI, I will argue that these two functions can be taken together and be better accounted for with a concept of discourse prominence, giving up topicality to some extent. In addition, Lambrecht (2001) points out that the pragmatic difference can also influence the choice of the resumptive element in some languages. He claims that left dislocation in German is restricted to *d*-pronouns because they are associated with topic shifts and not previously established topics in contrast to personal pronouns. However, recent research relates the choice of the pronoun in German with discourse prominence (Patterson & Schumacher, 2021). Hence, in the future, it could make sense to also account for dislocation in terms of discourse prominence rather than topicality.

It is striking that the explanation of dislocation in terms of function resembles the newer perspectives of DOI in many regards. There are clearly similarities between the two, irrespective of the question if it is discourse prominence or topicality that is the underlying source. In the previous section, I discussed potential grammaticalization paths for indexing in general and mentioned one particular account that considers dislocation structures as a mediator for the grammaticalization from pronouns to agreement markers: "In Givón's (1976) account, topicalized nominals turn into subjects. This is sometimes called the NP-detachment hypothesis: agreement markers develop from resumptive pronouns in topicalized constructions" (van Gelderen, 2011, p. 499).

If this account is true dislocation and DOI would be more directly related than sometimes thought. I cannot give a final answer to this discussion because it is more related to the boundedness of nominals within the clause. Haspelmath (2013) excludes dislocation from his indexing framework because of the extra-clausal position of the dislocated elements. But we saw that boundedness as attachment to the verb did not provide much insight into functional differences of clitic vs. affixes. Similarly, it would be a matter of debate if the exact position or the boundary of the clause is an ideal candidate to argue against a similarity of these constructions.

If dislocation turned out to be directly related to indexing, this would widen the scope of indexing research even more. It might turn out that the co-indexation or cross-indexing of a nominal element – irrespective of its position – is at the heart of both constructions in terms of function. If this is true, the joint function would have to be associated with discourse prominence and clearly related to the referent management in form of tracking them throughout discourse. At least for DOI, I will argue in the following that this is true.

3.4 Chapter conclusion

In this chapter, I pointed out that object reduplication shares similarities with subject agreement and showed that both can be treated within one unitary concept – additionally emphasizing the shared functional source. Particularly, it was shown that DOI should also bear some association with the role and function of indexing in discourse. Any functional explanation of DOI – including object reduplication – needs to take into consideration the functional associations stemming from the index.

This association was also in line with recent DOM research that takes indexing into consideration as a differential marker. For this purpose, I summarized the four main approaches in DOM research and highlighted the differences between DOF and DOI in order to describe the concept of DOI. I suggested that Bulgarian DOI might be explained in terms of the insights stated particularly in the last accounts. However, I also noted that often the notion of topic is applied for a situation that can better be captured with a notion of discourse prominence.

Taking this observation as a point of departure, I will discuss the notion of topicality and discourse prominence in more detail in the next chapter. There, I focus solely on the function of DOI in Bulgarian from the perspective of topicality and discourse since this seems to be central to the understanding of its function – as indicated by previous research on Bulgarian as well as recent accounts of DOM in general. My account of DOI for Bulgarian is therefore in line with a discourse-based perspective of DOI (or maybe DOM). In some respect, I depart from Dalrymple and Nikolaeva (2011) by trying to overcome their concept of topic. Similarly, I elaborate on Schikowski and Iemmolo (2015) in terms of prominence. I suggest that discourse prominence captures precisely the intuitions by these last two accounts – at least in the light of DOI. Future research on DOF will show if this can be generalized to DOM in general.

Based on this, I will elaborate my analysis of DOI in Bulgarian within the framework of discourse prominence and provide initial evidence from the corpus. I will then outline the key aspects of my analysis and provide an overview of the empirical investigation of DOI in Bulgarian that follows in chapter 5 to 7.

4 Differential object indexing in Bulgarian

In this chapter, I outline my analysis of differential object indexing in Bulgarian as a marker that is more directly related to reference tracking and the discourse prominence of referents (in the sense of Himmelmann & Primus, 2015, and von Heusinger & Schumacher, 2019) rather than being a topic marker as previously suggested.

Before I apply this analysis to the phenomena in Bulgarian, I discuss the notion of topicality and discourse prominence in more detail in the present chapter and additionally systematize observations with respect to predictability that implicitly turned up in the discussion of DOI. This overview refines some of the functional features associated with differential object indexing and specifies the aspects that are relevant for the empirical investigation.

Based on that, I apply the discourse prominence perspective to DOI in Bulgarian and present initial evidence for this analysis in section 4.2. At the end of this chapter (section 4.3), I outline the empirical investigation that I report in the following chapters.

4.1 The role of prominence and predictability

4.1.1 Tying up loose ends

So far, I have established the perspective that short pronouns in Bulgarian are person indexes in the sense of Haspelmath (2013, 2019) and argued that object reduplication is an instance of differential object indexing, following Iemmolo (2011). Elaborating on this concept, Schikowski and Iemmolo (2015) directly associate DOI with discourse based on the index used in this account.

As I have stated before, the notion of topicality used by Dalrymple and Nikolaeva (2011) can be replaced by the notion of discourse prominence because this concept captures the situation of ranking several referents in discourse and shifting them dynamically in a more direct, less categorial way than the notion of topicality implies. Particularly the notion of discourse topic(s) is nicely complemented by capturing different rankings via prominence.

Additionally, the claim by Schikowski and Iemmolo (2015) that DOM systems "reflect the special status of certain Ps in discourse", and particularly, that "DOI is ... primarily concerned with reference tracking" can be systematized by the perspective of discourse prominence. If DOI were concerned with reference tracking in a general way, it would most likely be marking each instance of P and not be differential.

The idea that DOI is directly related to reference tracking and discourse management due to the use of a person index in this encoding strategy reoccurred throughout chapter 3. To some extent, this is in contrast with previous accounts on object reduplication in Bulgarian (and also earlier topic-oriented) DOM research. As was said in chapter 2, it is often claimed in the literature on Bulgarian, that DOI in Bulgarian is triggered by (sentence) topicality and DOI is frequently described as a topic marker (e.g., Leafgren, 1997, 2002). Nevertheless, I believe that this is due to a misconception at two levels.

At the theoretical level, topicality is often defined in different and sometimes inconsistent ways. I already noted in chapter 3 that some of the notions of topicality that were used in DOI research can better be accounted for by a systematic concept of discourse prominence. Below I will show that this is also the case with some of the more recent

topicality-based accounts for Bulgarian DOI and use their insights as initial evidence for my analysis.

At the empirical level, I suspect that – at least for Bulgarian – the joint treatment of pre-verbal and post-verbal DOI led to a mixing up in terms of the functions that underlie these constructions. In line with the idea of primary functions of argument markers, I have the impression that word order might be responsible for the differences in topicality whereas the core function of DOI is not directly related to topicality – but rather derives from the frequent co-occurrence with word order. I provide examples that support this association below.

In the following, I first discuss topicality in some more detail before I then introduce the concept of discourse prominence in a more systematic way, drawing on the recent accounts developed by Himmelmann and Primus (2015) and – with respect to discourse – von Heusinger and Schumacher (2019).

4.1.2 Disentangling aboutness and activation

Despite the frequent application of the concept, there are quite different notions of topicality that are applied to the investigation of DOI in general and in Bulgarian. In particular, many accounts make use of a notion of aboutness topicality that is blended with some notion of activation of a referent in discourse. Despite the fact that these two functions or mechanisms often overlap in language, it makes sense to keep them apart at a theoretical level. To achieve this goal, it is practical to assume two distinct linguistic levels.

On the one side, discourse structure is more concerned with the overall organization of discourse, including the management of referents that are available at a certain point (Kruijff-Korbayová, 2003). Related to this is the general notion of reference and its linguistic instantiation in form of referring expressions. In a general sense, "a referring expression is a linguistic form that the speaker uses with the intention that it correspond to some discourse entity and bring that discourse entity to mind for the addressee." (Birner, 2013, p. 111). The discourse entity that is referred to is typically called the referent. Reference tracking is thereby a means of discourse management and linguistic forms that are used for this purpose depend on the salience (or prominence) of the referent.

In contrast, information structure is more generally concerned with the order and packaging in which information is presented (in the sense of Chafe, 1976). The difference can be illustrated with reference to the concept of *common ground*. In general, the "common ground consists not only of a set of propositions that is presumed to be mutually accepted ... but also of a set of entities that have already been introduced into the common ground previously" (Krifka & Musan, 2012, p. 3). One could say that information structure guides the hearer throughout the content by providing assistance on how to and in which order to process the content. In contrast, a mechanism of reference tracking at the level of discourse structure is related to which content is entered into the common ground and how central or salient the respective content is.

Very often, different linguistic means are related to one of these two functions but there is often also an overlap between those. Sometimes, information structure is considered to be restricted to sentence-internal processes whereas discourse structure captures the organization of larger pieces of discourse. This is a practical distinction but keep in mind that some linguistic processes that traverse the domain of a sentence and thereby go

beyond information structure in the strict sense (esp. discourse topic) challenge such a simple distinction.

I assume that DOI itself is only associated more closely with one of the two functions (activation in the sense of prominence, see below) and only co-occurs with the other (topicality) in particular cases (especially pre-verbal objects). Below I present examples illustrating this claim and provide empirical evidence supporting this analysis in the later parts of this dissertation. Before that, I want to shortly discuss the notions of topicality and discourse prominence from a more theoretical basis to introduce the final ingredients of my framework of DOI that captures its function in terms of indexing, differential marking, discourse prominence and predictability.

4.1.3 The notion of topic

The notion of topic goes back to early research within the Prague Functionalist School which postulated a distinction into *theme* and *rheme* (Mathesius, 1929). Despite this long-lasting tradition of the concept, the definition and notion of topic is problematic, and there are many different attempts to define and capture this information-structural category (Birner, 2013, p. 212). The most basic distinction that is relevant in a discussion of topic and discourse is the distinction between sentence or clause-level topic and discourse topic (see below). Most commonly, topic is used for the former notion.

A sentence topic is thereby an autonomic category and is defined as "what the sentence is about" (Reinhart, 1981, see also Gundel et al., 1993, Lambrecht, 1994). Lambrecht defines it a bit finer by describing sentence topic as "the matter of current interest which a statement is about" (Lambrecht, 1994, p. 199). In the classical file-card conception (Heim, 1982; Reinhart, 1981) as well as the common ground (management) perspective (Krifka & Musan, 2012; Stalnaker, 2002), the structuring into topic and comment therefore provides instructions to the hearer on how to interpret the sentence and helps him to build up the dependency of knowledge that he has about the entities in discourse. In this perspective, sentences are sub-divided into an element that is commented on and the comment itself.

There is some dispute in the literature on the question which entities can serve as topic of a sentence. Lambrecht, for instance, emphasizes that under his notion of topic, it is possible for every grammatical category in a sentence to be the (sentence) topic, hence enabling for example verbal topics (Lambrecht, 1994). Most accounts, in contrast, associate topicality with referential expressions. In these accounts, only (specific, identifiable) nominal entities are granted topichood, hence, the association of topic is limited to referential NPs with a discoursal antecedent (Erteschik-Shir, 2007; Reinhart, 1981). For the purpose of my investigation, this discussion is not really relevant, since DOI is clearly restricted to referring expressions either way.

Although information structure is often associated more closely with the linguistic structure itself (Kruijff-Korbayová, 2003), there is a strong interaction with the surrounding discourse and context. This is particularly true for topics that are claimed to be determined both by the context of the utterance and by their linguistic structure as pointed out by Reinhart (1981) (but see Erteschik-Shir, 2007, for a longer discussion on the cognitive vs. linguistic status of topics and focus).

Derived from the insight that sentences typically have a topic about which information is provided, it became clear that there is often also a entity that is talked about over larger

parts of a discourse, i.e., in more than one sentence. In this regard, van Dijk (1977) is among the first to explicitly distinguish sentence topic from discourse topic. In his account, he transfers the notion of *aboutness* to larger structures ("macro-structures" in his terminology) and argues that it is rather larger parts of a discourse that are concerned with (= about) a particular referent or entity (whereas single sentences might also only refer to properties of the referent or add contextual information). Both types of topic are concerned with slightly different functions, as he points out: "Sentential topics, as we have seen, determine the distribution of information along sequences of sentences, whereas discourse topics seem to reduce, organize and categorize semantic information of sequences as wholes" (van Dijk, 1977, p. 132).

There are basically two directions how the concept of sentence topic and discourse topic are connected. On the one side, one could argue that a referent who is sentence topic several times can be considered the discourse topic. In this approach, discourse topic is derived only from the formal aspect of repeated mention. On the other side, one could assume that there is also some underlying connection between several mentions in the sense of a mental link. This view is expressed by van Dijk (1977, p. 136) who states that the "topic of (a part of) a discourse [is] a proposition entailed by the joint set of propositions expressed by the sequence." It makes sense to follow the second perspective because even when there is an interruption in the (sentence) topic structure (one sentence with another topic intervened), the previous discourse topic can still be taken up without particular means of encoding.

This is also captured in the "principle of continuity" by Jasinskaja (2009). In her view, "[t]he Principle of Topic Continuity ... says that, by default, discourse topics do not change. These default principles can only be overridden by special linguistic mechanisms" (Jasinskaja, 2009, p. 300). In other words, discourse topics are relatively stable over larger parts of the discourse and this also leads to a relative stability of sentence topics (although both of course do not need to converge in every instance).

When the sentence topic shifts to another referent, this requires explicit marking. Additionally, when an earlier established discourse topic has lost its status due to the intervention of other referents, this re-establishment needs to be marked. Here, it becomes clear that means of reference tracking often may also be used to establish discourse topicality as well as interfere with sentence topic. However, it is also clear that discourse topicality – just like sentence topicality – depends on both the linguistic encoding as well as the context.

I assume that in a strict sense, sentence topics are concerned with information packaging whereas discourse topics extend the information packaging to the level of discourse referents and contribute to their organisation and management as discourse unfolds. Hence, it is concerned with singling out the entity about which more information is to be conveyed in the sentence. I also believe that topics are rather stable, and it requires heavy means to establish topichood. This is not really in line with DOI so far. Often, it is about the relation of several referents and is applied with intricate differences between them that cannot be fully explained by topicality. To be precise, it is not accurate to claim that DOI is not associated with topicality but I claim that the association is different from what was previously assumed.

The aforementioned DOM accounts use a notion of topicality that is somewhat distinct from the core information packaging/ aboutness perspective. Many accounts include a notion of activation and this association is also expectable when indexing is used. I believe

that this aspect of activation is better covered under the notion of discourse prominence. Of course, this does not exclude the possibility that discourse structure and information structure might interfere or draw on the same linguistic encoding strategies.

4.1.4 The notion of discourse prominence

From a theoretical perspective, DOI should be related to some notion of activation. This is also expectable since only definite or specific objects can receive cross-indexing. However, this observations hinges not only on overt marking of definiteness but the involvement of some form of referential activation can also be seen based on other factors. I present examples from Bulgarian DOI illustrating this point below. Also, it is clear that indexing is related to reference tracking and this is related to activation itself. Therefore, it is a good guess to assume a function of DOI in terms of this process.

Because of the centrality of this, I look at this process in more detail now. Just like topic, there is some debate with respect to the concepts of salience, activation, and prominence. I draw on recent proposals brought forward by von Heusinger and Schumacher (2019) (respectively drawing on the general concept of prominence described in Himmelmann & Primus, 2015). I am also going to discuss how this new approach relates to older approaches, drawing mainly on von Heusinger and Schumacher (2019) in the following debate.

At the heart of all the following accounts and the discourse prominence account is the general observation in discourse pragmatics that referents that are introduced and used in current discourse entail a certain cognitive status. It is well-known that different referential forms are associated with this cognitive status of a referent (Ariel, 1990; Givón, 1983b; Gundel et al., 1993; E. Prince, 1981). Specific referential forms thereby serve as "pointers to the cognitive status of a discourse referent" (Brilmayer and Schumacher, 2021, p. 1). This perspective has implicitly and explicitly been stated before in the discussion of indexing. The forms commonly investigated in this regard are (personal and demonstrative) pronouns, full noun phrases, and common names.

In the majority of studies, the focus lies on referents serving as agents because they typically exhibit a high degree or the assumed status. The cognitive status was described from different perspectives, the most widely known – among others – are the notions of activation, attention or centring, activation or givenness, and salience (Brilmayer & Schumacher, 2021; von Heusinger & Schumacher, 2019). In the following, I discuss these approaches and then shift to the notion of prominence and discourse prominence because this newer account captures much of the insights from the previous accounts in a more adequate way.

Earlier activation accounts. The basic idea that referents are "activated" in terms of a cognitive status was brought forward within the *activation perspective* (Chafe, 1976; Lambrecht, 1994). In short, it is assumed that an activation level is attributed to a referent after a representation of this referent is built up and that the form and syntactic role of a referential expression reflects the activation status. Lambrecht (1994) assumes a discourse register (similar to common ground) and attributes his notion of activation not to the referents themselves but to their mental representations.

With respect to these representations, he discusses two attributes. On the one hand, identifiability determines the "speaker's assessment of whether a discourse representation

of a particular referent is already stored in the hearer's mind or not"(Lambrecht, 1994, p. 76). On the other hand, activation is the "the speaker's assessment of the status of the representation of an identifiable referent as already 'activated', as merely 'accessible', or as 'inactive' in the mind of the hearer at the time of the speech act" (Lambrecht, 1994, p. 76). In other words, the first dimension captures which referents are available, whereas the second specifies to what extent these referents are available so that they can be used in discourse.

In contrast to their account, von Heusinger and Schumacher (2019) criticize that the concept of activation in this account is quite static and that it is unclear what characterizes different activation statuses. In particular, this theory only allows for view degrees of activation and does not explain what happens when referents are equally activated (esp. because the activation is considered for each referent individually and not in direct relation to each other). The idea of different activation levels is directly included in the idea of prominence levels but draws on some more specification of what constitutes a prominent (or less prominent) element (see below).

Accessibility accounts. A more direct approach was suggested in form of the *accessibility* or *givenness account* by Ariel (1990) and Gundel et al. (1993), respectively. Both accounts assume that the cognitive status of a referent is directly reflected in the way how this referent is encoded in language, i.e., which type of referential expression is used to refer to it. Somewhat related to this account (and not discussed in detail in von Heusinger & Schumacher, 2019) is the approach by Givón (1983a) who also related different degrees of explicitness/ choice for a particular referential expression and the continuity or accessibility of a referent. These perspectives account for the well-known observation that more activated or highly accessible referents are encoded with less form (e.g., zero forms or short pronouns). The fact that the referential expression directly depends on the mental representation indicates that the speaker uses some form of evaluation of how accessible or active a particular discourse item is at a certain point in time. Typically, cognitive statuses and accessibility/ givenness hierarchies are aligned in such accounts.

The proposal brought forward by von Heusinger and Schumacher (2019) is in line with this general association, but they criticize these accounts at two points. On the one hand, the typical association with hierarchies stated in the past is too static and non-relational. As in the previous accounts, only the activation level of one referent itself is evaluated in determining the referential choice – without considering the encoding of other referents involved. On the other hand, they also do not agree with the underlying mechanism. Prominent elements are not prominent because they are associated with a particular referential expression. Instead, prominent elements have more linguistic operations at their disposal than less prominent elements. Therefore, the selection of particular expressions can be assigned in a dynamical way – taking into consideration the prominence levels of several referents at the same time.

Salience in linguistics. A last notion that is important in discussing prominence is the closely connected concept of *salience*. This term is quite frequently used in linguistic descriptions (see above), but often only a vague intuition is reflected in these accounts and sometimes salience and prominence are used interchangeably in the linguistic literature. Chiarcos et al. (2011) and Falk (2014) attempt to define this notion more systematically (within discourse semantics) and relate the level of salience to the likelihood of a particular

realization of the referent in an utterance and discourse. As I stated in the introduction, I consider salience as a cognitive mechanism related to attention distinct from prominence as a linguistic principle.

Linguistic prominence. More recently, these views were subsumed and elaborated in the concept of discourse prominence (von Heusinger & Schumacher, 2019). This concept directly refers to a more general conceptualization of prominence in language as a general principle operative at all levels of language (Himmelmann & Primus, 2015). At the heart of this account is the general observation that prominence is widely used in linguistics to account for elements that can be considered "to be in the current centre of attention". Additionally, there is some intuition among linguistics that all sorts of asymmetries found in language bear a certain association with prominence (Himmelmann & Primus, 2015). These authors assume that "there is a correspondence between prominence-related linguistic structures and the psychological notion of attention" (Himmelmann & Primus, 2015, p. 40). However, they argue that the correspondence should not be mistaken for identity. Linguistic prominence is part of the linguistic structure and therefore subject to conventionalization (e.g., in language change).

With respect to (psychological/ cognitive) attention, they assume that linguistic elements might be in the 'a-centre' (as a correspondence to mental objects being in the attentional centre). An important difference is that "[a]ttentional centres involve cognitive states of individuals that may change on a moment-by-moment basis. A-centres involve linguistic structures that are shared among all members of a speech community" (Himmelmann & Primus, 2015, p. 42). Importantly, prominence is considered to be a "basic organizing principle in language" that operates on several (or maybe all) levels of language. Himmelmann and Primus (2015) particularly discuss prosodic prominence and syntactic-semantic prominence with respect to argument processing. They propose three criteria for prominence that are argued to be central in the way how this principle organizes linguistic structure:

- "linguistic structures are organized around a-centres, i.e., units that are selected from among other units of the same type 'stand out' in relation to them"
- "a-centering is dynamic and may shift in the running discourse"
- "prominent units serve as structural anchors for their domain"

To shortly illustrate this point, I repeat the example of agent prominence in terms of argument structure from Himmelmann and Primus (2015). In general, agents are typically assumed to be more prominent than patients (principle 1). However, elements other than the agent may also become the a-centre, e.g., when an object is raised in prominence in passive structures (principle 2). In addition, agents govern much of the predication and are prone to the most prominent (left) position (principle 3). Novel about this account is the strong emphasis on the relation of elements among each other (rather than the relation of a particular element to a prototypical instantiation of this element type or a relation to pre-defined features) and the focus on the dynamic shifting that is assumed to constantly take place in language.

Discourse prominence. Von Heusinger and Schumacher (2019) applied this framework to the investigation of discourse. For this purpose, they re-state the principle mentioned above with respect to discourse. In their account, "prominence is an organizational

principle that governs individual referents, eventualities, time points as well as propositions and basic discourse segments" (von Heusinger & Schumacher, 2019, p. 119). They also re-state the prominence criteria in the following way:

- "Prominence is a relational property that singles out one element from a set of elements of equal type and structure"
- "Prominence status shifts in time (as discourse unfolds)"
- "Prominent elements are structural attractors, i.e., they serve as anchors for the larger structures they are constituents of, and they may license more operations than their competitors"

In line with the first principle, different features (such as grammatical function, thematic role, topicality, givenness etc.) contribute to the perceived prominence of an element and thereby serve as prominence-lending cues at the level of discourse. The second principle emphasizes the fact "that the prominence status of an entity changes over time, i.e., the currently most prominent entity can become less prominent as discourse unfolds and an entity with low prominence can rise to high prominence status" (von Heusinger & Schumacher, 2019). This is in line with the descriptions stated above. The prominence of a referent is often stable but might shift to other referents available in common ground. Such shifts are typically associated with particular structures or forms of marking.

In contrast to previous accounts, it is not argued that particular prominence levels are associated with a particular referential expression. Rather, prominent referents can be used with different referential expressions because they are structural attractors to more operations than less prominent elements. In other words, the most prominent referent – although frequently marked with the least explicit form – can also be marked with more explicit forms (depending on different factors determining this choice). In contrast, less prominent elements are typically reduced to less forms, hence exhibit less variation in terms of referential expressions.

Of course, the referential expression is still more or less directly indicative of the (assumed) prominence of a referent. For instance, "[i]n this sense, personal pronouns select the most prominent discourse referent, which is singled-out from all other (less prominent) discourse referents" (Brilmayer & Schumacher, 2021, p. 2). This effect is caused by the fact that prominent referents "are structural attractors by impacting the progression of the discourse as a whole. Prominent entities thus give rise to referential continuity, reminiscent of Givon's (1983) notion of topic continuity." (von Heusinger & Schumacher, 2019, p. 120). Based on these insights, scales or hierarchies can be used as an indicator of referential prominence (but they are not in a 1:1 relationship, as discussed above).

Discourse prominence and shifting. A special point that is captured by discourse prominence is the situation when a less prominent or not prominent element becomes more prominent (or, more generally, when the prominence status of a referent changes). As I have said before, this account emphasizes that several referents have different prominence statuses at the same time because "[i]n this way, we can construct a relational scale of items with different activation levels ..." (von Heusinger & Schumacher, 2019, p. 122). When a larger prominence shift is to be conducted, typically additional (or "more") marking is needed to indicate this shift. This also allows for capturing two important directions in which the cognitive status of a referent can be referred to.

Referential shifting is sometimes considered with respect to the direction in which reference tracking is oriented by linguistic elements. Falk (2014, p. 4) summarizes this backward- and forward-looking function based on Givón (1983b) in a practical way:

> In his approach, backward-looking relations refer to the continuity of referents throughout discourse. Backward-looking salience therefore enhances the predictability that a referent was continued from previous discourse ... Forward-looking salience has the opposite direction: the more discontinuous and 'surprising' (Givón, 1983) a discourse entity is, the more it signals referential importance. In other words, a referent becomes more expected to play a role in the following discourse, and this despite the fact that it is not recoverable or predicted from previous discourse.

Personal pronouns can typically exhibit both functions and to some extent this is reflected in cross-indexing with personal pronouns. In some languages, there are different sets of pronouns that can induce referential shifting to different degrees. For instance, German d-pronouns are typically associated with a forward-looking function but also operate backward-looking by excluding the most prominent referent from the continuation, thereby marking a relatively strong referential shift. Therefore, these pronouns can typically establish a higher prominence-status of a less prominent element (Schumacher et al., 2015). I argue in my analysis that DOI is similar in this respect because it also typically targets less prominent referents or referents whose previously high prominence status became lost. Thereby, DOI also marks a referential shift from the referent that is most expected to be continued to a referent that is possible but less expected to be used for continuation.

Flexibility with the forward-looking potential and referential shifting is captured in the concept of dynamicity within the prominence framework. Although highly prominent elements are typically referred to by highly implicit markings – in line with the backward-looking function – (and ideally overlap with the function of agent and topic), previously less prominent elements that are elevated by a particular linguistic operation that induces referential shifts can become more central. A key aspect of prominence is that unlike former descriptions, it does not capture referents in a binary sense (+/-) but rather can assign different prominence levels for several referents at the same time because it deals with referents in a relational and dynamic sense. This is particularly superior to the notion of topicality that is clearly restricted to a limited set of referents.

Topicality and prominence may overlap, but the concepts capture two different aspects of referents. Of course, "prominent entities represent good candidates for the topic of a particular sentence" (von Heusinger & Schumacher, 2019, p. 124) – just like agents or subjects are more typically and more frequently topics. However, there is no one-to-one correspondence of prominence and topicality. Prominence is a general relational property and particularly associated with discourse representations that

> encodes the current state of the discourse, including potential shifts and updates in the discourse structure and the ranking of entities. At the same time, discourse representation structure is the basis for the generation of predictions for the next discourse units and discourse segments (von Heusinger & Schumacher, 2019, p. 125).

This is precisely the level where discourse prominence operates. It manages the ranked set of discourse units and serves in maintaining and constructing these discourse representations. With respect to referents, it is clearly occupied with managing and tracking these referents.

This is distinct from the underlying idea of topic as a means to manage and sequence the content of information that is conveyed. Often, these two functions converge but "although prominent entities are structural attractors for topicality, less prominent entities can still serve as topics under certain circumstances" (von Heusinger & Schumacher, 2019, p. 125). The reverse is true as well. Highly prominent elements do not need to be topic (neither sentence nor discourse topic). In a sense, prominence status updating is potentially more dynamical than topic assignment.

This framework is particularly useful for the discussion of different referential expressions and allows for a more thorough analysis of the management and tracking of referents in discourse. In line with the previous description of DOI, discourse prominence also should capture many aspects that are missed by a topic-based account. Nevertheless, there is one additional dimensions that needs to be addressed when accounting for differential marking, namely the involvement of some levels of predictability.

4.1.5 An implicit notion: Predictability

So far, I have established the view that DOI is associated with the activation of less prominent referents (and related sub-functions). However, this does not fully explain the occurrence of DOI. In discourse, there are typically more referents that can be considered less activated than DOI is used. If it were the case that (all) Ps at a specific (lower) prominence status receive this marking, it would probably be more frequent. At this point, I want to come back to one important insight from DOI and DOM research. As I have stated before, there is often a certain subjective evaluation in the usage of DOM and DOI.

This is in line with a more general notion that special encoding is dependent on some notion of predictability. The underlying observation is that "[s]peakers, and hence language systems, favour economical patterns, which require a greater amount of coding energy only for less predictable parts of linguistic messages. Hearers are more surprised by less frequent aspects of utterances and thus need more robust coding for them" (Haspelmath, 2021a, p. 607). Haspelmath assigns predictability a central role by emphasizing that "a key factor that aids comprehension is predictability: If the content of a message is not surprising, the message can be abbreviated. Speakers can afford to use short shapes or zero coding for predictable meanings, but they have to make a greater coding effort for unpredictable meanings" (Haspelmath, 2021a, p. 624). In his account, he argues that predictability directly stems from frequency of use.

This perspective of predictability in encoding is directly relatable to prominence. The more prominent a referent is, the more predictable it is in terms of tracking in discourse (and this is reflected in the fact that less coding is sufficient). In other words, prominence features contribute to the prediction with respect to referents in discourse. Subject indexing in Bulgarian is obligatory and marks the subject and agent because it is typically the most prominent element. In contrast, object cross-indexing (i.e., DOI) is used for a more restricted context and thereby signals a deviance or less predictable pattern with respect to discourse prominence. Hence, the role of predictability might be a bit more complex.

Throughout the discussion in this chapter, we saw different statements that seem to address this issue. Let me shortly summarize them here for the sake of illustration (key terms set in bold face). The last two quotes stem from research on Bulgarian DOI and I will discuss those below in more detail.

- "use the special marker only if there is a likelihood of confusion between A and P; the assessment of the likelihood of **confusion** is left to the speaker in the particular context" (Comrie, 1989, p. 130)
- "Users of a language are constantly required to design their utterance in accord with ... their **perception of their listener's needs**" (Hopper & Thompson, 1980, p. 280)
- "referents have a plethora of properties that may serve as a basis for **unexpectedness**" (Schikowski & Iemmolo, 2015)
- "special grammatical coding occurs in **nonusual, unexpected** situation – when role and referential prominence do not go together as they do most frequently" (Haspelmath, 2021a, p. 4)
- "Prominence-lending features corroborate establishing a ranking of discourse entities and this ranking feeds into **expectation-based** processing" (von Heusinger & Schumacher, 2019, p. 125)
- "when the topicality of an object seems **less obvious** in terms of the discourse structure" (Leafgren, 1997, p. 140)
- whether the referent can be *considered* 'accessible' at a particular point in the interaction" (Belloro, 2015, p. 57)

Obviously, not all of these statements necessarily have the same notion of predictability in mind, but the frequent mention of this intuition is arguably not random. In line with the frequency-based account by Haspelmath (2021b), Schikowski and Iemmolo (2015) outlined the role of predictability with respect to DOM in more detail. They claim that the notion of unexpectedness with respect to P derives from an underlying notion of predictability that ultimately is grounded in processing (hence, cognitive) demands. They argue that "[the] propensity of languages to mark Ps with unexpected properties derives from the importance of predictability (Bornkessel-Schlesewsky & Schlesewsky, 2009a; Hume, 2004), which requires grammatical relations in a clause be assigned in accordance with the expectations of the language user, built up through frequency" (Schikowski & Iemmolo, 2015).

In their account, the notion of unexpectedness is directly related to DOF: "This difference also matches the different macro-functions of DOM and DOI: referents have a plethora of properties that may serve as the basis for unexpectedness, whereas the trackability of referents depends on their accessibility" (Schikowski & Iemmolo, 2015). It seems that the notion of unexpectedness is not directly transferred to DOI as well in their account.

In contrast to this, I argue that it also plays a role in DOI. Actually, I assume that a certain notion of unpredictability is a prerequisite for differential marking. There would be no need to differentiate in language if the situation were fully aligned with the predictions of the interlocutors (if it were the case, zero coding would be the preferred choice). However, remember that pure P indexing systems are very rare cross-linguistically, and DOI is also very rare in Bulgarian (and alternative strategies are available).

I assume that adding a notion of unpredictability captures the high variation in Bulgarian better and explains the low frequency of using this strategy. Not those Ps are marked that are prominent or less prominent alone but those that are less prominent and that are to be elevated in prominence or at least brought back to the "centre of attention", this process entailing a certain level of unpredictability (at least assumed by the speaker with respect to the mental representation of the listener). Of course, such an relatively unstable system might be given up quickly for a "simpler" direct association with a feature such as topicality or definiteness as in Macedonian compared to Bulgarian.

Nevertheless, the evaluation of a particular element as being less expected requires the presence of a principle that captures this evaluation process. It is clear that highly predicted situations require less marking, whereas deviances give rise to particular encoding strategies. When a discourse referent is deemed less prominent and the speaker decides to mark the change in prominence, there must be some process evaluation that leads to that conclusion of the speaker (this is probably also true for overt topicalization). Unfortunately, there is no nice framework available that captures this notion in the same way as prominence captures the ranking and managing of different discourse referents. I cannot develop such a framework in this dissertation. Therefore, I only want to state some of the general observations with regard to predictions in language – especially because this issue seems to be of relevance also beyond the domain of differential marking.

Recent accounts in cognitive science as well as philosophy of mind assign predictive mechanisms a central role in human cognition. These accounts are directly related to insights from the neurosciences that emphasize the particular role of top-down predictive mechanisms in the nervous system. In simple terms, it is assumed that the brain constantly creates explanations for its sensory input by generating internal models of the world that are tested against the actual input by the sensory systems. Mismatches between the model and the sensory input are reflected in prediction errors that lead to model updating. It is the general goal of the system to minimize prediction error by reducing the divergence between the predictions and sensation (Friston, 2010). Importantly, such processes do not only seem to be present at lower levels of the neuronal system but also shape much of higher-level cognition. Some cognitive accounts go as far as to that our "mind is shaped by how we manage these predictive efforts" (Hohwy, 2013, p. 258).

Based on the general perspective of prediction in cognition, it is highly likely that there are detectable traces of prediction in the way how language is used, processed, and structured. If language were not guided by clear preferences and structural rules (that are equally anticipated), language would not be such an efficient means of communication. As was pointed out above, it is often assumed in typological research that language users build up certain preferences based on the frequency of using particular structures (Comrie, 1989; Haspelmath, 2021a). Deviations from these preferred patterns lead to "prediction errors" at a linguistic level. When the level of unpredictabiliy (or uncertainty) reaches a certain threshold, special encoding strategies are used.[44]

If we assume that humans tend to avoid prediction errors, this could explain why particular (or simply longer) encoding mechanism are used for these elements. The interesting point about such a principle is the direct connection to cognitive mechanisms and

[44]This can be generalized to other types of rankings and hierarchies – with lower-ranked elements typically being "marked", i.e., less predictable, because they constitute a deviance from a preferred pattern.

ultimately the neuronal source of such a mechanism – inspiring interdisciplinary reasearch grounded in shared basic assumptions on the workings of the brain and cognition.

I imagine that predictability of linguistic elements is a general mechanism or principle that can be found throughout several linguistic domains – not only in differential encoding. Most likely, there is also some reflection of prediction in cognition in prediction in language in a similar way as (cognitive) salience relates to (linguistic) prominence. Future research should elaborate on this issue. The aspect of predictability is very often just implicitly or loosely discussed in language, but it is obvious that it plays a role in how language is shaped and used. At this point, it does not make sense to formulate a strong notion or theory of predictability because much more systematic elaborations are needed in this direction.

At a limited scale, I will take up this perspective in the empirical part, especially in the context of discourse-based expectation reflected in a particular EEG component (see chapter 6). I also come back to this aspect in the conclusion of this dissertation where I suggest some directions for future research. The goal of this last theoretical discussion was to point out that discourse prominence alone cannot account for differential marking completely. In my view, differential indexing is clearly driven by the interplay of these two linguistic principles, prominence and predictability. I assume that both are jointly determining the use and function of DOI. In the following, I apply these principles to the analysis of DOI, systematize this perspective with a definition and provide initial evidence that this analysis accounts for the situation in Bulgarian.

4.2 Differential object indexing - A marker of discourse prominence

4.2.1 Applying the new perspective

I showed in chapter 3 that differential object indexing is a particular referential expression. As was said above, the forms of referential expressions can be taken as indicators of particular prominence levels. This is not to say that a particular prominence level always leads to the same choice of the expression. Nevertheless, a particular expression (or degree of explicitness) can serve as a rough (diagnostic) indicator of a particular prominence status.

Highly prominent elements typically receive less explicit marking with respect to the choice of a referential expression (Ariel, 1990; Gundel et al., 1989). For objects in Bulgarian, using the short pronoun alone is the most implicit form of marking. In contrast, non-prominent elements receive explicit forms of marking that indicate the (strong referential shift) (with finer-grained distinctions supported by the type of the NP or by definiteness and specificity markers).

Based on the description so far, I hypothesize that DOI is a particular referential expression that most likely ranges between these two end points. The use of a person index in this construction and the epiphenomenal association with definiteness points at some association with continuation in terms of reference tracking with DOI. The use of the overt NP, however, would rather be indicative of a referential shift. Since DOI basically combines both forms, it could be associated with a more subtle shift or change in the representation of referents in discourse.

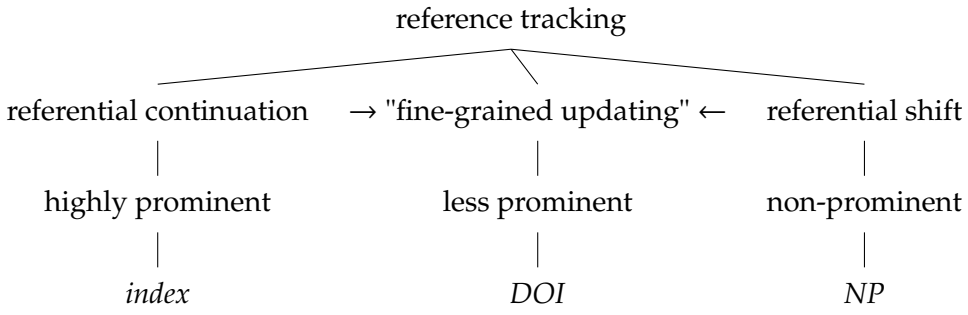
In terms of prominence, this would mean that DOI itself neither addresses the most prominent element (strong continuation) nor a non-prominent element (strong shift) but rather affect the prominence status of referents with a medium level of prominence whose status is elevated to a more prominent position.

Taking into account the role of predictability, this could indicate that DOI is primarily used to signal a less predictable shift in the prominence ranking. In other words, differential object indexing would be associated with the marking of less prominent elements and thereby highlight a subtle nuance of referential shifting among potentially but less predictably continuable referents.

This basic perspective is captured in figure (11) where it is emphasized that DOI entails some intermediate level between the two other referential expressions and their association with the reference structure.

Figure 11

Reference tracking and discourse prominence of Bulgarian objects



It is important to note that such an alignment suggests only a prototypical distribution of the different encoding strategies. As with other linguistic structures as well, one cannot expect clear-cut boundaries between these different functional associations. This is even more true when considering the high level of subjective evaluation found with the use of differential object indexing.

Nevertheless, I assume – based on the theoretical discussion so far – that this assignment captures the primary function of DOI. In the following, I present corpus evidence illustrating different functions of DOI that can be attributed to the joint core derived from this primary function.

My account so far captures DOI with respect to the activation in terms of discourse prominence and the involvement of deviances from typically expected patterns in terms of predictability. I assume that associations with topicality evolve secondarily. As I said before, a raise in prominence can lead to a higher likelihood for a referent to become topic but that does not prove that DOI itself is necessarily a marker of this topic shift or promotion. Therefore, a higher prominence status can correlate with topichood. I assume that in cases where the change in topicality needs to be overtly marked word order alternations (or other forms of topic-marking) are used jointly with DOI.

Based on my analysis so far, let me state a definition of DOI that captures the aspects

discussed so far:

> **Differential object indexing** is a type of *differential marking* of a P referent by means of a *person index* in cases when there is *a certain level of unpredictability* with respect to the (re)establishment or elevation of the *discourse prominence status* of this referent.

This definition captures the acclaimed core function of this construction in terms of discourse prominence (associated with reference tracking) rather than topicality. In general, the status promotion can operate in two shapes either by

- (re)establishing the (discourse) prominence status of a P referent whose status is uncertain or less predictable, or
- by elevating the (discourse) prominence status of one out of several almost equally ranking referents

In the following, I present initial evidence for these two prominence-related functions of DOI in Bulgarian. I first discuss two recent accounts accounts on Bulgarian that support my new analysis. These accounts still draw on a notion of topicality but it will become clear that their notion of topicality can likewise be replaced by an analysis in terms of discourse prominence. After the presentation of these accounts, I provide corpus evidence illustrating the functions associated with my definition of DOI.

4.2.2 Evidence from previous research on Bulgarian

In chapter 2, I summarized some of the classical accounts that assign a topic-marking function to DOI in Bulgarian. Two of them are particularly relevant with respect to my analysis because there conclusions can be related to my account of DOI. They analyses also provide initial evidence for my perspective.

Leafgren (1997, 2002). In one of the most widely known accounts of this sort, Leafgren (1997, 2002) argued that "doubling can be seen as a method of indicating this topic status" (Leafgren, 1997, p. 128). He claims that all instances of DOI in his analysis occur with topical objects. He further explains that DOI is comparably infrequent because of the rare topichood of objects and competing strategies such as object-fronting, intonation, or highly unambiguous contexts. Importantly, in contrast to previous claims, he shows that sentence-initial objects do not have to be cross-indexed by DOI. Leafgren (1997) also argues that definiteness is an epiphenomenon of the underlying topic-marking function.

I agree with him on this aspect but assume a different underlying function. Interestingly, Leafgren (1997, p. 128) himself expresses some dissatisfaction with his analysis: "It would be, of course, preferable by far to be able to identify conditions or factors which prompt speakers to opt to use the 'optional' marker. But such identifications of factors is possible only if they in fact exist". I claim that the usage DOI is conditioned by the evaluation of the discourse prominence status of an object referent and particularly used when there is a (perceived) deviance from an alternative prediction of the discourse referent based on the discourse prominence of the referents involved. To some extent, this perspective is also reflected implicitly in Leafgren (1997, 2002)'s account.

It is noteworthy that Leafgren (1997) also discusses some differences in the underlying topic-concept used in different accounts. Central to my discussion is his explanation in which situation the overt marking with DOI becomes more likely. He states that "it is when the topicality of an object seems less obvious in terms of the discourse structure that a speaker's inclination to mark the topicality with clitic doubling increases" (Leafgren, 1997, p. 140). On the one hand, this indicates that his understanding of topicality is not restricted exclusively to the notion ot sentence-level aboutness topic but bears some clear association with discourse. On the other hand, the statement that there is a certain estimation of "less obvious" relates to the involvement of predictability.

Five years later, Leafgren published a lengthy analysis of the different forms of marking of subjects, direct objects, and indirect objects based on corpus material (Leafgren, 2002). I have already mentioned some of the insights from this study in chapter 2. In the following, I summarize in greater detail the aspects directly related to topicality because this analysis carries some similarities with my account.

Leafgren (2002) applies a notion of aboutness topic operating at the clause level (and not at the sentence level). In general, he refers to the file-card approach to aboutness (but bases this on Sgall, 1975, although the file-card metaphor in the strict sense stems from Reinhart, 1981 and Heim, 1982). In addition, he considers topic to be compatible with indefiniteness, focus, and newness in discourse. He relates his account to the previous account by Guentchéva (1994) who "associates object reduplication with both 'thématisation' and with 'focalisation', depending on whether there is or is not emphasis on the reduplicated object" and captures both options under a joint function of "terme de départ" (Leafgren, 2002, p. 30).

However, he also makes use of a concept of *discourse theme* (i.e., discourse topic) that captures "what a greater stretch of discourse is about", hence entailing a notion of aboutness topic at a higher level (Leafgren, 2002, p. 12). Of course, he acknowledges, that discourse topic and clause-level topic often overlap and that topic is prototypically definite and given.

He sees his account in line with the understanding of communication and information structure as outlined by Lambrecht (1994). In particular, his analysis "investigates primarily the pragmatic, information structure motivations for the selection among various 'alternative' means of referring to participants in the roles of grammatical subject, direct object and indirect object" (Leafgren, 2002, p. 13). He basically investigates the different encoding means for the grammatical functions from a very broad perspective and pays attention to the interplay of different levels involved:

> Central to this is the communication or clarification of grammatical roles, focus, topicality at the clause level, themehood at the discourse level and what might be regarded as the semantic aspects of the message – referential identify and the provision of (additional) information about the participant in question. (Leafgren, 2002, p, . 13)

In contrast to my own investigation, Leafgren (2002) also discusses intonation and prosody (drawing on a spoken language corpus) and equally discusses indirect objects (with the roles of recipients, beneficiaries, and experiencers) as well as cross-indexing of personal pronouns.

In general, Leafgren assumes that different forms express different degrees of explicitness and states the following general distribution for objects – not yet including the interplay with focus, topic, and discourse topic (Leafgren, 2002, p. 5) (I use my terminology here). This description is clearly related to Ariel (1990)'s accessibility hierarchy and previous work but no reference to her is made by Leafgren (2002) (but both draw on Givón, 1976, 1983a). Leafgren (2002) further assumes that highly implicit reference correlates with topicality, whereas explicit reference correlates with focus.

$$\overset{-\qquad\qquad\qquad\qquad\qquad\qquad degrees\quad of\quad explicitness\qquad\qquad\qquad\qquad\qquad\qquad +}{\longleftrightarrow}$$

∅ - index - long pronoun - cross-indexed long pronoun - NP - cross-indexed NP

In summary, his main idea is that "reduplication can be analysed as positively marked for clause-level topicality. It serves as a device employed by language users to signal the unusual packaging ot topical participants as objects" (Leafgren, 2002, p. 164).[45] He also mentions two alternative means to achieve the same effect, namely passives and *se*-constructions (a type of impersonal constructions with reflexives; for details, see Stanchev, 2013).

Leafgren (2002) particularly locates DOI in situations where discourse topic and sentence (or clause-level) topic diverge. As an underlying assumption, he states that – in the case of objects – discourse topicality typically leads to less explicit forms of marking, whereas clause-level topicality that diverges from discourse topicality typically requires more explicit marking.[46] In general, he assumes that "the norm is to maintain the current theme of discourse (or to make any shifts in DT transparent)" (Leafgren, 2002, p. 152-153). In my account, I assume instead that DOI is not determined by this deviance between sentence and discourse topic but by deviances in the discourse prominence status of a referent. Note, however, that both situations may co-occur since more prominent elements or elements that are elevate in their prominence status are also more prone to other linguistic operations, including topichood.

Furthermore, Leafgren (2002) relates the topic (deviance) marking not to a general formal description but rather emphasizes that the evaluation of the deviance from the discourse topic is subject to the speaker's evaluation: "In those rarer cases where it is an object which is topical ... the producer of the atypical clause knows that the utterance is in

[45] Additionally, Leafgren (2002) discusses some examples and earlier studies dealing with the case disambiguation hypothesis. He acknowledges this function in one particular case, namely indirect objects with *na*-drop (i.e., the loss of the case marker) but concludes that "[a]ll other examples of reduplication in both the oral and written data bases can be explained using the analysis based on a function of marking the topic-comment structure" (Leafgren, 2002, p. 136).

[46] In general, DOI is considered as a means to overcome potential conflicts imposed by the diverging levels of topicality:

> If, however, a participant expressed as an object is not a DT [= discourse topic] (or else is not a DT easily perceived as such in the judgment of the speaker or writer), the presence of a clause-level topicality actually works in favor of the specific sort of increased explicitness afforded by reduplication (the R-PP [= cross-indexed pronoun] for pronominal reference, and the R-FNP [= cross-indexed NP] when pronominal packaging is deemed insufficient for semantic reasons). (Leafgren, 2002, p. 152)

a sense abnormal and will not match addressee expectations" (Leafgren, 2002, p. 153).[47]

At the discourse level, he argues that "we find an increased frequency of reduplication for topical objects when they have features less typical of participants being spoken or written about" and that overt marking of topicality at the clause-level becomes more available "when this clause-level aboutness is less in keeping with what the addressee would be led to expect by the content and structure of the preceding discourse" (Leafgren, 2002, p. 179).

I agree with him on this issue but assume that the evaluation takes place by accounting for the prominence status of the referents. A referent with a lower prominence level that needs to be elevated is marked by DOI in order to signal this less predictable updating of the discourse representation that is countering the expectation that the most prominent element is continued in discourse.

In addition to an analysis of some examples, Leafgren (2002) also states some figures based on his examination. He claims that in over 60 % of his sentences with DOI, the object that is cross-indexed is not the discourse topic (but clause-level topic, according to his analysis). Since discourse topics are frequently instantiated by the most prominent element one could reinterpret this finding as suggesting that less prominent referents are selected by DOI.

Unfortunately, he did not evaluate if these referents became discourse topic after they were cross-indexed (this would support the idea of topic promotion or – in my analysis – elevation in prominence). In the remaining 40 %, he claims that the discourse topic is unstable. He identifies three potential ways how the topic status can be unstable:

- "topical DT occurs in a main clause after a major temporal shift in what is being reported" (Leafgren, 2002, p. 181)
- "DT is used as a topic for the first time in the discourse" (Leafgren, 2002, p. 182)
- "DT is being reintroduced as a topic after intervening material in which reference is made to some other performer of a dynamic action (i.e., after reference to a 'competitor' for perceived aboutness at the discourse level)" (Leafgren, 2002, p. 182)

Basically, his functions can be summarized as clause-level topic marking, discourse topic shift, discourse topic raise, and discourse topic reintroduction. He presents examples for all types that are more or less convincing. However, he does not present examples for direct and indirect objects and for preverbal and postverbal DOI for each case. Hence, it is possible that there is some confounding for different sub-types with respect to the function. Instead, the instability could also be due to unclear prominence rankings or changes in the prominence assignment.

In addition – and in line with his assumption that topics might be focal –, he states some examples where DOI occurs with a focal element, both with contrastive and non-contrastive focus. In example (37), *the child* talks about the different pieces she has learned on the piano and contrastingly focuses on one piece that she has not learned yet (this is also

[47] In more detail, Leafgren (2002) argues that animate, definite, dative, 1st or 2nd person, preverbal objects and objects of an impersonal verb are more likely to be topical in comparison to their respective counterparts (inanimate, indefinite, accusative, 3rd person, postverbal objects or object of a personal verb). Deviances in this pattern strengthen the evaluation that a referent might be an atypical or less expected topic.

another instance of DOI with specific but indefinite referents). In this example, a referent is selected from a set of almost equally ranking elements. This promotion is reflected in a higher prominence status of this selected element and the focal interpretation of this entity supports the idea that this does not have to interline with topic assignment.

(37) DOI with contrastive focus (Leafgren, 2002, p. 149)

Context: A person talking to a child who is learning to play the piano. The person asks the child what kind of songs it plays. And the child answers:

Razni pieski. Ama **edna** ošte ne săm **ja** naučil, zaštoto
various pieces but one still NEG be.PRS.1SG 3SG.F.ACC learn-PTCP.SG.M because
e mnogo trudna.
be.PRS.3SG very hard
'Various pieces. But one I haven't learned yet because it's very hard.'

This is even more so in the following example (38), where a completely new discourse entity (*comrade Slavčeva*) is introduced and marked with DOI. This referent was not mentioned before in this piece of discourse. In line with a topic-based analysis, one could argue here that the referent is topicalized because a comment is made on it. However, one could also argue that a non-prominent referent is brought to a more prominent status. In my analysis, this would provide an example for a more peripheral use of DOI to promote also a completely non-prominent referent.

(38) DOI with non-contrastive focus (Leafgren, 2002, p. 149)

Context: A person telling a story from the past and mentioning the sudden, unexpected appearance of another person at a train station.

i razgele tam namiram **ja** **drugarkata** **Slavčeva**, kojato si
and just_now there find.PRS-1SG 3SG.F.ACC comrade-F-ART.SG.F Slavčeva who REFL
podava čarovnata glava ot edno kupe
stick_out.PRS-3SG charming-ART.SG.F head from one compartment
'and just then I spot comrade Slavčeva there, who was sticking her charming head out of the compartment'.

In sum, there are important insights from Leafgren (2002)'s study, namely that DOI is related to some deviance in the discourse status of the referents involved. However, it is less clear why he sticks to a notion of topicality in his account. The deviations from discourse topic could also be re-interpreted as overtly marking the shift in discourse (prominence) status rather than topicality.

In most of his sub-functions, there is a notion of (re-)activation of a particular referent. In line with the general discussion given above, I believe that the discourse prominence perspective should be applied here rather than topicality to account for this. Additionally, he does not make a distinction between pre-verbal and post-verbal objects nor between indirect and direct objects in his account. Maybe, some of the topicality effect might be attributed to order instead – leading to some confounding in his study.

Leafgren also misses to emphasize one important point that is relevant in this direction. In most cases, an element is overtly marked that is given in the previous discourse (except

for the situation where a new referent is introduced). These elements are not discourse topical – as he points out –, but arguably these referents are active or at least accessible to some extent (i.e., they have a medium-level prominence status). In the case of discourse-new referents, it is possible that they are actually identifiable (hence also more active than truly brand-new entities). In most cases, it seems that DOI is particularly concerned with a special group of referents that is neither highly active (and discourse topic) nor brand-new (and unaccessible) but rather at a medium level of discourse prominence.

Ovcharova (2018). Leafgren (2002) did not treat pre-verbal and post-verbal DOI differently. In contrast, a more recent analysis of pre-verbal DOI was presented by Ovcharova (2018). She investigated exclusively the function of "clitic doubling of the proposed direct object" (i.e., preverbal DOI) in Bulgarian. In line with the general description of object reduplication in chapter 2, Ovcharova (2018) distinguishes completely obligatory DOI (with particular lexical classes or as a true disambiguation marker) from pragmatically driven DOI.

For the latter, she discusses two main aspects. Firstly, DOI cannot occur with contrastive (emphatic) focus but may occur with non-constrastive focus, as in the following example.[48]

(39) DOI with pre-verbal, focal objects (Ovcharova, 2018, p. 11)

Context: What car would you prefer - small and fast, or big and slow?

I **dvete** **gi** iskam
also both-ART.PL 3SG.M.ACC want.PRS-1SG
'I want both.'

The second (and arguably more prototypical) group is DOI "as a topicality marker ... in oral discourse for discourse-old referent or when a referent of an expression is activated into the discourse although such an element usually bears prosodic prominence" (Ovcharova, 2018, p. 10). The first claim is not really novel since all accounts of topicality or definiteness of DOI assume givenness in discourse as a pre-condition (and this is questioned by example 38).

In the following example, previously introduced entities (*the clothes*) are re-referenced by preverbal DOI. Here, they are arguably topical and also entail a certain notion of contrast:

(40) DOI with discourse-old elements (Ovcharova, 2018, p. 13)

Njamam nishto [nikakvi dreški] za davane az. Hubavite gi vze sestra
NEG.have-1SG 3PL.ACC none clothes to giving 1SG nice-ART.PL 3PL.ACC all sister
mi, a drugite gi podarih na edna žena săs 2
3SG.POSS and otherART.PL 3PL.ACC give_away.PST.1SG to one woman with 2
deca ot našija kvartal
children from our-ART.SG.M quarter
'I have nothing [clothes] to give away. The nice ones, my sister took them, and the others [I] gave away to a woman with 7 children living in the area.'

[48] Note that I only present the target sentence with DOI in Bulgarian here and the context in English for the sake of readability. I follow the same procedure in other examples of this section.

The final function that she identifies is the case where "clitic doubling also occurs with activated referents of preposed NPs, or in other words, these NPs realizing the Od [=DO] introduce inactive referents in the discourse" (Ovcharova, 2018, p. 14).[49] She explicitly argues that "activated identifiable but inactive referents" are marked by DOI as in the following example:

(41) Activating "activated identifiable but inactive referents" (Ovcharova, 2018, p. 14)

Context: Before Christmas I found out that my husband has a lover – my daughter's age. In fact I had suspected him for a while, but I became certain of it not long ago. Believe me, it didn't affect me in any way. I simply said to myself that that's how it is supposed to be.

Rešenieto za razvod go vzeh na sekundata.
decision-ART.SG.N for divorce 3SG.N.ACC take.PST.1SG in second-ART.SG.F
'The decision to divorce, [I] took it in a split second.

Ovcharova (2018) argues that *the divorce* is identifiable and activated by the context to some extent. She claims that this is an instance of activation and topic promotion and DOI basically achieves this function here. Note in addition, that this is an instance of an indirect anaphoric reference in a (topic) shifting context.

As was pointed out in section 4.1, the activation of a referent is captured by the concept of discourse prominence. Activating inactive referents would therefore translate to the promotion of none or less prominent referents. Ovcharova (2018, p. 14-15) states that

> [t]he occurrence of clitic doubling in the example above is admissible due to the fact that, although the constituent is new to the discourse, it expresses given or hearer-old information in the sense that this information represents 'knowledge which the speaker assumes to be in the consciousness of the addressee at the time of the utterance' (Chafe, 1976, p. 30, as cited in Birner & Ward, 1998, p. 10).

Therefore, in her account, DOI is concerned with a notion of activation of less activated material (i.e., the promotion of less prominent referents). Her analysis suggests that DOI operates on a particular level of activation (or prominence). She also mentions cases where DOI is "changing the line of narration by introducing a new-to-the-discourse topical referent" (Ovcharova, 2018, p. 16).

The suggestion by Ovcharova (2018) is directly in line with my discourse prominence explanation. There is no clear reason why she still sticks to the concept of topicality although she clearly described DOI in terms of accessibility and activation. Of course, a highly active or activated (i.e., prominent) referent might additionally serve as the topic – and the preverbal position strengthens this interpretation –, but it is not clear why she needs to assign a topic-marking function to DOI where prominence marking might be considered a function in its own right – directly derived from the general function of indexing.

As I have said before, I believe that there is a confusion of the two functions of topic marking and highlighting prominence alternations of referents when dealing with cross-indexed and fronted objects at the same time. I also believe that some of the confusion

[49] In her account, Ovcharova (2018) applies a notion of activation states taken from Chafe (1976) who subdivides referents depending on their accessibility or activation state into *active*, *semi-active (accessible)*, and *inactive* referents. In addition, she applies the additional subdivision of inactive referents into *identifiable but inactive* and *unidentifiable/ brand-new* referent suggested by Lambrecht (1994).

regarding topicality stems from the joint treatment of preverbal and postverbal DOI in older accounts. It might be the case that it is the order difference that really leads to the topic marking, whereas DOI is concerned with something else.[50]

Interestingly, there is a similar observation made for (Buenos Aires) Spanish that DOI is (irrespective of order) a marker of accessible but less active referents (Belloro, 2007, 2015)[51]. Belloro (2015) suggests that object indexes alone are used for active referents, DOI is used for accessible (but less active) referents, and NPs are used for inactive or new referents (basically irrespective of the the grammatical function). She is among the first who tries to overcome topicality in the discourse-oriented accounts of DOI. I believe that getting rid of (or at least circumventing) topicality in trying to explain differential object indexing might lead to new insights and a more accurate understanding of this phenomenon.

Similarly, García-Miguel (2015) and Melis (2018) refer to some notion ot topicality that is associated with a certain notion of activation in the tradition of Givón (1983b) and Lambrecht (1994) in their studies of Spanish DOI. These accounts are in line with the general discussion of indexing and differential marking and the concept of activation can directly be captured by the concept of discourse prominence as outlined above.

4.2.3 Evidence from corpus data

As we saw throughout this chapter, there are good reasons to assume that DOI is related to some notion of reference tracking in discourse and particularly operates with respect to the discourse prominence status of the referents. The analyses of previous accounts can be translated to this perspective.

It seems that DOI favours certain referents whose prominence status needs to be updated or elevated (particularly when this elevation or re-activation is potentially unpredicted). In addition, there is some indication that topicality is not necessary to account for

[50] This suggestion is actually not new but was brought forward also by Alexandrova (1997). She argues that only clitic left dislocation (here in the sense of preverbal DOI) is associated with topicality, but clitic doubling is not – based on syntactic claims.

[51] A brilliant example for her account is quoted in the following (I restrict this example to the target sentence but indicate the referents in Spanish in the English translation of the context).

(i) Activation of "accessible but less active referents" (Belloro, 2015, p. 56)

Context: 'Look, the other day on the bus a 'porteño' gets on, a very typical 'porteño'. And the guy who drove the bus— was another very typical porteño, those that drive on the side— at a forty-five degree of angle with respect to the wheel. And this guy I don't know if he paid him with a hundred-peso bill or five hundred and the other guy gave him change...eh... notoriously in coins— any amount of them. Then this guy when he received the impact of all those coins, that he didn't expect, sat there with his hand still in the shape of a scale as if weighing them and staring at this brutal pack of coins.

Y **lo** miró fijo y provocativamente **al** **colectivero**
and 3SG.M.ACC look.PRS-3SG straight and provocatively to.ART.SG.M bus_driver
'And he looked at the bus driver straight and provocatively ...'

In this example, two referents are referred to several times. In the second half of this excerpt, one referent is more prominent and referred to by subject indexes only at several instances. Arguably, this referent stays the discourse topic over this part. Then, the second referent, is to some extent less accessible but re-activated as an object into discourse. Here, DOI is used to signal this re-activation, i.e., a previously prominent referent who lost its status in between is re-activated to a more prominent position.

these cases.

In order to support this perspective, I present eight natural examples from Bulgarian that fall into the following functional domains:

- select a referent that is directly accessible to the interlocutors due to proximity or previous mention (without and with topicalization)
- activate a referent that is accessible/ identifiable in general (but not prominent) in discourse (without and with topicalization)
- singling out one out of two (more or less) equally accessible referents to activate one of them (without and with topicalization)
- reactivate a referent that was active before but whose status got potentially lost or uncertain (without and with topicalization)

These four functions can directly be associated with discourse prominence in the sense outlined above. Activation and selection or singling out directly affects the prominence status by increasing it.

In addition, one example is given where a referent is topicalized but not marked with DOI, hence arguably the prominence status shift is not necessarily signalled. In contrast, in example (38), a focal element was marked by DOI signalling the promotion to a higher prominence level without establishing topicality.

Select a referent (proximity/ deictic reference). In the first example, three people stand together and two are having a conversation. One of them asks the second one about the third and thereby brings him to attention in discourse. For this purpose, the third referent is cross-indexed. However, no additional comment is made about this referent and no topicalization via order is used (in contrast to the second example).

(42) *Context: Barceló to the old Sempere (pointing at his son)* (SDV01-BG/ES)

Sempere, ama s kakvo **go** hranite tova **drebosăče**
Sempere but with what 3SG.M.ACC feed.PRS.2PL DEM.SG.N little_child-DIM
'Sempere, what are you feeding this little fellow?'

A similar situation can be found with additionally indicating topicality via order and subsequently commenting on this new topic. In the following example (43) two interlocutors are standing in front of a stationary store and look into the window of the store. The father promised his son to buy him a particular pen. They look at the pen and discuss it. In the sentence following the example sentence a comment is made on the now more prominent and topical *pen*. Here, the object index *ja* cross-indexes *the pen* and emphasizes the selection and prominence raise of this discourse referent (that is directly available from the surrounding).

(43) *Context: looking into the window of a stationary store* (SDV05-BG)

tazi **pisalka** nikoj njama da **ja** vzeme
DEM.SG.F pen nobody FUT COMP 3SG.F.ACC take.PRS.3SG
'Nobody will take this pen away [before we buy it].'

Both examples illustrate how DOI is used to select a referent that is more or less available to the interlocutors leading to a higher prominence level of the respective referent and making it attributable to more linguistic operations (esp. topicality).

Activate a generally accessible referent. Similar to the first case, referents that are not previously mentioned but widely accessible due to world knowledge may also receive indexing. In the following example, the text is about the improving economy of Bulgaria. Particularly, the author talks about the car industry and refers to *the Germans* in a generic sense. This referent was not directly mentioned before but can be considered highly identifiable at this stage – hence the promotion of this referent is supported by DOI.

In this example, the referent is not topicalized as an object and no direct comment is made on it when serving as the acclaimed topic. Rather, it seems, the referent was promoted from a lower activation to a higher one in order to license it for subject-hood in the next sentence. This example illustrates that DOI is not used to directly shift topicality to this object referent but rather to promote its prominence status and thereby allowing for more linguistic operations (subjecthood in this case).

(44) *Context: Comment on the improving economy of Bulgaria* (BG-Web2012, 715644717)

sega veče **gi** ozorihme **germancite** – šte trjabva denonošno
now already 3PL.ACC pressure.PST.1PL German-ART.PL – FUT must.PRS incessantly
da proizvežd*at* mercedesi, ta da ima za vsički ni
COMP produce.PRS.3PL Mercedes-PL so COMP have.PST.3SG for all 1.PL.ACC
'Now we pressured the Germans – they will have to produce Mercedes around the clock, so that there will be enough for all of us'

In the second example (see example 45) a highly identifiable referent (the famous Asturian dish *fabada*) is introduced and topicalized because a comment is made on it directly as an object. Here, I argue that DOI is used to signal the sudden raise of a less active (but identifiable) referent to a higher discourse prominence status. In addition, the order alternations directly captures the co-occurring shift in the topic assignment.

(45) *Context: A side comment on a former costumer* (SDV04-BG/-ES)

turist janki, ubeden če **fabadata ja** e
tourist yankee convinced COMP fabada-ART.SG.F 3SG.F.ACC be.PRS.3SG
izmislil Heminguej v San fermines
think_of-PTCP.SG.M Hemingway in San Fermines
'... a yankee tourist, who was convinced that Hemingway invented fabada in San Fermines'

Both examples illustrate that DOI can also be used to elevate the prominence status of referents that are generally identifiable or inferable without previous mention.

Single out one of two or more referents. DOI can also be used to activate one out of two or several referents that have comparably high prominence rankings (or whose exact ranking is unclear). This is illustrated in the next example where the preparation of *tarator*, a Bulgarian cold soup, is explained. In this example, one out of two almost equally prominent referents (*walnuts* and *dill*) – that were both introduced together in the previouse

clause – is selected and brought to the centre of attention. In the following, however, *tarator* is in the centre and the continuing discourse topic.

(46) *Context: On the preparation of tarator* (BG-Web2012, 486920412)

zabravih, ako imate orehi i kopăr, ne vseki **go**
forget-PST.1SG when have.PRS.2PL walnut-PL and dill NEG everybody 3SG.M.ACC
običa **kopăra**, no e prekrasen, taratorăt...
love.PRS.3SG dill-ART.SG.M but be.PRS.3SG great tarator-ART.SG.M
'I forgot, when you use walnuts and dill, but not everybody likes the dill, but it is great, the tarator ...'

An interesting case is provided in the following example where the author discusses two former prime-ministers of the socialist party. In the final sentence, the first singles out the one person with DOI, topicalizes him by order and comments on him directly and then uses exactly the same marking for the other one (expressing contrast as well). Here, arguably, DOI is uses to differentiate the distinct association with each referent.

(47) *Context: A comment on two former prime-ministers* (BG-Web2012, 172879372)

imam predvid nastroenijata okolo Ivan Kostov. Ne otričam, če
have.PRS.1SG in_view_of mood-ART.SG.F around Ivan Kostov NEG deny.PRS.1SG COMP
negovoto pravitelstvo verojatno e napravilo naj-mnogo
3SG.M.POSS-ART.SG.F government probably be.PRS.3SG commit.PTCP.SG.N SUPER-much
dalaveri ot vsički, može i taka da e. no săšto taka e
fraud-PL of all may.PRS.3SG and so COMP be.PRS.3SG but also so be.PRS.3SG
fakt, če negovoto pravitelstvo ni izvadi ot
fact COMP 3SG.M.POSS-ART.SG.F government 1PL.ACC pull_out.PST.3SG from
tinjata, v kojato bjahme zatănali do ušite blagodarenie na Žan
mud-ART.SG.F in which be.PST.1PL stuck.PTCP.PL to ears thanks to Žan
Videnov. Drug fakt e, če **Ivan Kostov** ošte **go** pljujat
Videnov another fact be.PRS.3SG COMP Ivan Kostov still 3SG.M.ACC spit_at.PRS.3PL
vsički, a **gospodina Žan go** zabravihme.
everybody but mister-ART.SG.M Žan 3SG.M.ACC forget.PST.3PL
'I mean the mood around Ivan Kostov. I do not deny that his government has probably done the most scams of all, it may be so. But it is also a fact that his government pulled us out of the mire we were up to our ears in thanks to Žan Videnov. Another fact is that Ivan Kostov is still spat upon by everyone, and/but we have forgotten Mr. Žan.'

Both examples suggest that DOI can also express some level of contrast when two (or more) referents are comparably prominent. The second example clearly shows that DOI can even be used to highlight both referents consecutively.

Reactive a previously active referent. In line with Ovcharova (2018), I believe that reactivation of previously mentioned referents is among the most central functions of DOI because this is most in line with what to expect when indexing and differential marking

is used. Nevertheless, I believe that this can be accounted for in terms of discourse prominence.In the following example the speaker talks about an entry in the facebook timeline, mentions the timeline itself (in a prepositional phrase) and then shifts to the timeline as object because it becomes the centre of attention (looking at the timeline itself and not the entry as such) and this is directly followed by another comment on the entry (now as subject).

Arguably, *the timeline* was activated as a referent (and remains active at a lower level) but since it is directly talked about this reactivation at this point is re-initiated with DOI. However, no direct comment is made on the timeline but rather about the entry and therefore no topicalization needs to be assume here.

(48) *Context: A forum entry about deleting a post from the facebook timeline* (BG-Web2012, 19848462)

sega săm ja iztrila, da ne se pokazva v
now be.PRS.1SG 3SG.F.ACC delete.PTCP.SG.F COMP NEG REFL show.PRS.3SG in
dnevnika mi, no kogato **go** razgleždam **dnevnika**
timeline-ART.SG.M 1SG.POSS but when 3SG.M.ACC view.PRS.1SG timeline-ART.SG.M
kato publik, si stoi datata na prisăedinjavane.
like public REFL stand.PRS.3SG date-ART.SG.F of joining
'Now I deleted it myself so it doesn't show up in my timeline but when I look at the timeline from the public view, the join date is (still) there. '

Another brilliant example is the following where one referent (*Jesusa*) is introduced and referred to several times (also by the most implicit means). Then, several other referents turn up (indicated by different colors) and obscure the discourse status of what was before arguably the discourse topic. *Jesusa* is then re-introduced and topicalized. This makes sense because the sentence is directly commenting on her whereas she is also re-established as highly prominent entity. This suggests that both functions are distinct from each other.

(49) *Context: Fermín talking about his sister Jesusa* (SVD26-BG)

V moeto semjstvo vsički vinagi sme imali uskoren metabolizăm.
in my family all always be.PRS.3PL have.PST.PL accelerated metabolism
Sestra mi Hesusa, mir na praha í, beš-e v săstojanie da
my sister Jesusa peace on ash her be.PST.3SG in state COMP
zjad-e tortilja s kărvavica, šest jajza i presen česăn kăm
eat_up.PST.3SG tortilla with blood_sausage six eegs and fresh garlic towards
sredata na sledobeda i posle da se otlič-i kato kazak na večerja.
middle of afternoon and later COMP REFL excell.PRS.3SG like cossack at dinner
Vikaha í "Černoto drobče", zašoto stradaš-e ot halitozis.
call.PST.3PL her black liver-DIM because suffer.PST.3SG from halitosis
Bedničkata. Znaete li, beš-e săštata kato men. Săštoto ličice i săštata
poor_girl know.PST.2PL Q be.PST.3SG same like me same face and same
izjaštna figura s dosta malko meso po neja. Edin doktor ot Kaseres
exquisite shape with enough little flesh on her one doctor from Cáceres
vednăž kazal na majka mi, če familijata Romero de Tores sme
once tell.PRF.3SG to mother my COMP family Romero de Torres be.PRS.3PL

lipsvaštoto zveno meždu čoveka i ribata_čuk, zaštoto devetdeset
missing link between man and hammerhead_shark because ninety
procenta ot organizma ni e hruštjal, săsredotočen naj-veče v nosa i vănšnoto
percent of organism our is cartilage concentrated mostly in nose and outer
uho. **Hesusa** često **ja** bărkaha s men v seloto, zaštoto nikoga
ear Jesusa often 3SG.F.ACC confuse.PST.3PL with me in village because never
ne í porasnaha gărdi i vze da sebrăsne predi men,
NEG her grow.PST.3PL breasts and already COMP shave.PST.3SG before me
gorkata.
poor_thing
'In my family weve always had a speedy metabolism. My sister Jesusa, may God rest her soul, was capable of eating a six-egg omelette with blood sausage in the middle of the afternoon and then tucking in like a Cossack at night. Poor thing. She was just like me, you know? Same face and same classic figure, rather on the lean side. A doctor from Cáceres once told my mother that the Romero de Torres family was the missing link between man and the hammerhead, for ninety percent of our organism is cartilage, mainly concentrated in the nose and the outer ear. Jesusa was often mistaken for me in the village, because she never grew breasts and began to shave before me.'

The last example illustrate the dynamic shifting of prominence throughout discourse and show that DOI is used at the point where a previously prominent referent who lost its status in between is again re-activated to a more or the most prominent position.

Subjective evaluation of the status deviance. Note however, that the decision to use DOI depends on the speaker's evaluation to what extent the referent under discussion is accessible or to be activated. In the following examples (taken from a book forum) are quite parallel in structure. In the second case, the speaker decided to use DOI to re-active the discourse status of the referent but in the first example another speaker did not feel the need to re-emphasis this aspect.

(50) *Context: Forum comments on a book review*

a. without DOI (BG-Web2012, 39067677)

i az pročetoh knigata i napălno săm săglasna
and 1SG.NOM PRF-read.PST.1SG book-ART.SG.F and fully be.PRS.1SG agree.PTCP
'I also read the book and I fully agree.'

b. with DOI (BG-Web2012, 11249951)

i az **ja** pročetoh **knigata** i moga da
and 1SG.NOM 3SG.ACC PRF-read.PST.1SG book-ART.SG.F and can.PRS.1SG COMP
kaša če mi dopadna
tell.PRS.1SG COMP 1.SG.DAT like.PTCP
'I also read the book and I can say that I liked it.'

Remember also that there are extra-linguistic factors that affect the usage of differential object indexing in Bulgarian. The text style and register might additionally determine the

application of DOI as an encoding strategy. In the last two examples, however, the register and context was highly comparable.

Topicalization without DOI. As an alternative evidence, I state another example illustrating that objects may also appear in sentence-initial order without DOI (this was also pointed out by Leafgren, 1997). In example (11) – stated again as example (51) –, the object (*book*) can be interpreted as contrastive topic because it is contrasted with another entity ("stood in front of the camera already with 19") in the previous sentence. Here, there is no previous association with *book* and no cross-indexing is used.

(51) *Context: An article about Violeta Draganova (author)* (BG-Web2012, 129334672)

a părvata si kniga pročita ošte predi da vleze v
and first-ART-SG.F REFL book PRF-read.PST.3SG already before COMP enter.PST.3SG in
klasnata staja.
class-ART-SG.F room
'and she finished (reading) her first book even before entering school.'

Despite the potential topicalization of *the book* it seems not be necessary to also indicate a raise in prominence of the book, either because this referent was already in the centre of attention (and is now only made topic) or because no further operations are applied to this referent.

Summary of the examples. The aforementioned examples are indicative of what I believe is at the heart of Bulgarian DOI, namely the reactivation of a referent in discourse in line with the perspective of discourse prominence. In the following table, the different sub-functions of this primary function are summarized again with their respective examples illustrating these functions.

Table 4

Summary of examples illustrating the functions of DOI in Bulgarian

function	SVO (-TOP)	OVS (+TOP)
select a referent that is directly accessible to the interlocutors due to proximity or previous mention	(42)	(43)
activate a referent that is accessible/ identifiable in general (but not prominent) in discourse	(44), also (38)	(45), also (41)
singling out one out of two almost equally accessible referents to activate on of them	(46)	(47), also (37) and (40), indirectly (39)
reactivate a referent that was active before but whose status got potentially lost or uncertain	(48)	(49)

In the first three cases, a referent that is available due to different factors but is not yet prominent enough to be directly referred to with the most implicit marking is elevated in prominence with the differential marker. In the fourth case, a referent was previously prominent but lost its status due to the intervention of other referents (competing for the

most prominent position). The re-activation toward a higher prominence status is marked by DOI.

More generally, all the functions are indicative of a core function, namely "elevating the prominence status of less prominent referents". In particular, it seems, that less prominent elements (either because they were not prominent before or lost their prominence status as discourse unfolded) are targeted by DOI. Thereby, my analysis suggests that DOI is more directly related to discourse prominence (and reference tracking) rather than topicality.

4.3 Chapter conclusion and introduction to the empirical investigation

4.3.1 Key aspects of my analysis

In this chapter, I developed the perspective that DOI (at least in Bulgarian) is not directly a topic marker but rather a special encoding strategy for marking a (relatively unpredictable) deviance or elevation in discourse prominence of a referent with a particular prominence level. I first discussed some problems with the notion of topicality and suggested that discourse prominence is a more adequate framework to discuss differential object indexing, particularly due to the role of object indexing as a referential expression. I also pointed out that a certain notion of predictability in determining the relative deviance from a prominence level needs to be included in an explanation of DOI. I showed that this reflects a general idea that is underlying research in linguistics.

Based on these more theoretically-oriented evaluations and in completion to my discussion of differential marking, I argued that "differential object indexing is a type of differential marking of a P referent by means of a person index in cases when there is a certain level of unpredictability with respect to the (re)establishment or elevation of the discourse prominence status of this referent".

In this regard, I discussed more recent accounts of DOI in Bulgarian that brought forward a comparable analysis (however, still under the notion of topicality). I re-analysed their description with respect to my own analysis and presented initial corpus evidence supporting this view. It became clear that classical notions of topicality seem to be invalid for the description of DOI (at least in Bulgarian).

Instead, I developed the perspective of object reduplication as differential object indexing that operates as a prominence-lending cue on less prominent referents whose raise in prominence is less predictable from the context – with the association to reference tracking being directly derived from the index participating in these structures and the predictability aspect being reflected in the differential marking.

Interestingly, the reinterpretation of what was formerly described as a topic marker to a discourse prominence marker and the general description of DOI as a discourse prominence marker has some predecessors. Riesberg (2018) convincingly argues that the split ergative marker in Yali can be described as a marker of discourse prominence rather than topicality. Some of her diagnostics are similar to mine. Similarly, Khan (2008) adopts a notion of discourse prominence that is similar to the modern concept in his description of object agreement in the Neo-Aramaic dialect of Barwari (Iraq). This supports the view that the notion of discourse prominence can be fruitfully applied to other DOI systems as well. The cross-linguistic investigation of shared patterns of different DOI systems is up to future research.

In order to investigate the representation, function and processing of differential object indexing in Bulgarian and to test my analysis further I conducted ten experiments that I present in chapter 5 to chapter 7. In the following, I shortly outline the empirical investigation.

4.3.2 Outline of the empirical investigation

In the empirical investigation of my dissertation I provide a more thorough analysis of differential object indexing in Bulgarian. In the past, DOI in Bulgarian did not receive much attention from the psycho- and neurolinguistic perspective and previous accounts based their analysis mainly on corpus studies. In my investigation I used a combination of different empirical methods instead in order to highlight and investigate different aspects related to this encoding strategy in Bulgarian. The investigation can be sub-divided into three major areas corresponding with the respective chapters:

- studies focussing on the role of DOI in argument marking and its cue validity (chapter 5)
- studies directly focussing on topicality and prominence (chapter 6)
- studies focussing on processing aspects of DOI in relation to discourse updating (EEG) and visual salience (SPR) (chapter 7)

In the following I provide a short outline of the three chapter and the experiments that are reported in them.

Argument marking and cue validity. First and foremost, differential object indexing is an argument marking strategy. Irrespective of the primary discourse-based function that motivates its use, DOI is also serving as a cue alongside other cues (e.g., case, order, etc.) in determining the role assignment within a sentence. In chapter 5, I report studies that focussed on DOI as a linguistic cue in role interpretation and investigated the interaction of DOI with other cues, especially the semantic feature animacy and the syntactic dimension order.

Definiteness of an argument is typically a pre-condition of differential object indexing in Bulgarian. I consider this association an epiphenomenon of DOI targeting referents of a medium-level prominence status (i.e., referents that are at least available or easily identifiable). The finding of rare instances of DOI with indefinite (but specific) referents supports this view. As was shown in the discussion of DOM in chapter 3 and section 4.1, animacy is another semantic feature that is known to affect role interpretation in general, determines DOM systems in some languages and also contributes to the prominence of a linguistic element (with animate referents being typically perceived as more prominent). In addition, in role assignment there are typically strong animacy-based predictions. Animate referents are more likely (expected) to be the agent of a sentence whereas inanimate referents are more commonly patients (Bornkessel-Schlesewsky & Schlesewsky, 2009b).

In contrast to the referential feature definiteness, the inherent feature animacy was not tested before for Bulgarian DOI. Therefore, in the first two acceptability I focus on animacy effects in the evaluation of sentences with DOI marking either animate or inanimate referents. If DOI was concerned with marking general deviances from expected patterns,

one could expect a more common association of DOI with animate referents serving (untypically) as the object of the sentence. Also, if animacy was sensitive to the interpretation of discourse prominence in Bulgarian, different evaluation patterns could emerge.

Another acceptability judgment study directly investigated the evaluation of DOI with pre-verbal and post-verbal object position. I discussed in chapter 2 that DOI often correlates with a pre-verbal object position but in section 4.2 I argued that this could be due to the more common co-occurrence of topichood with prominent (or promoted) referents. In this study, I presented sentences with pre-verbal and post-verbal DOI *out of the blue* without any contextual specification. The goal of this study was to test if there is a general difference in the acceptability of DOI depending on the object order when no supporting context is provided.

Another aspects concerns the interaction with other cues in determining roles and the question how valid and strong DOI is in comparison to the other cues. I argued above that DOI is primarily used to promote the discourse prominence status of referents at a medium-level of prominence. Thereby, DOI should embrace a specific but comparably strong shifting potential, especially since the prominence shift is to be exhibited toward an object and patient and not the subject and agent. In terms of role assignment, this would require that object cross-indexes are reliable and unambiguous cues that can even override other cues when used. This is particularly true with respect to order and subject indexing when both support (a more typically predicted) joint subject, topic and agent assignment on the same referent. In cases where the competing (object, patient) referent needs to be promoted, DOI must be able to outrule these alternative cues when a particularly strong deviance is to be signalled.

A classical way to measure the reliability and strength of cues in role assignment is the *cue validity* paradigm within the *competition model (CM)* (E. Bates & MacWhinney, 1982; MacWhinney et al., 1984). I present the results from a web-based cue validity study that focussed on the interaction and correlation with these cues including object cross-indexing.

Topicality and discourse prominence. The experiments that I report in chapter 6 are directly concerned with the investigation of the previous claims of DOI as a topicality marker and my analysis of DOI as a discourse prominence. Three acceptability judgment studies investigate the acclaimed function of DOI as a topic marker and a combined reaction time – acceptability judgment study directly tests the claims from my main analysis.

In the first two studies, I limit topicality closely to the notion of sentence-level aboutness and only use simple (parallel) questions to probe for topic contrasted with focus. In two different experiments, I investigate this association with post-verbal object order and post-verbal object order. By comparing the results from the two studies, I also focus on the acclaimed association of order with topicality. These studies suggest that the rating of DOI is not affected by a context probing either for a topical or focal interpretation, challenging the perspective of DOI as a (simple) marker of topichood.

In the third acceptability judgment study of this chapter, I provide indirect evidence against the topic marker perspective by focussing on the question if different givenness associations of the referents affect the acceptability of DOI. This study did not find evidence that supports the topic-marker perspective.

In addition to the three offline acceptability judgment studies, I conducted a combined acceptability judgment and reaction time study that addressed the question if a most

prominent and discourse topical, a less prominent but accessible or a non-prominent and inferable referent are more preferred with DOI – reflected in the acceptability and speed of processing these sentences. This study is directly concerned with the function of DOI as a marker of discourse prominence and – in line with the corpus examples stated in the present chapter – investigates the activation of a less prominent element. For this purpose, a larger context with a subsequent structural manipulation was used to control for the different prominence assignments.

The results presented in this chapter directly support my analysis of DOI as a marker of a particular change in the discourse prominence status of referents rather than being directly concerned with topic-marking. Based on these findings, I conducted a last round of experiments focussing on associated processing patterns.

Discourse updating and visual salience. The main purpose of this last empirical chapter 7 is to approximate processing patterns and the time course of processing differential object indexing with particular focus on the singling out and activation of a referent in discourse. The experiments reported in this chapter tackle the question which patterns emerge or are affected when DOI is processed online. Particular focus is given to the question how DOI behaves with respect to discourse updating in the course of processing sentences and attention allocation (derived from the primary function).

I first present the results from an event-related potential study that focusses on the neurophysiological correlates of discourse linking and discourse updating after an object index is encountered in sentences with pre-verbal DOI. In this experiment I investigated the acclaimed function of DOI as a prominence-lending cue for object referents in discourse and particularly their relation to the function of DOI of singling out one out of two referents. This study illustrates how the use of an object indexing for this purpose affects discourse-based predictions with respect to the referents involved and triggers consequently discourse-upating.

The second experiment addresses the interaction of DOI as a prominence-lending cue with visually established salience. In a combined visual cueing and self-paced reading study I investigate the interaction of DOI as a prominence marker with modulations of attention induced by visual cueing. Hence, the association and interaction of visual salience is investigated in interaction with linguistic prominence.

Both studies focus on underlying patterns reflecting the involvement of prominence-related as well as predictive mechanisms in the processing of differential object indexing. This shows that the role of prominence and predictability in determining differential object indexing is reflected in processing-correlates of these principles suggesting a direct link to the underlying cognitive mechanisms.

Final remarks on the discourse marker analysis. At several points, I stated that differential object indexing in Bulgarian should be described as a *discourse prominence marker* and this is also the underlying assumption in the presentation of my empirical investigation. It is important to note, however, that this term is only a descriptive construct that I apply to capture what I consider the primary function of DOI as outlined in this chapter and investigated particularly in chapter 6. Nevertheless, my analysis leaves open one general issue with respect to this classification.

It is not directly clear if DOI should really be perceived as a marker of discourse prominence (in the sense of being a marker of a particular prominence level) or rather if it serves as

an attentional cue that marks the relative unpredictability of a less prominent referent with respect to the most prominent referent in discourse (i.e., highlighting a particular deviance in discourse prominence). In a functional-cognitive framework, the latter would arguably be an even more accurate description but is more complex to prove empirically. At this point, however, I restrict myself to the former perspective. Future research needs to address the question whether all cross-indexed objects have a particular level of prominence (i.e., if DOI targets a particular prominence level relative to other levels of the competing referents) or rather whether relative deviances in prominence (independent of the rank) can lead to the use of DOI. I have an intuition that DOI is indeed closely associated with deviances in a more general sense at the level of discourse prominence but this issue requires larger corpus samples and more profound experiments than I could provide in this investigation.

For the purpose of this dissertation, I take my analysis of DOI as a discourse prominence marker targeting mid-level prominent referents as the point of departure and underlying functional assumption for the following empirical investigation of differential object indexing in Bulgarian.

5 Empirical evidence: Argument marking and cue validity

In the present chapter and the following two chapters I report on ten experiments on differential object indexing in Bulgarian that attempted a closer determination of its representation, function and processing-related aspects. In the current chapter, I take a step back from the previous discussion and focus on DOI from a broader perspective by treating it as an argument marking strategy. In the experiments of this chapter, no context was provided for the participants – disallowing strong claims in direction of discourse or information structure. It is primarily about the interaction and correlation with other features that are argued to serve or support role interpretation, especially animacy and word order.

In the first three (acceptability judgment) studies, it was tested if native speakers of Bulgarian evaluate sentences with DOI differently if they co-occur with different levels of animacy or a non-canonical, object-initial word order. The underlying idea of these studies is to identify potential preferences in using DOI on the sentence-level. In addition to the determination of such preferences, a cue validity experiment is presented at the end of this chapter. Here, the focus was placed on testing the on-line interaction of object indexes with animacy and order (compared with subject indexes) in determing the role interpretation. The studies of this chapter provide some general insights into the representation and within-sentence behaviour of DOI – without a consideration of discourse or information structure influence via context.

In the following, I emphasize some of the reasons why I investigated animacy in particular and shortly repeat the main facts of order alternations with DOI from chapter 2. After the presentation of the three acceptability studies, I give a brief overview of cue validity and the competition model in section 5.3 – motivating the final experiment of this chapter. After reporting my own cue validity experiment (section 5.4), I shortly conclude this chapter.

5.1 Parameters and scales

5.1.1 Inherent and referential features

Semantic features are sometimes sub-divided into "inherent" and "referential" features, particularly in DOM research (e.g., Bossong, 1982). Both were often combined as "prominence" features or features contributing to the general prominence of an argument in subsequent research (e.g., Aissen, 2003). As was shown in chapter 3, many DOM systems are particularly prone to animacy and fewer ones also to definiteness. However, one should distinguish between these features or properties as the main parameter driving a particular DOM system or as epiphenomenal features that are reflections of the actual function underlying a particular DOM system. In this chapter, I do not aim to describe other DOM systems and restrict myself to a closer discussion of DOI in Bulgarian.

In chapter 2, it was pointed out that definiteness (and in fewer cases specificity) is considered a pre-condition for DOI in Bulgarian. Additionally, this is to be expected due to the definite nature of person indexes involved in this construction. Therefore, I consider the definiteness-precondition as a given that requires no further analysis. However, I do not agree with previous accounts that consider definiteness as the main parameter of DOI in Bulgarian, for instance, Georgieva (1974). It is not clear to me why Bulgarian should

use a second definiteness marker in cases where definiteness is already overtly marked by an article (in direct contrast to Serbo-Croatian, where neither a definite article nor DOI – except for very few contexts – exists). In addition, instances of DOI with specific referents that are unmarked for definiteness suggest that DOI does not depend on the presence of an overt definiteness marking.[52]

An explanation for the association with definiteness in Bulgarian in line with my account of DOI can be the close association of definiteness with topical or discourse prominent referents (in addition to the aforementioned restriction of indexes to definite referents). In this perspective, definiteness can easily be explained as an epiphenomenon of this underlying function. The second major category discussed in the literature on DOM and in relation to case is animacy. To my knowledge, animacy was not discussed in detail as a parameter or at least as a contributing feature of DOI in Bulgarian before, although such associations could be possible – similar to the epiphenomenal character of definiteness.

DOI and animacy. As I pointed out in the previous chapter, animacy does not play a role in previous accounts of Bulgarian DOI. Throughout the previous parts of this dissertation, I have presented several examples with animate and inanimate referents – both for pre-verbal and post-verbal DOI. However, there could be links between animacy and DOI that might also be reflected in the joint evaluation of the two via acceptability judgment. There are several reasons why potential effects of animacy on DOI should be evaluated. Firstly, animacy of a referent is a highly valid and relevant cue for the identification of the subject function and agent role (for a summary of empirical evidence, see Bornkessel-Schlesewsky & Schlesewsky, 2015). To some extent, this is also the case in Bulgarian (Andonova, 1998).

Secondly, it is often argued that "[a]nimacy and agentivity are assumed to be independent but interacting notions" (García García et al., 2018, p. 27). Due to the closer association of animacy with agentivity, this interaction can be exploited to use animacy as a simple test for the influence of agentivity features on DOI. If animacy played a strong role for DOI, this would suggest that more fine-grained differences in the agentivity levels ought be investigated. Therefore, a closer look at animacy makes sense.

Also, as was mentioned before, animacy is often found as a parameter or at least confounding factor in differential marking systems (e.g., as discussed in Aissen, 2003). In cases for which animacy plays a role, the differentiation of referents typically takes place alongside a scale from *human* to *[non-human] animate* to *inanimate*, with some languages only using a less nuanced distinction (Comrie, 1989). This mechanism is well-known with respect to differential object flagging in Spanish (*a-marking*) and Romanian (*pe-marking*). In both languages, the animacy-driven flagging is also accompanied by object indexing with a short, unstressed pronoun (Chiriacescu & von Heusinger, 2010).

However, also pure DOI systems with animacy as the main parameter exist (Schikowski & Iemmolo, 2015). Interestingly, Haig (2018) claims that "[a]nimacy-related Differential Object Indexing is widespread in Indo-European, e.g., Greek, Rumanian, South Slavic languages, Albanian, and Iranian" (p. 791). This might be true to some extent for Romanian (maybe due to the structural interaction with flagging, see Chiriacescu and von Heusinger,

[52] As was pointed out several times throughout this book, this situation is different in Macedonian, where this last connection indeed is the case (Tomić, 2012) – probably due to an overgeneralization of DOI in the course of grammaticalisation to the category of definiteness.

2010) and to lesser extents for Albanian (due to the higher correlation of animacy and dative case/experiencer role, see Kallulli, 1995). In Bulgarian, object indexes are additionally marked for case and case is often more sensitive to animacy. Therefore, there could be some interaction with animacy that goes back to the involvement of case.

However, in all these systems, animacy alone seems to not be the underlying parameter that accounts for all instances of these constructions (see the short discussion of DOI in the Balkan languages in chapter 2). Also, with respect to a larger typological sample, Schikowski and Iemmolo (2015) claim that animacy – despite being a main parameter in many DOM (DOF and DOI) systems – cannot account for all instances. Hence, it seems that animacy might rather reflect an underlying principle in many languages and or is an epiphenomenon of an underlying core function.

There could be animacy effects that are attributable to underlying motivations of DOI in terms of topicality or discourse prominence. In addition to the interaction of animacy with agents, animacy is also considered a typical feature of topics (Givón, 1976). In line with this, empirical evidence showes that animacy influences the topic interpretation in some languages (e.g., Chinese, see Hung & Schumacher, 2014). Similarly, the description of discourse prominence in von Heusinger and Schumacher (2019) suggests that animacy can also be a cue that contributes to the prominence of a referent.

Despite the differing views on the role animacy might or might not play with respect to Bulgarian DOI, this was never before tested empirically.[53] Hence, in the first two acceptability studies, I test if there is a certain preference of cross-indexing animate referents over inanimate referents (in both post-verbal and pre-verbal position).

5.1.2 DOI and word order

In chapter 2 and 3, I discussed DOI with pre-verbal and post-verbal objects and took up some of the debates concerning the commonalities and differences of DOI and dislocation. I will not repeat these discussions again here for the sake of brevity. Let me only stress the main line of reasoning underlying the testing of word order with DOI in this chapter.

As was said in chapter 2, it is occasionally claimed that DOI is much more frequent with pre-verbal objects and sometimes this is considered to be the only normatively accepted way for using DOI. Based on my framework developed in chapter 4, I assume that DOI and object-initial orders play two different roles and express two different functions – even when they co-occur. If my functional assumptions are valid, DOI is more concerned with reference tracking and discourse prominence of referents, whereas order is concerned with topicality.

In addition, word order can also be considered as a means of argument marking. However, the underlying function of order is more concerned with "the sequencing of information in ways which best reflect the communicative intentions of the speaker" (Siewierska & Bakker, 2012, p. 294) – closely associating order with information packaging. Just like DOI

[53] There is only a rough estimate of the distribution described by Leafgren (1997). He states that in his sample of 7385 occurrences of objects, there were 3141 animate objects of which 126 (4 %) were cross-indexed. Among his 4244 inanimate objects, only 77 (1.8%) were cross-indexed. He explains this discrepancy by way of the higher likelihood of an animate object to be topical (unfortunately, he does not distinguish further between direct and indirect objects in the analysis of animacy – increasing the risk of potential confounding in his study, due to the different argument roles).

marks an untypical discourse prominence status of an object referent, object-initial orders are instances of untypical topic structures. These untypical associations tend to overlap. Since topicality and prominence often align at the same referent, it could be the case that this is reflected in the preference of the co-occurence in acceptability judgment – particularly when no context is provided that could support a particular information structure representation (or prediction for such a structure). Since I am dealing with pre-verbal and post-verbal DOI in the later chapters, it makes sense to generally test the judgment of the two when presented "neutrally" together and separately, i.e., without any context.

5.1.3 Other potential features

There are other features or structures that could have been tested instead of the ones that I focussed on. With regard to role interpretation and particularly with respect to perceived deviances of patient referents from preferred role patterns, one could also discuss agentive features more explicitly (rather than taking the "detour" via animacy). Typical features of proto-agents are sentience, volition (or control), autonomous movement, and alienable possession and proto-patients typically rank lower on these features or entail less of them (Primus, 1999, 2012). Just like animacy, these features can be used directly for acceptability judgment (e.g., Kretzschmar & Brilmayer, 2020, and studies quoted by them). As I said before, I use animacy as a means to control for effects in this direction.

Similarly, one could also test features such as the number of verbal arguments, different argument roles (e.g., P and R) and associated cases (e.g., accusative and dative) as well as the question to which extent is cross-indexing of two arguments at the same time possible in di-transitive sentences. The transfer of my account of DOI to other (non-patient) object arguments is a task for future research. With respect to word order, there are more order alternations in Bulgarian. Dyer (1992) provides a broad overview of different word orders in Bulgarian and shows that basically all logical possibilities can be found (with differing frequencies). Particularly the issue of DOI with (admittedly rare) verb-initial orders (VSO and VOS) requires more attention in the future.

5.2 Acceptability judgment studies

The purpose of the studies in this chapter is to explore some of the aspects shortly outlined above in order to avoid potential confounds with respect to dimensions not discussed in this dissertation. Animacy serves as a proxy category for agentivity features and word order serves as a general test to determine the perceived association of order and DOI in Bulgarian when presented *out of the blue*. In the following, I present the empirical evidence with respect to animacy and word order from three acceptability judgment studies and then take a look at their joint interaction in role interpretation.

5.2.1 Acceptability judgment study 1: Post-verbal DOI and animacy

Preliminaries and hypotheses. In the first acceptability judgment study of this project, I tested whether sentences with post-verbal DOI were rated differently if they either occurred with an animate or an inanimate referent. The sentence order was canonical (SVO) with the object of the sentences being located in its post-verbal position. This study

was exploratory to some extent, given that the interaction of animacy and Bulgarian DOI was not explored in detail before.

In line with the general discussion, I hypothesized that animacy affects the rating of DOI sentences insofar as animate referents are more common with the optional cross-indexing, due to an overlap of co-occurrence. Frequently, prominent, topical, and definite referents are also animate. Since DOI is claimed to activate or elevate the discourse prominence status of patients, it could be the case that animate referents are attracted to this operation. Alternatively, of course, DOI could also be independently raising the discourse prominence status without a preference for animate referents. This would indicate that DOI can serve as a comparably strong prominence-lending cue that may even override other preferences and thereby equally elevates the prominence status of animate and inanimate referents. Since such preferences are based on frequencies of co-occurrence, they should be reflected in the acceptability judgment.

Participants. In total, forty-five native speakers of Bulgarian were recruited on *Prolific* (www.prolific.co) and conduced the survey on *Qualtrics* (Qualtrics, Provo, UT). Five of them had to be excluded because they failed to answer the consistency checks appropriately. That was the case when they rated fillers with easy-to-detect grammatical errors on a 7-point *Likert* scale with a rating of four or higher in four or more cases (33.3 % of the fillers with errors).

The remaining 40 native speakers of Bulgarian (34 female, 85 %) had a mean age of 34.88 (SD = 7.16). All participants gave their voluntary consent to participate in the study and were reimbursed with approximately 8.37 Euro per hour payment.

Materials and design. In the first three experiments of this chapter, the experimental stimuli consisted of single, declarative sentences without additional context. The experimental data (stimuli, script and data lists) of these acceptability judgment studies are publicly available at https://osf.io/5mj6t/. Each lexical set consisted of a combination of different nouns in terms of grammatical gender or number, in order to avoid a potential reinterpretation as pre-verbal DOI. I used a 2x2 design with the factors animacy (animate vs inanimate) and presence of DOI (yes vs no). Also, to avoid a potential interference of case, only feminine and neuter gender nouns were used in this study. Hence, in conditions with differential marking, the index always pointed uniquely and unambiguously to the second NP of a sentence in this experiment.

In total, 48 target sentences were created based on 19 different verbs and 96 different nouns. In addition, 12 sentences contained combinations of masculine and feminine or neuter gender without DOI. These sentences with a clear interpretation enforced by both case and order (and without any differential marking) served as a comparison baseline of grammatical sentences, hence they were (grammatically) correct fillers. Another set of 12 sentences contained easy-to-detect agreement violations in number and served as a negative baseline of definitely ungrammatical sentences (error fillers).

Every lexical set was checked for consistency and naturalness in the canonical and no-DOI condition by two native speakers and were later transformed into the other conditions. For creating the four conditions, only two features were changed, namely gender agreement on the clitic (object index) and on the verb inflection (subject index). The lexical sets were distributed into fours lists with the help of a Latin square design, hence, 12 sentences per condition were part of each list. The fillers were the same continuously. In total, each

participant read 72 sentences. Sentences were presented in a pseudo-randomized order. One lexical set in each condition is presented in table 5 for illustration.

Table 5

Acceptability judgment study 1: Illustration of target stimuli per condition

Condition	Example
Inanimate without DOI	*Včera studentkata vidja ezeroto.*
	Yesterday student-F-ART.SG.F see.PST.3SG lake-ART.SG.N
	'Yesterday, the student saw the lake.'
Animate without DOI	*Včera studentkata vidja čičoto.*
	Yesterday student-F-ART.SG.F see.PST.3SG uncle-ART.SG.N
	'Yesterday, the student saw the uncle.'
Inanimate with DOI	*Včera studentkata **go** vidja **ezeroto**.*
	Yesterday student-F-ART.SG.F 3SG.N.ACC see.PST.3SG lake-ART.SG.N
	'Yesterday, the student saw the lake.'
Animate with DOI	*Včera studentkata **go** vidja **čičoto.***
	Yesterday student-F-ART.SG.F 3SG.M.ACC see.PST.3SG uncle-ART.SG.N
	'Yesterday, the student saw the uncle.'

Procedure. Participants accessed the study in *Prolific*, where they were directed to the questionnaire on *Qualtrics*. Firstly, they were informed about the general purpose of the study and had to consent to their participation. Then, they answered a few demographic questions (incl. age, gender, mother tongue, place of birth and place of living the most time). Thereafter, a short practice trial took place with non-DOI sentences and an indication of the use of the scale.

The scale itself was instantiated by stars (similar to an online rating scheme on typical webpages such as *Google*). Participants could rate the sentences on a Likert-scale from 1 to 7. Next to the star, the actual number was presented and an indication of the range (1 = *completely wrong* to 7 = *perfect*) presented underneath the scale. Once familiar with the rating structure, participants could take a short break and start the actual questionnaire.

Items were presented individually. After giving a rating, participants had to manually proceed to the next sentence (giving them ample time and chance to pause between each item). Each participant received one out of the four possible alternations of the sentences including all four conditions (12 sentences each; in total 48) and 24 filler sentences (72 sentences in total per participant). After completing the questionnaire, participants where thanked for their participation and re-directed to *Prolific*.

Statistical analyses. All calculations of this analysis were conducted in *R* (R Core Team, 2019). Likert scale values are technically ordinal by principle (or even nominal if each value is given as a verbal description only). In order to overcome this limitation to some extent with respect to statistical analysis, I added three aspects to this study. Firstly, not only verbal but also numerical denominators for each rating on the scale was presented (next to the star, as indicated below). Also, anchoring examples were used as suggested by Schütze and Sprouse (2018).

With respect to the statistical analysis, the results from the 7-point Likert scale were transformed into *z*-values per subject, following the procedure described in Schütze and Sprouse (2018). By transforming the data with the individual mean and scaling them with the standard deviation allows to account better for inter-individual variation that is expected with respect to differential object indexing in Bulgarian. Also, *z*-scores are more robust to scale compression or skew (Schütze & Sprouse, 2018). *Z*-scores indicate to what extent (quantified as standard deviation) the actual value per subject and per rating was either below or above the mean rating of a particular value, indicating which ratings were generally above or below the mean (Gries, 2013).

Then, the means and standard deviations of the *z*-scores were calculated for every condition and filler type. In a second step, the *z*-values were entered into linear mixed effects model using the lmer() function from the R packages *"lme4"* (D. Bates et al., 2015). In this calculation, the *z*-scores per subject were the dependent variable. The models included the fixed factors ANIMACY and DOI (presence of DOI), random effects for subject and item as well as random slopes for DOI to account for different general rating scalings per subject.

For an additional (visual) investigation of the group-level differences, the values are plotted in a raincloud plot based on a script taken from Bornkessel-Schlesewsky et al. (2020). Raincloud plots basically combine three data sources: The actual data points, a regular boxplot and a violin plot that basically shows a distribution of the data based on density estimates. Hereby, the width of the curve at each level of the factor provides information about the approximate frequency of data points there.

Results. The means and standard deviations for the actual values and the *z*-scores are given in table 6.

Table 6

Acceptability judgment study 1: Means and standard deviations

condition	Mean values	*SD*	Mean *z*-scores	*SD*
Inanimate-DOI	4.86	2.25	0.60	0.87
Animate-DOI	5.00	2.23	0.66	0.89
Inanimate+DOI	2.00	1.48	-0.64	0.50
Animate+DOI	2.16	1.61	-0.57	0.52
correct fillers	5.27	2.07	0.79	0.82
error fillers	1.56	1.21	-0.84	0.55

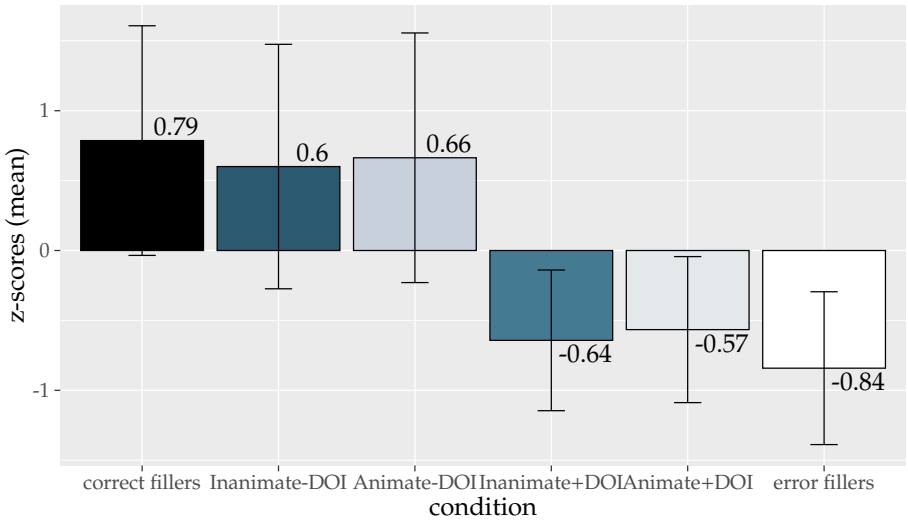
For sentences without DOI, the rating for sentences with animate objects (M = 5.00, SD = 2.23) was slightly higher than for sentences with inanimate sentences (M = 4.86, SD = 2.25), the variance was comparable. Sentences with DOI were rated much lower. But also here, sentences with animate objects (M = 2.16, SD = 1.61) were rated a bit higher than sentences with inanimate ones (M = 2.00, SD = 1.48).

The *z*-scores for each condition are additionally plotted in form of boxplots in figure 12. Here, it is particularly visible that DOI sentences received a comparably low rating. However, only a minor difference showed up between animate and inanimate ratings just

as described above.

Figure 12

Acceptability judgment study 1: Boxplot of z-values



The results from the linear mixed effects model for all conditions are given in table 7. The model revealed a significant effect of animacy ($\chi^2(1) = 5.90$, $p = .015$) and a highly significant effect of DOI ($\chi^2(1) = 283.00$, $p = .000$) on the z-transformed ratings. However, the interaction of animacy and DOI did not cause a significant effect on the rating ($\chi^2(1) = 0.07$, $p = .790$).

Table 7

Acceptability judgment study 1: Analysis of deviance (Type II Wald χ^2)

condition	χ^2	df	p	
animacy	5.90	1	.015	*
DOI	283.00	1	.000	***
animacy*DOI	0.07	1	.790	

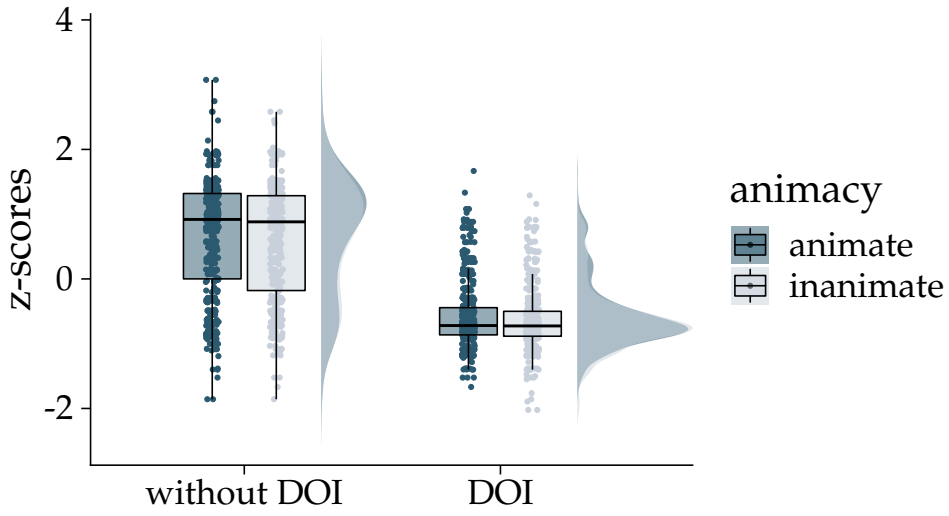
Since there was no significant effect for the interaction, no further group-level statistical analyses were conducted. Only an additional visual inspection based on rainclouds (see figure 13) was conducted. Here, the distribution of the ratings looks rather comparable with respect to animacy. There seems to be a smaller cluster resolving around higher ratings where animate referents were preferred over inanimate ones in the sentences with DOI. However, the majority of data-points in the distribution seem to overlap with the distribution of inanimate referents.

Discussion. No significant interaction effect of differential object indexing and animacy was identified in this study. The lower rating of inanimate referents was comparable

for sentences with and without cross-indexing. Group-level visual analyses supported this finding. This study does not support the interpretation that animacy affected DOI marking in a systematic way. Therefore, the hypothesis that differential object indexing is preferred with animate referents over inanimate referents was not confirmed by this study. This is in line with the general observation that DOI in Bulgarian may occur with animate and inanimate referents. Hereby, animacy does not affect DOI in the same way as definiteness does.

Figure 13

Acceptability judgment study 1: Raincloud plot of z-values



In the latter case clearly only definite (and in few exceptions specific) objects can be cross-indexed at all. In comparison to animacy, definiteness is a category with a clear cut-off point with respect to differential marking. However, it is still possible that more fine-graded preferences for animacy exist. But no such preference was identified by the present study. Insofar, this finding confirms the intuition that animacy does not restrict the use of DOI in Bulgarian, as pointed out for example by Kallulli (2008). If we interpret the findings with respect to the perspective of marking the (less expected) discourse prominence status of a certain P, this suggests that DOI can fulfill this function irrespective of the animacy of the referent under discussion. DOI is therefore a comparably strong prominence-lending cue that operates independently of animacy-based preferences.

An interesting observation is that animate referents were slightly preferred over inanimate ones with and without DOI – although the respective referent was used in the patient role. This finding might appear a bit surprising since the patient role is more typically expected to be filled by an inanimate referent. However, the difference was not stark and does not allow for additional insights.

There are some limitations of this study. As expected, the general rating of DOI was

comparably low. For some subjects, DOI was rated even as low as error fillers. On average however, the rating was higher than for the fillers with clear ungrammaticality. This situation can be explained by the rather strict dispreference or rejection of DOI in written language and it's generally lower use in this modality (as described in chapter 2). In that sense, designs like those presented in this dissertation might appear a bit unnatural (note, however, that DOI in written mode becomes more and more common due to social media). In later experiments, it will become clear that this does not constitute a problem for the investigation in general.

Especially the next experiment and the experiments in chapter 6 show that ratings are improved if DOI is presented after a supporting context or in combination with an object-initial order. Nevertheless, future research on Bulgarian should make use of auditory stimuli when investigating the more detailed function and usage of DOI in colloquial speech.

A second limitation concerns the restriction to use only a bipartite division of animacy. Based on this highly controlled design, there was no close investigation alongside the extended animacy hierarchy (Croft, 2003). As I mentioned before, there is some indication that Bulgarian DOI occurs most frequently with doubling 1st and 2nd person long pronouns (most commonly in dative case). However, there is no indication (and I did not test it either) if proper nouns are preferred over common nouns, for instance. Hence, using a more detailed grading of animacy alongside connected dimensions could yield some more elaborate insights in our understanding of DOI.

For now, I conclude that animacy does not affect post-verbal DOI in any systematic sense. Since pre-verbal DOI is more closely associated with topicality and since topics also prefer animate referents the picture could be different for pre-verbal DOI. Therefore, I repeated this study with pre-verbal DOI and present the results in the next section.

5.2.2 Acceptability judgment study 2: Pre-verbal DOI and animacy

Preliminaries and hypotheses. So far, there is no indication that animacy affects differential marking of objects in Bulgarian. However, as was discussed in the theoretical part of this work, there is some reason to assume that DOI with object-initial order behaves somewhat different from DOI with canonical (subject-initial order). For this reason, I conducted the same experiment again with pre-verbal DOI. This study is again somewhat exploratory. It could be that the association of the sentence-initial order with topicality alters the preference for animate referents since topicality and animacy often coincide. However, this is not necessarily the case. Therefore, I do not want to state a hypothesis for either of the two options here.

Participants. Thirty-three mono-lingual native speakers of Bulgarian were recruited on *Prolific* and conduced the survey on *Qualtrics*. Participants who participated in the first experiment were not allowed to participate via *Prolific's* pre-screening function. Three of them had to be excluded because they failed to answer the consistency checks appropriately. That was the case when they rated fillers with easy-to-detect grammatical errors with a rating of four or higher in four or more cases (33.3 % of the fillers with errors).

The remaining 30 native speakers of Bulgarian had a slightly younger mean age of 30.60 (SD = 7.92) and a comparable (high) percentage of women (25 female, 83.33 %). All

participants gave their voluntary consent to participate in the study and were reimbursed with approximately 8.28 Euro per hour payment.

Materials and design. The design was basically the same as in the first experiment. The same stimuli material was used, with the only difference that sentences with DOI were transformed into sentences with pre-verbal DOI by switching the position of the subject and the object. Presence of DOI was thereby aligned with order, so that presence of DOI also indicates an object-initial order in this experiment. The adapted stimuli for each condition are presented in table 8:

Table 8

Acceptability judgment study 2: Illustration of target stimuli per condition

Condition	Example
Inanimate without DOI	*Včera studentkata vidja ezeroto.*
	Yesterday student-F-ART.SG.F see.PST.3SG lake-ART.SG.N
	'Yesterday, the student saw the lake.'
Animate without DOI	*Včera studentkata vidja čičoto.*
	Yesterday student-F-ART.SG.F see.PST.3SG uncle-ART.SG.N
	'Yesterday, the student saw the uncle.'
Inanimate with pre-verbal DOI	*Včera* ***ezeroto go*** *vidja studentkata.*
	Yesterday lake-ART.SG.N 3SG.N.ACC see.PST.3SG student-F-ART.SG.F
	'Yesterday, the student saw the lake.'
Animate with pre-verbal DOI	*Včera* ***čičoto go*** *vidja studentkata.*
	Yesterday uncle-ART.SG.N 3SG.M.ACC see.PST.3SG student-F-ART.SG.F
	'Yesterday, the student saw the uncle.'

Procedure and statistical analyses. The procedure of this study and the statistical analyses were exactly the same as in the previous two studies.

Results. The means and standard deviations for the actual values and the *z*-scores are given in table 9. Comparable to the first experiment, for sentences without DOI, the rating for sentences with animate objects ($M = 5.32$, $SD = 2.20$) was a bit higher than for sentences with inanimate sentences ($M = 5.03$, $SD = 2.24$), the variance was comparable between the two conditions and in comparison to experiment 1.

Acceptability of DOI sentences with the object in pre-verbal position was much higher than for DOI in canonical word order in the previous experiment. But also here, sentences with animate objects ($M = 3.25$, $SD = 2.00$) were rated a bit higher than sentences with inanimate ones ($M = 3.15$, $SD = 2.03$).

The *z*-scores for each condition are additionally plotted in form of boxplots in figure 14. Here, it is particularly visible that DOI sentences received a comparably low rating. However, only a minor difference showed up between animate and inanimate ratings just as described above.

The results from the linear mixed effects model for all conditions are provided in table 10. The model revealed a significant effect of animacy ($\chi^2(1) = 5.15$, $p = .023$) and a highly significant effect of pre-verbal DOI ($\chi^2(1) = 110.37$, $p = .000$) on the *z*-transformed ratings.

Table 9

Acceptability judgment study 2: Means and standard deviations

condition	Mean values	*SD*	Mean *z*-scores	*SD*
Inanimate-DOI	5.03	2.24	0.48	0.85
Animate-DOI	5.32	2.20	0.60	0.81
Inanimate+DOI	3.15	2.03	-0.36	0.71
Animate+DOI	3.25	2.00	-0.32	0.68
correct fillers	5.58	1.98	0.74	0.79
error fillers	1.43	0.98	-1.14	0.52

However, the interaction of animacy and pre-verbal DOI did not cause a significant effect on the rating ($\chi^2(1) = 1.44$, $p = .230$).

Figure 14

Acceptability judgment study 2: Boxplot of z-values

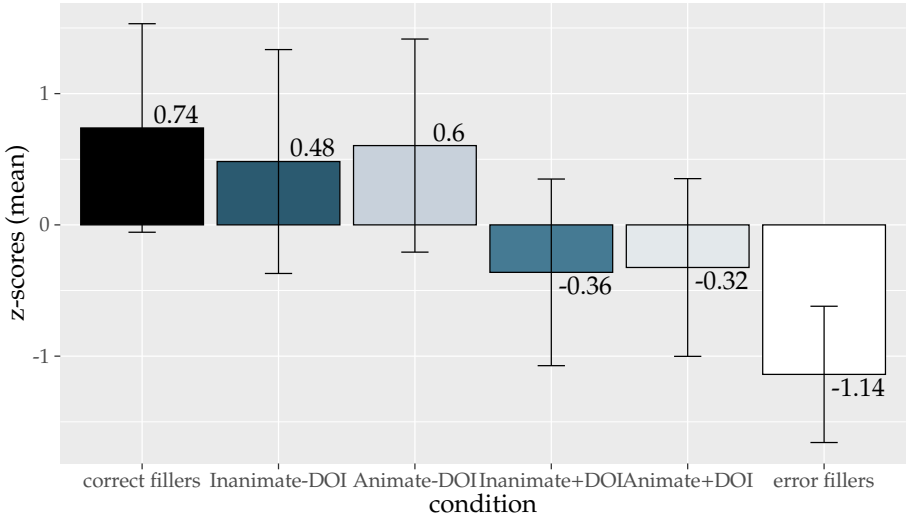


Table 10

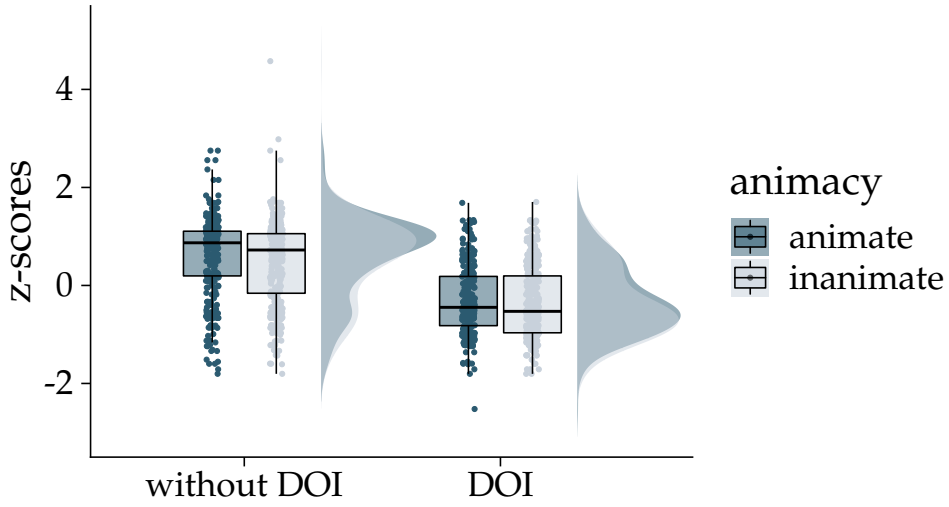
Acceptability judgment study 2: Analysis of deviance (Type II Wald χ^2)

condition	χ^2	df	*p*	
animacy	5.15	1	.023	*
DOI	110.37	1	.000	***
animacy*DOI	1.44	1	.230	

Again, no group-level statistical analysis was conducted since there is no significant effect. At the visual inspection based on rainclouds (see figure 13), the distribution of the ratings looks rather comparable with respect to animacy. As was the case with the previous experiment, there is a smaller cluster resolving around higher ratings where animate referents were preferred over inanimate ones in sentences with DOI. However, the majority of data-points in the distribution overlap with the distribution of inanimate referents.

Figure 15

Acceptability judgment study 2: Raincloud plot of z-values



Discussion. The ratings for pre-verbal DOI were comparably higher than for post-verbal DOI in the previous acceptability judgment study. However, no significant interaction of pre-verbal DOI marking and animacy was identified either. Irrespective of the (assumed) additional association of pre-verbal DOI with topicality due to the order alternation, no association with animacy was present in this experiment. This is in line with the general observation that pre-verbal and post-verbal DOI in Bulgarian may occur with animate and inanimate entities. As in the previous study, animate referents were slightly preferred over inanimate ones in general – despite being patient arguments.

The limitations of this study are basically the same as for the previous study. However, there was a clear difference in the rating of DOI in general. Importantly, this study – in comparison to the first acceptability judgment study – suggests that pre-verbal DOI receives a higher acceptability rating than post-verbal DOI, at least when presented without any context. To investigate this further, I conducted a direct comparison of pre-verbal and post-verbal DOI (with animate referents) only and present these results in the following.

5.2.3 Acceptability judgment study 3: DOI and word-order

Preliminaries and hypotheses. In this study, I directly compared the acceptability of DOI sentences depending on the question if the respective object occurs in its canonical (post-verbal) position or in pre-verbal position. There are at least three reasons why to assume a difference in the rating between the two (particularly when they are presented without any additional context). As I discussed in the theoretical part, there is some indication that DOI occurs more frequently with sentences with an object-initial order. I discussed different accounts of these phenomena (also with respect to dislocation) and opted for two distinct functions of DOI and the order alternation.

I assume that DOI itself (also in the pre-verbal situation) serves the tracking of referents in discourse – particularly with respect to less predictable prominence raises – whereas putting an object to the pre-verbal or sentence-initial position is a topic-marking structure. Of course, promoting a referent to a more prominent rank correlates with topic promotion because a more prominent rank makes a referent available for more operations, including topichood.

A third reason to assume a difference in rating stems from the previous two experiments. Sentences with pre-verbal DOI received a higher rating than sentences without (irrespective of the animacy of the referent). In line with the previous discussion and insights, I hypothesize that sentences with pre-verbal DOI are rated higher than sentences with post-verbal DOI. In comparison, sentences without DOI in SVO order are predicted to receive the highest rating whereas sentences without DOI in OVS are expected to yield the lowest rating.

Participants. For this experiment, 41 native speakers of Bulgarian were recruited on *Prolific* and worked on the the survey on *Qualtrics*. Six of them had to be excluded because they failed to answer the consistency checks in form of fillers with easy-to-detect grammatical errors appropriately. The cut-off point for exclusion based on these fillers was the same as before (33.3 % of the fillers with errors).

The remaining 35 native speakers of Bulgarian had – in comparison to the first acceptability judgment study – a comparable mean age of 33.91 (SD = 8.13) and a comparable (high) percentage of women (29 female, 82.86 %). All participants gave their voluntary consent to participate in the study and were reimbursed with approximately 8.27 Euro per hour payment (differences to the first experiment stem from some bonus payments for particularly long but correct trials by some subjects). Participants who participated in one of the previous two experiments were excluded beforehand using the pre-screening function of *Prolific*.

Materials and design. As before, the experimental stimuli consisted of single, declarative sentences without additional context. Each lexical set consisted of a combination of different nouns in terms of grammatical gender or number in order to avoid a potential reinterpretation as pre-verbal or post-verbal respectively. I used a 2x2 design with the factors order (pre-verbal vs post-verbal) and presence of DOI (yes vs no). Note that the "OVS without DOI" condition can be assumed to be ungrammatical (although instances of pre-verbal objects without DOI exist in very rare cases). Also, to avoid a potential interference of case, only feminine and neuter gender nouns were used in this study.

In total, 48 target sentences were created based on the same material from the previous studies. In addition, 12 sentences contained combinations of masculine and feminine or

neuter gender without DOI and served as a positive baseline for comparison. The 12 error fillers served as negative baseline. All fillers were presented with a neutral, canonical word order. The material was adapted from acceptability judgment study 1 but due to the changes, every lexical set was checked again for consistency and naturalness in the canonical and no-DOI condition by two native speakers and later transformed into the other conditions.

The lexical sets were distributed into fours lists with the help of a Latin square design, so that 12 sentences per condition were part of each list. The fillers were always the same. In total, each participant read 72 sentences. Sentences were presented in a pseudo-randomized order. One lexical set in each condition is presented below in table 11:

Table 11

Acceptability judgment study 3: Illustration of target stimuli per condition

Condition	Example
SVO without DOI	*Včera studentkata vidja tatkoto.*
	Yesterday student-F-ART.SG.F see.PST.3SG father-ART.SG.N
	'Yesterday, the student saw the father.'
OVS without DOI	*?Včera tatkoto vidjaha studentkite*
	Yesterday father-ART.SG.N see.PST.3PL student-F.PL-ART.PL.F
	'Yesterday, the students saw the father.'
SVO with DOI	*Včera studentkata* ***go*** *vidja* ***tatkoto****.*
	Yesterday student-F-ART.SG.F 3SG.N.ACC see.PST.3SG father-ART.SG.N
	'Yesterday, the student saw the father.'
OVS with DOI	*Včera* ***tatkoto go*** *vidja studentkata*
	Yesterday father-ART.SG.N 3SG.M.ACC see.PST.3SG student-F-ART.SG.F
	'Yesterday, the student saw the father.'

Procedure and statistical analyses. The procedure and the statistical analyses were the same as in the first acceptability judgment study, with the only difference that the linear mixed effects models included the fixed factors ORDER and DOI (presence of DOI), random effects for subject and item as well as random slopes for DOI. Again, *z*-scored were used for the reasons outlined in section 5.2.1 and additional plots used for a visual inspection.

Results. The means and standard deviations for the actual values and the *z*-scores are given in table 12. For sentences without DOI, the rating for sentences with (canonical) post-verbal objects (M = 5.04, SD = 2.33) was much higher than for sentences with pre-verbal objects (M = 1.65, SD = 1.28). The variance for the second condition was much lower, indicating a higher confidence of the rating within the whole group.

For sentences with DOI, the opposite picture emerged. Cross-indexed pre-verbal objects (M = 2.61, SD = 2.08) were rated substantially higher than sentences with post-verbal DOI (M = 2.15, SD = 1.75). The *z*-scores for each condition are additionally plotted in form of boxplots in figure 16. Here, the picture described above is clearly visible. Object-initial orders are preferred with DOI.

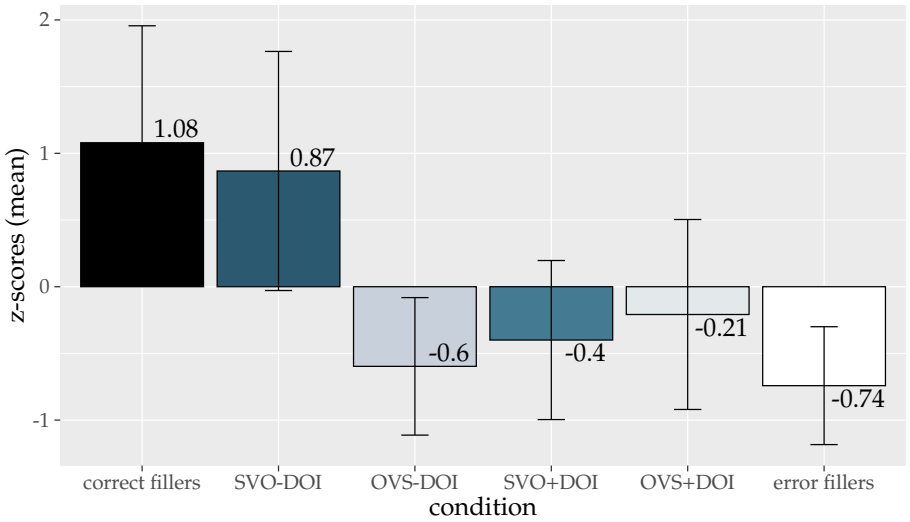
Table 12

Acceptability judgment study 3: Means and standard deviations

condition	Mean values	*SD*	Mean *z*-scores	*SD*
SVO without DOI	5.04	2.33	0.87	0.90
OVS without DOI	1.65	1.28	-0.60	0.52
SVO with DOI	2.15	1.75	-0.40	0.60
OVS with DOI	2.61	2.08	-0.21	0.71
correct fillers	5.45	2.12	1.08	0.88
error fillers	1.31	0.81	-0.74	0.44

Figure 16

Acceptability judgment study 3: Boxplot of z-values



The results from the linear mixed effects model for all conditions are given in table 13. The model revealed a highly significant effect of order ($\chi^2(1) = 398.63$, $p = .000$) and a highly significant effect of DOI ($\chi^2(1) = 54.55$, $p = .000$) on the *z*-transformed ratings. Also, the interaction of order and DOI yielded a significant interaction ($\chi^2(1) = 678.70$, $p = .000$).

When the conditions with and without DOI were examined independently in form of a group-level comparison, the effects of order remained significant as can be seen in table 14.

Finally, the visual inspection based on raincloud (see figure 17) clearly supports these findings. Although there is some spreading in the distribution of OVS without DOI, the main picture remains the same. Also, for some of the judgments of DOI, ratings were comparable but still there is a clearly higher judgment for OVS with DOI on average.

Table 13

Acceptability judgment study 3: Analysis of deviance (Type II Wald χ^2)

condition	χ^2	df	p	
order	398.63	1	.000	***
DOI	54.44	1	.000	***
order*DOI	678.70	1	.000	***

Table 14

Acceptability judgment study 3: Group-level analysis (Type II Wald χ^2)

group	χ^2	df	p	
without DOI	925.19	1	.000	***
with	19.23	1	.000	***

Discussion. This study confirms a general claim that was often stated before in the literature without much substantial testing. In general, DOI is preferred with pre-verbal objects – when presented *out of the blue*. In contrast, sentence-initial objects are dispreferred without cross-indexing. This study confirms the joint association of DOI with pre-verbal orders. It is clear that DOI also occurs without pre-verbal objects – but this clearly depends on particular contexts. DOI with pre-verbal objects is even acceptable without such a context. This could suggest that pre-verbal order and DOI are perceived more commonly together.

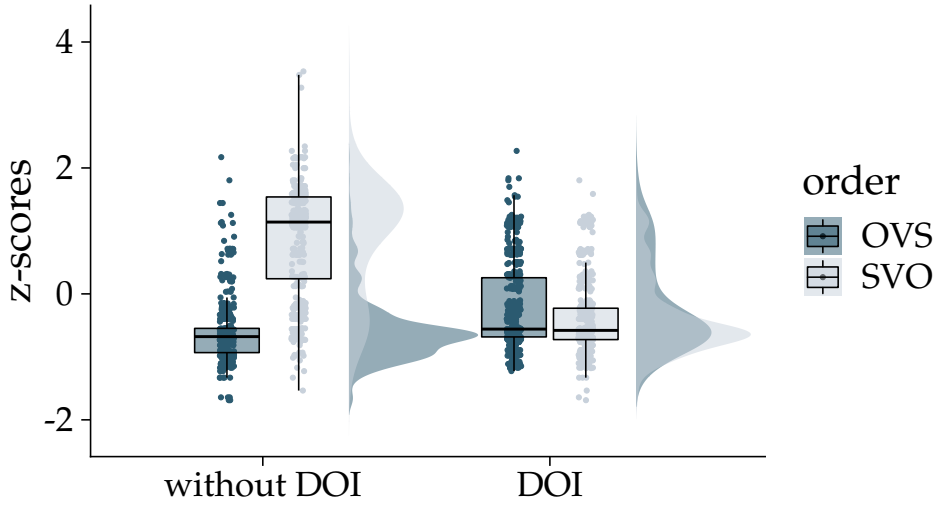
This study does not indicate any function underlying the motivation to use DOI or pre-verbal object positions. But it is well-known that pre-verbal or sentence-initial objects are typically associated with a topic-marking function (see for example Jasinskaja, 2016, for Slavic languages). For DOI, the topic-marking function is a matter of debate (see chapter 4 and 6). This study does not directly inform the understanding of the function. But if we assume that the topicality-account of object-initial orders is correct, DOI should be related in one way or the other to this since there is this strong preference for DOI and object-initial orders to co-occur.

This is true with both accounts. If DOI also marks topics, it makes sense that it is preferred with another structure that marks topicality and the perception of the joint function explains the higher rating in this study. However, this could also be explained by the fact that more prominent elements tend to be topical. Hence, if DOI marks the activation in prominence (making the object more licensable for topicality) and order indicates the topicality the structure could have been judged more adequate irrespective of context because traces of these two functions are strongly present there (whereas neither of the two functions is sufficient to cause that effect – due to rarity in the case of not-indexed objects in OVS or due to a missing context in the case of post-verbal DOI). If both encoding types are presented together, the reading is arguably enforced even without a matching context.

The three studies presented so far only focussed on the co-occurence of DOI with a

Figure 17

Acceptability judgment study 3: Raincloud plot of z-values



semantic feature (animacy) or another argument marking strategy (word order). Only the joint occurrence of them was evaluated. In order to determine potential functions of DOI and order alternations, context needs to be provided. This is done in the studies in chapter 6 where particularly two experiments (acceptability judgment study 4 and 5) support these claims. The present study gave some initial insights in this direction.

Additionally, the studies so far do not provide much insight into the role these features and markers play in role interpretation, although it is clear that they influence the choice and identification of an argument. In order to investigate this aspect further an additional experiment is reported in this chapter – focussing on the involvement and validity of these features and markers as cues for role interpretation.

5.3 Cue interaction and role interpretation

Indexing, word order, animacy – just like case, prosody and definiteness – can also be understood and investigated as cues that contribute to role identification – irrespective of their actual core function. For this task, different cues may interact in different ways and to different degrees. Hence, it is possible that – despite no preferences in isolation in pair-wise acceptability judgment studies were found – the categories interact in order to account for "*who did what to whom?*" (i.e., determining the argument structure of a sentence).

Investigating potential interactions between the categories or cues in that respect can also contribute to our understanding of DOI. This is the main task of the remainder of this chapter. I present one particular approach based on the *competition model (CM)* (MacWhinney et al., 1984) and a related experimental design that allows for the determination of the cue validity and cue strength of elements operating in role identification.

5.3.1 Cue validity and the competition model

The competition model was developed in 1980s psycholinguistic research as a processing model (E. Bates & MacWhinney, 1982; MacWhinney et al., 1984) and adapted for language acquisition in subsequent research (for a broader overview of the range of applications, see MacWhinney & Bates, 1989).

The CM is mainly a model of performance (in the sense of language use) and accounts for the contribution of different features in determining the roles of a sentence. Put simply, "[t]his model envisages sentence comprehension as a direct form-to-function mapping based on a variety of interacting information types ('cues'; e.g., word order, animacy, agreement, stress). The relative importance of a particular cue is language specific and determined via the notion of 'cue validity': a cue that is highly valid in a particular language exerts the strongest influence on interpretation" (Bornkessel-Schlesewsky et al., 2015, p. 330).

Six general claims (highlighted with italics in the following) underlie this model (see MacWhinney et al., 1984, for details). Firstly, the model assumes only two levels of processing in the form of a functional level and a formal level. It is assumed that *direct mapping* takes place between the two levels – hence, they argue for a strong association of form and function but assume that the mapping is often not in a one-to-one correspondence between a single form and a single function. Hence, a polysemous *multiplicity of form-function mappings* is claimed to exist in the grammatical system of each language (i.e., several cues may account for the identification of the actor and each cue may carry other functions as well). Often, certain functions prototypically pair together and map onto the same formal device in forms of *coalitions* (e.g., topic-marking and definiteness-marking). These coalitions are not fully stable and can break down, for example when an indefinite referent is topicalized. In comprehension (form onto function mapping) and production (function onto form mapping), the mapping is governed by *competition*. This is the central insight of the model.

Competition is hereby envisioned as a "system of parallel activation with strength-based conflict resolution" (MacWhinney et al., 1984, p. 129). Form-function pairs are weighted by receiving different *cue strengths*. The weights of the cues are reflections of their *cue validity*: "In comprehension, cues are high in application if they are 'available' when you need them and cues are high in reliability if they are never misleading or ambiguous" (MacWhinney et al., 1984, p. 130).

Experiments in the CM framework aim at estimating the cue validity. Among the main goals of these experiments is to determine the role different features and markers play in different languages for identifying the agent or actor (and indirectly, the patient and other argument roles). Research in this domain pointed out that different cues may cross-linguistically serve this goal to different degrees.

In general, the competition model is also compatible with a more profound neurolinguistic model of sentence processing, namely the *Extended Argument Dependency Model (eADM)* (Bornkessel, 2002; Bornkessel & Schlesewsky, 2006). To some extent, the results or measurements within the competition framework can be considered "an output of the online comprehension system" (Bornkessel & Schlesewsky, 2006, p. 816). Since the competition model is mainly concerned with (agent) prominence-related processes it seems to match what is captured in stage 3 of the eADM (a processes called "generalized mapping"

there), as pointed out by Bornkessel and Schlesewsky (2006, p. 816).

In line with this, the competition model can be related to the theories of language processing that emphasize processes at the interfaces, especially because it supports the idea that prominence information can be equally relevant to role interpretation as overt marking (a fact also pointed out in the eADM, see Bornkessel & Schlesewsky, 2006). Bornkessel-Schlesewsky and Schlesewsky (2015, p. 330) point out that the competition model accounts for the different contributions of the cues to the overall prominence (here in the sense of argument prominence) – irrespective of the "regular" task or function of the cue – because "the interaction between prominence information of different types essentially amounts to a differential weighting of the various prominence cues, while individual cues could be processed in qualitatively dissociable subsystems".

DOI or indexing could be such a candidate. Although it is most likely associated with operations at the level of discourse structure it clearly also contributes to argument prominence. This insight can also be derived when considering the underlying (discourse) prominence principles. As I said before with reference to von Heusinger and Schumacher (2019), prominent elements are structural attractors that license more operation than less prominent elements. Therefore, a referent that is elevated in discourse prominence also becomes more likely to be of relevance for operations at other levels (including argument structure). Discourse prominence and agent (or argument) prominence should be kept apart but clearly influence each other.

In addition, it is noteworthy that the cue validity approach is also valued in recent accounts trying to account for the role of predictability in language processing. For instance, Bornkessel-Schlesewsky and Schlesewsky (2019, p. 13) point out that "cue validity in the sense of the Competition Model ... could be used to quantify the precision of features related to sentence interpretation" and precisely this "precision has a direct link to cue validity in a particular language and, thereby, to relevance of individual linguistic features for internal model updating" (Bornkessel-Schlesewsky & Schlesewsky, 2019, p. 1). I will discuss this account in more detail in chapter 7 with respect to the N400 component in ERP research. Nevertheless, it is already interesting here to see that cue validity can also be associated to some ideas of predictability. I assume that processing predictability should also be reflected in a notion of predictability at the structural and functional level. The identification and description of such an interface is up to future research.

5.3.2 Cue validity studies

The design of cue validity experiments within the framework of the competition model is comparably simple. Based on the cues that are to be investigated, the researcher defines the sub-levels for each cue that are tested. For instance, in the study by MacWhinney et al. (1984) the cue validity of agreement (= subject indexing), animacy, word order and stress was tested in English, German and Italian. For word order, they tested the potential order alternations NVN (noun - verb - noun), NNV (noun - noun - verb) and VNN (verb - noun - noun). Animacy was controlled for the NPs so that either both nouns were animate (AA), the first noun was animate (AI) or the second NP was animate (IA).

Agreement was either potentially ambiguous (Ag0) in the sense that the index could theoretically agree with both nouns (typically controlled for by number), agreed only with the first NP (Ag1) or with the second one (Ag2). For stress, both NPs either carried neutral

stress (St0) or one of the two received stress (St1 or St2). Based on these sub-factors, sentences are constructed with each of the possible combinations. Each sentence consists of one particular feature combination. Note that in this design some sentences may be illogical in terms of semantics or ungrammatical. This procedure is chosen on purpose because potentially colliding cues inform the understanding of their validity in terms of competition. For a short illustration, see the following example stimuli:

(52) Example stimuli for cue validity experiments (adapted from MacWhinney et al., 1984)
Interpretation task: "Who performs the action?"
a. NVN - AI - Ag0: *The dog grabs the pencil*
b. NNV - IA - Ag1: *The eraser the pigs chases*
c. VNN - AA - Ag2: *Licks the cows the cat*

Participants are presented with these sentences (either visually on a screen or auditorily) and have to decide who of the two NP referents is responsible for the event described by the sentence. This task probes for the agent of the sentence. The potential ungrammaticality is ignored in these studies because it is informative to the understanding of a single cue how it behaves also in ungrammatical settings. Based on the strengths or validities (measured as number of times the first NP was chosen as the agent and reaction time to the choice), language-specific rankings of cues can be stated as a core results of these studies. For example, MacWhinney et al. (1984) report the following ranking in the three languages under discussion:

- English: word order > subject index (= agreement), animacy
- German: (case) > animacy > subject index > word order
- Italian: subject index > animacy > word order

Based on such rankings, one can state some general aspects with respect to role assignment in the different languages. English role interpretation mainly hinges on word order whereas this cue does not play a strong role in German or Italian where animacy or agreement play a bigger role. Note that case marking in German was not included as a factor for the sake of comparability (but case is assumed to be the strongest cue in this language). This design was also applied to other cues and other languages as well (for an overview, see MacWhinney & Bates, 1989).

However, object indexing did not receive as much attention as other cues (including subject indexing), although this was already suggested as a contributing cue (for Italian) in the early paper: "It would be useful to investigate whether other morphological cues might play a similar 'case-like' role in parsing. In Italian, a good candidate might be clitic object pronouns, which agree with the object in person and number" (MacWhinney et al., 1984, p. 148-149).

Subsequent research included object indexes, for example on Spanish (see next paragraph). Interestingly, a later cue validity experiment on English found out that (case-marked) object pronouns in English can override the order-based role assignment, however, only in non-canonical orders (Yoshimura & MacWhinney, 2010).

To some extent, Bulgarian object indexes are promising candidates in this direction. On the one hand, they are directly associated with discourse roles in my framework. Hence,

they target referents of a particular prominence level and most likely this adds to the role interpretation. On the other hand, Bulgarian object indexes are overtly marked for case (as in Spanish). There is already one study on Bulgarian (without DOI) and one on Spanish (with DOI) that I am shortly going to discuss because they inspired my following experiment directly.

5.3.3 DOI as a cue in role interpretation

Andonova (1998) conducted a cue validity study on Bulgarian with 24 native speakers. She tested the cues word order, subject indexing and animacy. In contrast to previous studies, she used a subdivision of animacy. The degree of animacy was rated by another subject group beforehand. These subjects had to evaluate the degree of animacy contrasts between noun pairs into high, medium and low contrast levels. In the actual study, contrasts between them in terms of one degree difference (e.g., high to medium, medium to low) were clustered into 5 contrast types (including zero contrast, however only for the highly animate nouns). In her study, she found the following cue ranking:

subject index > animacy > order

In her study, subject indexes turned out to be highly reliable cues in Bulgarian. In addition, she reports a more fine-grained effect of the different animacy types. The highest contrasts (in both directions) and the zero contrast are no decisive cues (ranging around 50 % with respect to choosing either of the NPs as agent). Therefore, animacy is not an utterly strong cue. However, when there is only a smaller animacy contrast between the two NPs, "subjects prefer the less animate noun as agent" (Andonova, 1998, p. 57). Unfortunately – although this result is quite surprising – she does not discuss reasons that could account for these data and only states that the "animacy contrast between nouns plays a (modest) role in these processes" (Andonova, 1998, p. 59).

Kail (1989) who included object indexes as well as (animate) object flags reported the following cue strengths for Spanish:

a-marking > subject index > object index > order

However, Kail (1989) did not include animacy but only *a*-marking (that is sensitive to animacy). However, animacy and *a*-marking cannot be fully equated since the former is a semantic feature of a lexeme and the latter a functional encoding strategy with both not correlating completely. Interestingly, this flagging cue is very strong when available (potentially, since it marks non-agents unambiguously) in line with the general idea that case-marking is a highly reliable cue (and sometimes considered a baseline for the other cues, see MacWhinney et al., 1984).

In contrast, object indexing (although it is also specified for case in Spanish) ranges lower than the flag or the subject index. The higher ranking of the subject index could be explained by the strong association with the most prominent element (as discussed in length in chapter 3 and 4). However, as was said before, the comparison of subject and object indexes require more substantial research within the unitary perspective of indexing. The last two studies inspired my idea to run a new cue validity on Bulgarian with testing DOI included as a potential cue –therefore merging the design of the two last-mentioned studies.

5.4 Cue validity experiment

Preliminaries. This study is a typical cue validity experiment (conducted as a web-based experiment) in the tradition of the competition model (MacWhinney et al., 1984) investigating the validity of subject indexes ("agreement"), animacy, object indexes and word order as potential cues for role interpretation. In terms of the material, there are two differences to the previous cue validity study on Bulgarian (Andonova, 1998). I do not use a fine-grained sub-division of animacy (into 5 different contrast levels) but stick to a simple tripartite division (both arguments animate, only first or second argument animate).

On the other hand, I include object indexes as potential cues for the role interpretation (inspired by work on Spanish and French presented in Kail (1989)). Based on these two studies, I hypothesize that the relative cue validity ranking is comparable to the study by Andonova (1998) but predict that object indexes rank somewhere between subject indexes and animacy, similarly to the ranking in Spanish presented by Kail (1989):

subject index > object index > animacy > order

In addition, I assume some interaction effects of the cues in combination. Despite the predicted low cue validity of order, I expect a strong interaction of order and object indexes based on the previous acceptability study. Additionally, a strong interaction of subject and object indexes is expected (when they support the same role assignment).

Participants. Thirty-one native speakers of Bulgarian participated in this study. One participant had to be excluded from the analysis because she failed to identify easy-to-detect attention checks ("if you read this, press A"). The remaining 30 participants included in the analysis had a mean age of 32.77 (SD = 9.04) and consisted of 22 women (73.33 %). All participants were recruited via *Prolific* (www.prolific.co) and received a per hour average reward of 10.82 Euro. The time taken for the experiment ranged from 12 minutes to 27 minutes.

Materials and design. Following the logic of the cue validity design, all combinations of cues under discussion were examined – including sentences that are ungrammatical or potentially illogical. Each sentence was constructed based on the combinations possible with the cue factors and always included two noun phrases. The experimental data (raw data and analysis scripts) of this experiment are publicly available at https://osf.io/gzuqb/.

In my study, I included the factors order, animacy, subject index and object index. Order appeared in three versions, namely NVN (noun - verb - noun), NNV (noun - noun - verb) and VNN (verb - noun - noun). Animacy was differentiated as An0 (both NPs are animate), An1 (only the first NP is animate) or An2 (only the second NP is animate). Similarly, Ag0 indicated that the subject index could potentially agree with both nouns. In Ag1, the subject index unambiguously agreed with the first NP (ensured via number). In Ag2, the object marker always cross-indexed the second NP respectively.

Since object indexes are normatively marked I decided against using them in each sentence. Therefore, Cl0 indicated that no object index was present. In sentences with Cl1, the object index cross-indexed the first NP, in Cl2 the second NP. A potentially ambiguous object index condition (agreeing with both NPs) was not tested.

Note, that in this set-up cues may of course collide with respect to which NP they refer to or which agent interpretation they support. This is a conscious decision in this type of

designs in order to investigate also the cue strength in competing situations. The sentences were made up based on the lexical material prepared for the first three acceptability judgment studies. Since all logical combinations were tested, technically speaking, a 3x3x3x3 design was applied with 81 different sentence structures. Four of these combinations are given for illustration in table 15.

In addition to the target sentences, ten filler sentences were included (with unambiguous interpretations enforced by masculine case and the use of the *l*-participle). Also, four attention checks of the type described above were included in each list. In total, each participant read 95 sentences. The entries in the list were pseudo-randomized to avoid a frequent sequential occurrence of ungrammatical sentences.

The task given to each participant was to determine who of the two referents (stated as NPs) was responsible for the action described, i.e., this question type is about which NP they interpret as being the agent of the sentence. Participants were explicitly told to ignore ungrammaticality and give a choice either way in order to determine their interpretations, irrespective of the overall plausibility of the sentences.

Table 15

Cue validity experiment: Illustration of target stimuli per condition

Condition	Example
NVN - Ag0 - An0 - Cl0	*Minalata sedmica učitelkata udari čičoto*
	last-ART.SG.F week teacher-F-ART.SG.F kill.PST.3SG uncle-ART.SG.N
	'Last week, the (female) teacher killed the uncle.'
NNV - Ag1 - An2 - Cl2	*#Včera paltoto mesarkite gi prebi čičoto*
	yesterday coat-ART.SG.N butcherF.PL-ART.PL 3PL.ACC beat.PST.3SG
	'Yesterday, the coat beat the (female) butchers.'
VNN - Ag1 - An2 - Cl2	*#Toku-što gi tărsi studentkite legloto*
	shortly_ago 3PL.ACC search.PST.3SG student-F.PL-ART.PL bed-ART.SG.N
	'A moment ago, the bed looked for the (female) students.'
NVN - Ag1 - An0 - Cl1	**Minalata godina policajkata ja celuna glupčovcite*
	last-ART.SG.F year police-F-ART.SG.F 3SG.F.ACC kiss.PST.3SG fool-PL-ART.PL
	'Last year, the (female)police officer kissed (her) the fools.'

Procedure. After the selection of the study on *Prolific*, participants where directed to the experiment hosted on *Pavlovia* (*www.pavlovia.org*). The presentation script for this web-based experiment was developed using the *jsPsych* package (de Leeuw, 2015). For the purpose of this study, a new plugin was developed (*jspsych-wordbyword*) with the help of the developers of *jsPsych*. The script and the stimuli lists were uploaded as a *Gitlab* project (*www.gitlab.pavlovia.org*) and due to the interface directly transferred into a *Pavlovia* experiment and connected to *Prolific* by using the directing-function of this platform.

On the first page of the study, participants were informed about data stored and processed in this study. In order to proceed, people had to give their consent. After that, a few demographics were collected (gender, age, second language, if applicable). After that, the instructions were presented and participants were asked to start the four exercise trials. After the exercise, participants could take a short break and then start the actual

experiment where they read 96 sentences with a subsequent referent choice.

Each trial started with a fixation cross (size: 50 points, duration: 500 ms) on a white screen followed by a blank screen for 500 ms. Then, the target sentence was presented word-by-word with a duration of 700 ms per word. After the sentences, a question mark appeared for 700 ms indicating the upcoming task. Participants had to answer a referent choice question ("Who performed the action?"). The first and the second NP were both instantiated underneath the question.

In half of the trials, the order of the NPs matched the order of presentation in the target sentence. In the remaining trials, the order was reversed. Participants had to press the key "e" for selecting the left entity and "i" for the right one. The referent choice and the reaction time (from presenting the question to answering it) was measured. Trials were presented in four blocks (with 24 trials per block). After each block a pause trial was presented that had to be manually proceeded with a space bar press (allowing the participants to take breaks of variable length). At the end of the experiment, participants were automatically re-directed and the completion code automatically transferred to *Prolific*.

Statistical analyses. In contrast to previous cue validity studies, I used liner mixed models in the investigation of the individual cues and their interactions. The pre-processing of the raw data as well as the statistical analyses and the plotting were conducted in *R* (R Core Team, 2019). In the pre-processing script, data for each subject were inserted and combined into one list. From the list, demographic data were automatically extracted and the responses to the attention checks and the fillers per subject evaluated. Based on this, the exclusion criteria were checked (as stated before, one participant had to be excluded) and data were pre-processed for subsequent analysis.

In the analysis script, 143 of 2430 (5.88 %) reaction time trials were excluded because their trial duration was either below 100 ms or above 3000 ms, indicating that speakers either did not read the question or did take a break at this point. The referent choices were re-coded from 1 and 2 for position to 1 and 0 since I am concerned with the percentage of NP1 choices per cue and the order of the factors for each variable changed for readability (note that NP2 can thereby be determined by subtracting the percentage of NP1 choice from 100%). A table with mean NP1 choices and reaction times for each condition and factor for the two dependent variables NP choice and reaction time was drawn from the data.

The independent variable NP1 choice was entered into a linear mixed effects model using the lmer() function from the *R* packages *"lme4"* (D. Bates et al., 2015). The model included the interaction of the factors (order*animacy*subject index*object index), random effects for subject and item as well as random slopes for the presence of the object index. In tradition of the cue validity experiments, the means for both dependent variables were plotted as point plots with connected lines for each sub-factor.

In addition to the general comparison, group-wise comparisons were calculated. For each dimension of the independent variables, the means for selecting the first NP as subject were calculated dependent on the use and type of an object index. For each variable, an additional linear mixed effects model was calculated with respect to NP1 choice with object index as a fixed effect, random effects for item and subject and random slopes for the object index. For an additional (visual) investigation of the group-level differences, the group-wise values were plotted as violin plots. Violin plots indicate a distribution of the

data based on density estimates. Hereby, the width of the curve at each level of the factor provides information about the approximate frequency distribution of data points.

Results. The means and standard deviations for each sub-factor are provided in table 16. Additionally, the behaviour in terms of NP1 choice and reaction time is plotted for each condition.[54] It becomes visible in the table (and the plots) that object indexes are comparably strong cues in determining the role of the agent (by pointing at the non-agent in an unambiguous way).

Table 16

Cue validity experiment: Means and standard deviations

condition	NP1 choice (*M*)	NP1 choice (*SD*)	Reaction time (*M*)	Reaction time (*SD*)
NVN	63.46 %	48.19 %	1346	955
NNV	56.91 %	49.55 %	1527	1009
VNN	45.93 %	49.87 %	1519	1015
An0	58.52 %	49.30 %	1467	1028
An1	63.83 %	48.08 %	1359	911
An2	43.95 %	49.66 %	1563	1037
Ag0	57.28 %	49.50 %	1311	917
Ag1	67.78 %	46.76 %	1592	1068
Ag2	41.23 %	49.26 %	1488	981
Cl0	61.85 %	48.61 %	1371	935
Cl1	22.72 %	41.93 %	1520	1016
Cl2	81.73 %	38.67 %	1500	1031

In cases where no object index was present (Cl0), 61.85 % of the times the first nominal entity was selected as the subject or agent of the sentence (irrespective of the behaviour of the other cues). When the object index pointed at the first noun (Cl1, i.e., agreed with it in terms of number) the NP1 choice dropped to only 22.72 %. This indicates that the object index can easily rule out a preference to select the first NP as the subject. In contrast, when the object index pointed in direction of the second NP (Cl2), the choice of the first noun as subject increased up to 81.87 %. This pattern is also illustrated in the first plot in figure 18. Note, however, that the presence of the short pronoun slows down the reaction time (especially in comparison to sentences without any short object pronoun).

None of the other cues led to such a strong association. For instance, agreement only ranges between 60 to 70 % in determining the agent role based on this cue. In cases when the subject index points at the first NP (Ag1), this NP is selected as the agent in 67.79 % of the times. If the marker agrees with the second NP, the first NP is selected as the agent in 41.23 % of the times (i.e., the second NP that is agreeing with the subject index is selected in 100 % - 41.23 % = 58.77 % of the times). In comparison to the other cues, agreement is, of course, still the second-strongest cue (see also the second plot in figure 18). Interestingly, Ag1 slowed down reaction time drastically in comparison to the other two conditions.

[54]Note that both dependent variables are plotted together in the figures with the respective scales being located on the left and the right side for NP1 choice and reaction time, respectively.

Figure 18

Cue validity experiment: NP1 choice and reaction time for indexes

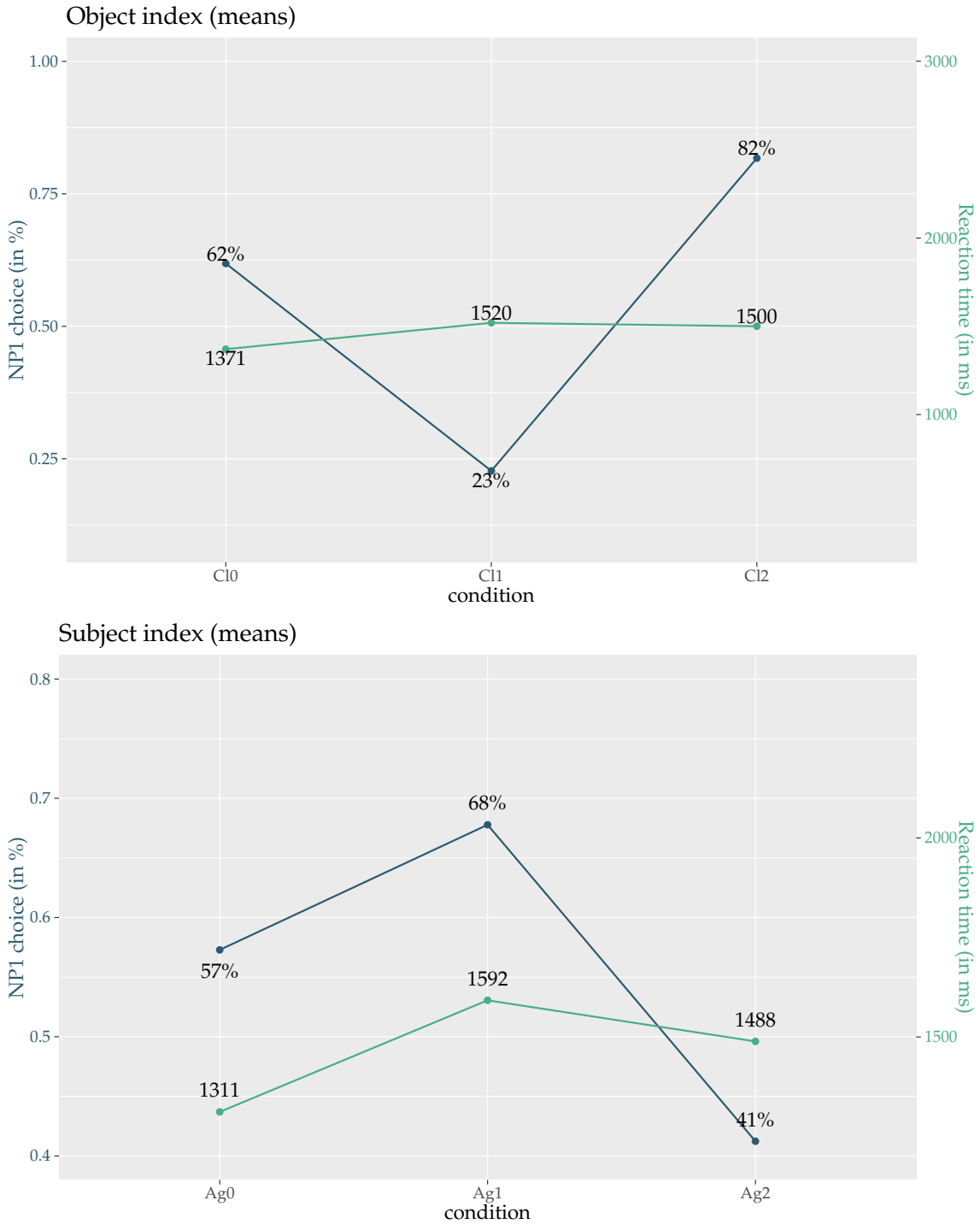
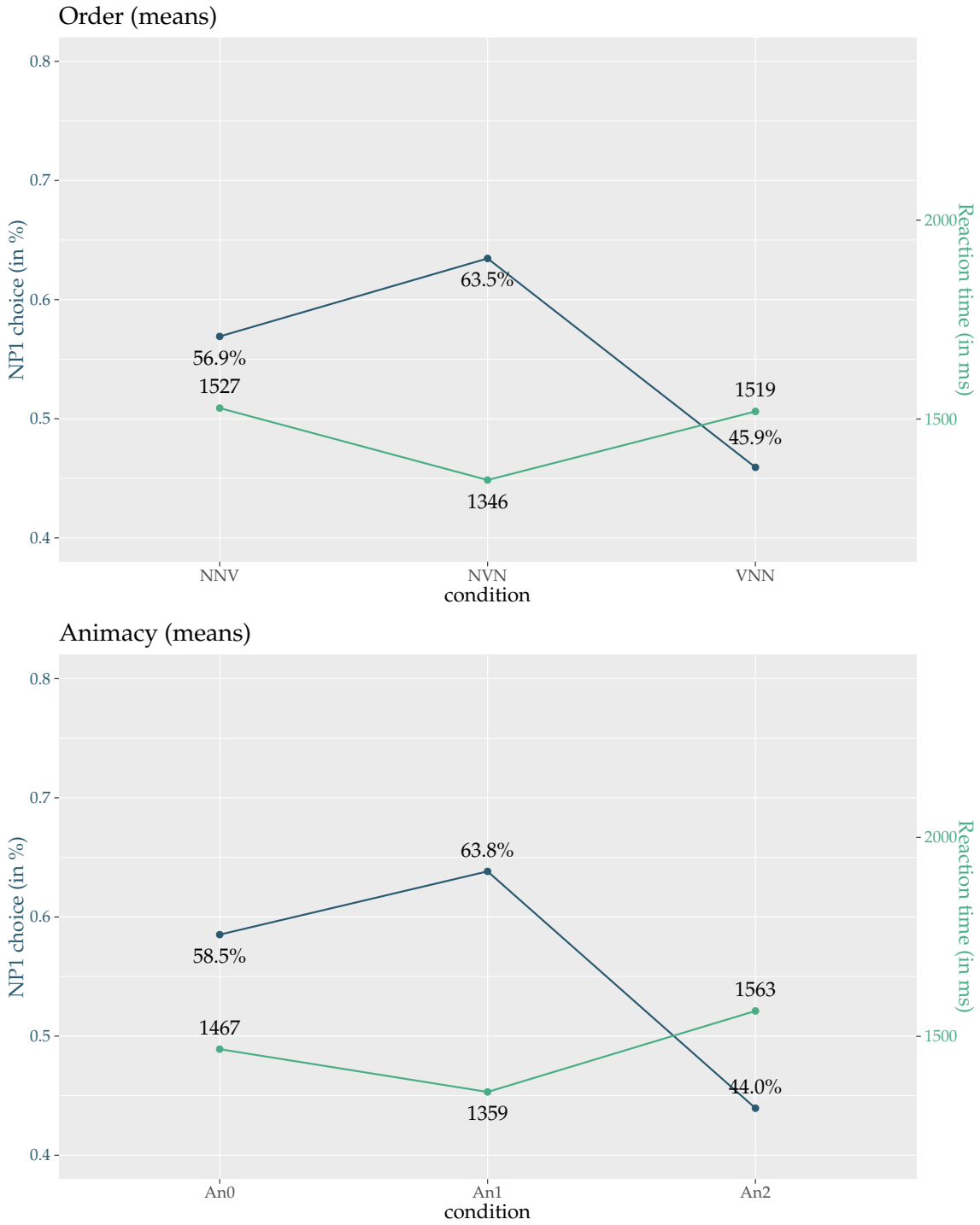


Figure 19

Cue validity experiment: NP1 choice and reaction time for order and animacy



For order (first plot in figure 19, canonical NVN leads to NP1 as subject interpretation in 63.5 % of the cases whereas VNN reveres this pattern. Here, the second NP is more commonly chosen as the subject. For the third option (NNV), there is almost no clear preference (as long as no other cues are considered in interaction). Interestingly, the most typical word order (NVN) yielded the fastest reaction time.

Animacy (see the second plot in figure 19) is comparable to order. When there is no difference in animacy, it is not a reliable cue. If the first NP is animate and the second one is inanimate, there is a 63.8 % chance that the first NP is selected as subject. If the second referent is animate the interpretation is reverse. Hence, animacy can also affect which nominal entity is selected. In direct comparison, agreement (second plot in figure 18) was a more reliable cue. When the first NP was animate, reaction time was faster, but slower for animate second NPs.

In the following table, the results from the first linear mixed effects model for NP1 choice are presented. Each cue had a significant effect on the choice of NP1 (see table 17).

Table 17

Cue validity experiment: Analysis of deviance – NP1 choice (Type II Wald χ^2)

model	χ^2	df	p	
order	100.10	2	0.000	***
animacy	135.09	2	0.000	***
subject index	227.12	2	0.000	***
object index	306.12	2	0.000	***
order:animacy	19.67	4	0.000	***
order:subject index	12.33	4	0.015	*
animacy:subject index	7.25	4	0.123	
order:object index	156.26	4	0.000	***
animacy:object index	89.95	4	0.000	***
subject index:object index	61.02	4	0.000	***
order:animacy:subject index	59.49	8	0.000	***
order:animacy:object index	14.23	8	0.076	
order:subject index:object index	30.27	8	0.000	***
animacy:subject index:object index	33.72	8	0.000	***
order:animacy:subject index:object index	66.58	16	0.000	***

In terms of bilateral interactions, almost all interaction effects were significant with the exception of animacy and subject index for NP1 choice. For trilateral interactions, the interaction of order, animacy and object index was not significant for NP1 choice. The joint interaction of all cues for determining the NP1 as the agent was significant.

Since I am interested in the role of DOI as a cue and its interaction with the other cues additional analyses were conducted that directly addressed this issue further (see table 18, summarizing results for NP1 choice). Here I focus exclusively on NP1 choice because this comparison allows for a better determination of the strength of the single cues (in contrast,

reaction times were relatively different for the single sub-types of each dependent variable).

Pre-verbal DOI is instantiated here in cases where the short pronoun (or clitic) agreed with the first NP (i.e., Cl1), whereas post-verbal DOI is the case where the clitic agreed with the second NP (i.e., Cl2). Remember, that the percentage indicated the number of times the first NP was chosen as the agent of the event (and the other NP interpreted as the patient, respectively).

Table 18

Cue validity experiment: Interaction of object indexes with other cue types

condition	Cl0	Cl1	Cl1 - Cl0	Cl2	Cl2 - Cl0	χ^2	df	p	
NVN	80.37%	20.74%	-59.63%	89.26%	8.89%	117.65	2.00	0.000	***
NNV	68.89%	19.63%	-49.26%	82.22%	13.33%	75.84	2.00	0.000	***
VNN	36.30%	27.78%	-8.52%	73.70%	37.41%	28.67	2.00	0.000	***
An0	72.59%	17.04%	-55.56%	85.93%	13.33%	134.24	2.00	0.000	***
An1	74.81%	32.59%	-42.22%	84.07%	9.26%	39.50	2.00	0.000	***
An2	38.15%	18.52%	-19.63%	75.19%	37.04%	54.76	2.00	0.000	***
Ag0	67.41%	17.78%	-49.63%	86.67%	19.26%	109.46	2.00	0.000	***
Ag1	79.26%	38.15%	-41.11%	85.93%	6.67%	36.33	2.00	0.000	***
Ag2	38.89%	12.22%	-26.67%	72.59%	33.70%	93.98	2.00	0.000	***
total	61.85%	22.72%	-39.14%	81.73%	19.88%	132.44	2.00	0.000	***

Note that object indexes uniquely pointing at the first NP can be equated with pre-verbal DOI whereas object indexes agreeing with the second NP (in terms of number) are instances of post-verbal DOI. In table 18 all means for each sub-dimension are given in dependency of the type of the clitic. In the first column (Cl0) the average choice of NP1 is for each type of order, animacy and subject index is given when no object index was present. These effects of object indexes on the choice with respect to the other cues can be nicely illustrated in form of violin plots.

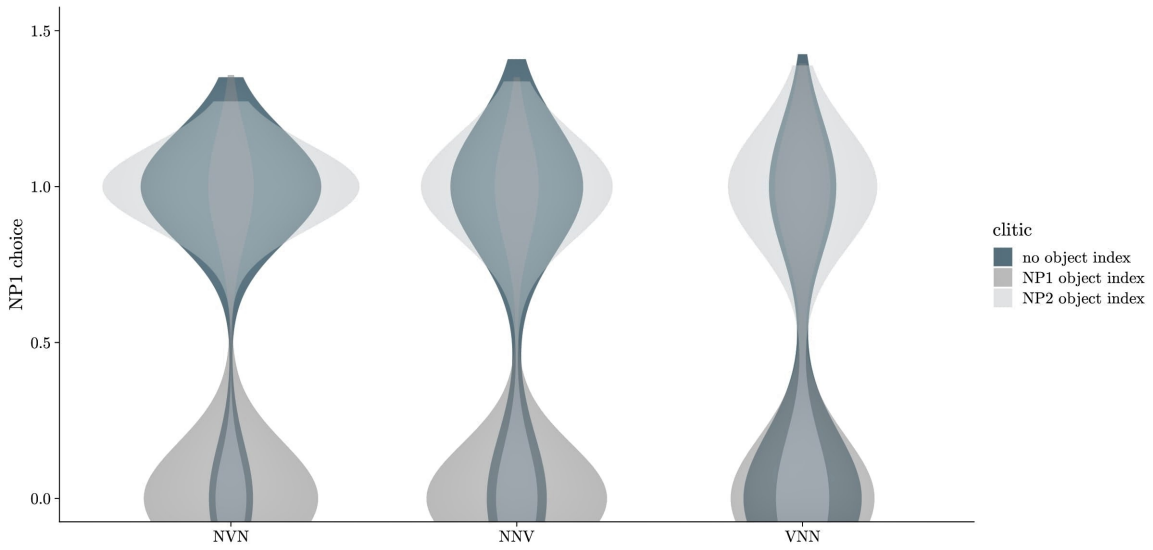
For each dimensions, violin plots are given in the following plots. As is visible in table 18, the different orders, subject indexes and animacy contribute to the role identification of the first NP as agent also without object indexes to different degrees. The range is quite wide. In sentences without an object index, only 36.30 % are selected as having a subject in the first position when the word order is verb-initial (VNN). In contrast, in NVN order the first NP is selected as agent in 80.37 % of the cases. All other sub-domains lie within this range. Object indexes that agree with the first NP always lead to a lower percentage in selecting the first NP as agent (across all domains, as can be seen in the column "Cl1-Cl0"). The opposite is true with object indexes agreeing with the second NP. In all these cases (column "Cl2-Cl0"), the selection of the first NP as agent increases.

All these interactions of the single cues with object indexes are significant. However, the strength of the contribution of object indexes (the interaction) differs from sub-domain to sub-domain. As was said before, NVN and NNV order typically lead to NP1 as agent choice, whereas VNN leads to the selection of the second NP as agent or subject. In combination with Cl1, this choice decreases for each order type, most drastically with the

first option NVN (now leading to the selection of the NP2). For CL2, the opposite is true. The typical choice of NP2 as the agent is ruled out in favour of selecting the second NP1 when the NP2 is cross-indexed (and therefore marked as being patient). This strong effect of the object index can also be seen in figure 20).

Figure 20

Cue validity experiment: Violin plot for order and object indexes



For the first and the second ordering type, the distribution largely resolves around associating the first NP with the role of agent. The presence of a countering object index changes this (seen in the light gray distribution in comparison to the dark distribution). As described above, the opposite is true.

For animacy, similar effects can be observed (see figure 21). When both nouns are animate or when only the first noun is animate, the first NP is chosen in 72.59 % or 74.81 % of the times. The occurence of a clitic pointing at the first NP as being patient decreases this pattern by 17.04 % in the first case and even 32.59 % in the second case. If the second NP is animate this one is already less preferred as agent and the object index strengthens this even more. The opposite is true for the reverse cross-indexing.

However, when the animacy is equal or only the first noun is animate, a clitic pointing at the first NP only slightly decreases the interpretation. In this case, animacy is a relatively strong cue. In contrast, this strong role cue function disappears when only the second NP is animate and an object index cross-indexes this NP. In this case, animacy does not serve anymore as a cue for identifying the agent.

The interaction of subject and object indexes is also comparable. In case of agreement of the subject index with both NPs, a decisive clitic can clearly influence the decision which NP is chosen as likely agent of the event. However, something interesting happens when both indexing types are not in alignment (i.e., do not agree with different NPs as would

Figure 21

Cue validity experiment: Violin plot for animacy and object indexes

be expected in well-formed sentences). This is the case when Ag1 and Cl1 or Ag2 and Cl2 co-occur. Choosing the first NP as agent with a corresponding subject index decreases from 79.26 % to 38.15 % when the object index cross-refers to the same noun. A similar drop can be observed when both indexes refer to the second NP. This suggests that an object index is an even stronger cue than subject indexes – especially when the two are in direct competition. This is also visible in the violin plot (see figure 22).

In summary, object indexes can easily strengthen an interpretation based on the other cues – when they are in coalition – but can also easily override the identification based on other cues when they collide with the object index.

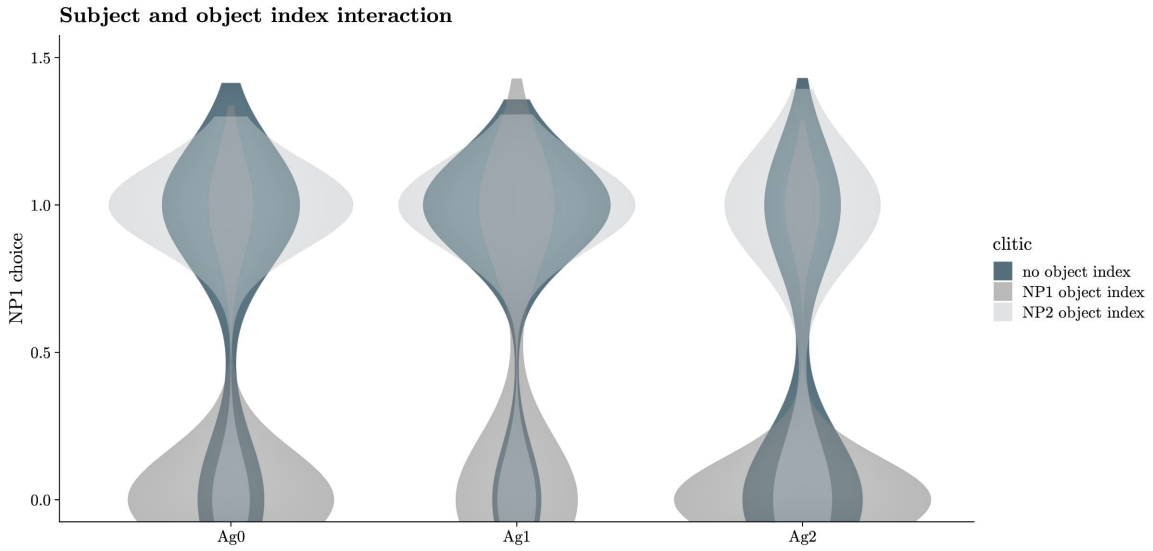
Discussion. This study was the first cue validity study on Bulgarian that also included object indexes in the analysis. It turned out that object indexes are actually very strong cues for determining the argument roles. Therefore, the cue ranking is not completely as predicted. Instead, object indexes range even higher than subject indexes. In the following, the ranking is stated as a hierarchy, based on the NP1 choice.

object index > subject index > animacy > order

When available in a sentence, object indexes are very strong cues. They triggered the strongest main effect, participated in the strongest interaction effects, strengthened or overrode interpretations based on the other cues and had a strong impact on the choice (as well as on reaction time). When one NP was cross-indexed by the object index, the other NP was chosen as the agent in in most of the cases and yielded the strongest main effect on NP choice, irrespective of the other combination of the other cues. NPs that are marked with an object index are highly likely to be interpreted as the patient of the sentence (and the other NP as the agent).

Figure 22

Cue validity experiment: Violin plot for subject and object indexes



The object index either facilitates the role interpretation or almost completely determines the role interpretation alone when another cue collides with it. This finding matches the results from the study on Spanish (Kail, 1989) who found a comparably high ranking of object indexes in this language.

This study also confirmes the pattern previously described by Andonova (1998). Subject indexes caused the second-strongest main effect and the NP cross-indexed by the subject index was chosen as the agent in 68 % or 59 % of the cases. This is followed by animacy and word order (with the difference between the two last mentioned cues being less pronounced). In terms of reaction time, the effects were slightly less pronounced. Conditions with or without (pre-verbal or post-verbal) DOI were rated equally quickly whereas some modulation can be observed for the other cues. This suggests that DOI is not necessarily slowing down the interpretation to larger extents than other cues.

Of course, an important difference is that object indexes point at patients whereas most of the others arguably point at agents (except for VNN order maybe). Hence, the effect of the index is more indirect on the agent. Nevertheless, they contribute to role interpretation in the whole sentence. In another account it was even emphasized that the assessment of agentivity (and its prototypicality) depends on the consideration of a second argument involved in the utterance (Bornkessel-Schlesewsky & Schlesewsky, 2015). Therefore, the consideration of object indexes as cues in this context provides important insights – in particular if my account is true that object indexing in Bulgarian is concerned with the marking of (medium-level) prominent referents, i.e., referents that potentially compete with other referents that are more prominent and agentive.

A reason that could explain the cue strength of the object indexes could be that they

are associated with discourse referents (via person) and are additionally marked for case, as was pointed out in the previous chapters. The same is true for Spanish where object indexes are also comparably strong cues (but weaker than subject indexes and the actual case marking preposition). I cannot provide an explanation for the different ranking of object indexes in Bulgarian and Spanish – despite their clear similarities in structure and function. It could be that a solution can be found with respect to the increasing coincidence of P and R in the pronominal system. But this is pure speculation here and requires further cross-linguistic research.

For reaction time (i.e., the speed to make a choice), the picture is more complex. A uniquely marking agreement marker (i.e., subject index) or a short object pronoun (i.e., DOI) slowed down the reaction time, whereas an animate NP1 was processed faster. Nevertheless, if both referents were animate, reaction time to choice was quicker than sentences with only an animate second NP. The latter findings are in line with a strong expectation that animate referents in the sentence-initial position are the agents but the results for the two indexing or agreement types are inconclusive. Based on this, it is not possible to directly state a reaction-times based pattern. It might be the case that there is a certain level of accuracy - speed of processing trade-off reflected in this design.

There are some limitations that need to be addressed. As with all cue validity designs, it is peculiar to use a number of ungrammatical or illogical sentences. This might cause some confusion for the participants but is a necessary pre-condition for this particular design. Also, there are some potential problems with recording reaction times in web-based experiments in comparison to lab-based experiments. There is typically a delay in direct comparison to measuring reaction time in the lab (Reimers & Stewart, 2007) for instance). However, it was widely shown that this is not a problem for data quality. The relative differences between conditions are typically preserved (as outlined for instance in Hilbig, 2016) and using *jsPsych* was shown to be adequate for recording reaction times even with different browsers and operating systems (Bridges et al., 2020). Since my study detected some clear reaction time differences that appear to be plausible in comparison to NP choice, this should not be a source of confounding. The drop-out or exclusion rate was comparably low, probably due to the use of direct attention checks (in contrast to the previous acceptability studies with comparably strict exclusion criteria).

In sum, this study is mainly in line with previous work within the cue validity paradigm. The overall pattern from a previous (lab-based) study on Bulgarian was confirmed and it was additionally shown that object indexes serve as a strong cue in determining the argument roles of a sentence. As is pointed out in the competition model, different cues may have different functions and can contribute to role interpretation even when this is not their primary task. The present study did not shed light on the potential underlying function of DOI but looked at the behaviour of DOI as a cue for argument role. The strong cue validity could be explained by the association with topicality or discourse prominence – the main aspects of investigation in the next chapter.

5.5 Chapter conclusion

In this chapter, I focussed on two particular issues. On the one side, I looked at DOI as a cue in role interpretation. On the other side, I investigated the interaction of DOI with other cues, namely a semantic feature (animacy) and a syntactic means that can also

be employed for argument marking (word order). For this purpose, I conducted three acceptability judgment studies and one cue validity experiment. These studies suggest that DOI is not affected by animacy but can heavily interact with order. In addition, DOI can serve as a particularly strong cue in role identification (also in interaction) and can outpace other cues when applicable.

In the previous chapter, I developed a perspective of DOI as a marker that can elevate or activate the discourse prominence status of a referent whose status (or status shift) is less expected from the previous discourse, i.e., DOI also serves as a type of attention cue indicating the perceived deviance in discourse prominence to the listener. The results from the present chapter are not directly related with the investigation of this acclaimed function but contribute to the idea implicitly. DOI seems to be a marker that singles out certain referents at a medium-level of discourse prominence.

It appears that DOI is a comparably strong cue that can unambiguously be used to determine the patient role in a sentence. It seems that semantic properties of the referent do not play a strong role here. Inanimate or animate referents can equally be selected with DOI and there is no preference for one or the other. Also, in interaction, DOI can easily override preferences built up via animacy (with animacy being a comparably weak cue either way).

In terms of order, there is a clear general preference for object-initial orders with DOI. As I stated before, this could be due to the frequent correlation of topics with elements that are prominent or that are raised in its prominence status. Without any supporting context, it seems that the joint marking via DOI and order alternation enforces such a reading.

In interaction, DOI can override order-based assignment as well but when the two support the same interpretation the contribution of both cues together is very strong. The high cue validity of object indexes is interesting when we take into consideration that this cue is rarely used. Arguably, its availability (in terms of frequency) is relatively low – but due to the acclaimed association with discourse roles and the additional case-marking it becomes a highly reliable cue (when needed).

The results of this chapter suggest that DOI can target referents irrespective of their animacy status, that the function of DOI must be comparably specific and unique (as is the case with particular prominence levels but also topics) and are clearly preferred in interaction with an encoding strategy that is well-known to mark topicality (order). Which of the two mechanisms is ultimately responsible for DOI cannot be determined based on the evidence presented in this chapter.

So far, sentences with DOI were only tested without any context. However, it is clear, that the perspective of DOI that I am elaborating on in this dissertation, understands DOI as being driven by discourse factors. In order to investigate this issue further it is necessary to test the judgment and processing of DOI with contexts. These contexts must be designed in a way that they match the potential functions of this construction. For this purpose, I take a closer look at contexts manipulating the topicality or discourse prominence of discourse referents in the following chapter.

6 Empirical evidence: Topicality and discourse prominence

In chapter 4, I argued that object reduplication (or "clitic doubling") phenomena can be described as a form of differential object indexing. I discussed recent accounts on differential object marking (differential object flagging and differential object indexing) that account for the function of these encoding strategies by means of information structure (Dalrymple & Nikolaeva, 2011; Nikolaeva, 1999, 2001) and discourse (Iemmolo, 2011; Schikowski & Iemmolo, 2015).

As I pointed out, the concept of *secondary topic* by Dalrymple and Nikolaeva (2011) does not use a strict notion of sentence topicality (in the sense of Reinhart, 1981), but rather a definition of topic that is grounded in the relationship of the referential features and the preceding context of an object. Particularly, they emphasize that topicality "depends on the speakers assessment of its saliency within a given communicative context..." (Dalrymple & Nikolaeva, 2011, p. 14).

I elaborated on this emphasis by showing that the notion of topicality used by Dalrymple and Nikolaeva (2011) can be replaced by a more recent notion of discourse prominence (von Heusinger & Schumacher, 2019). Dalrymple and Nikolaeva acknowledge similarities between their topic concept and the notion of discourse prominence (however, they refer to an older, less systematic account of discourse prominence by de Swart, 2007). Discourse prominence captures the situation of ranking several referents in discourse and shifting them dynamically in a more direct, less categorial way than the notion of topicality implies. This account also complements the notion of discourse topic(s), by capturing different rankings via prominence.

Additionally, the claim by Schikowski and Iemmolo (2015) that DOM systems "reflect the special status of certain Ps in discourse", and particularly that "DOI is ... primarily concerned with reference tracking" can be systematized by the perspective of discourse prominence. If DOI was concerned with reference tracking in a generalized way, it would most likely mark every instance of P and not be differential. Hence, discourse prominence can be applied to capture the "special status in discourse".

In this chapter, I provide some initial empirical evidence that DOI (in Bulgarian) is associated with special discourse prominence statuses, rather than topicality in a direct sense. One challenge in determining the function of DOI is the relation of discourse prominence and topicality. As I described in the section on prominence, the information status of a referent may contribute to the (discourse) prominence status of this particular referent (and probably, vice versa).

Hence, it is far from trivial to investigate the distinction of topicality and discourse prominence, particularly since many accounts of Bulgarian postulate that DOI is a topic marker (see chapter 2). It is possible, of course, that DOI is just a topic marker of an entity or referent and only affects the discourse prominence status of the referent secondarily. However, also the opposite may hold. Referents high in prominence are more prone to be topics of a given sentence or piece of discourse. Remember, however, that DOI (in Bulgarian) might as well occur with focal elements and is a comparably rare construction (in contrast to passives, for instance).

Prior to dealing with discourse prominence more directly in the second part of this chapter (section 6.3), I draw on the traditional perspective of Bulgarian DOI and investigate

the association of DOI and topicality in more detail in section 6.1. The first two studies in this chapter (section 6.2.1 and 6.2.2) are directly concerned with (sentence) topic and use a highly restricted manipulation with respect to information structure. In section 6.2.3, I report the results from another acceptability judgment study focussing on givenness (and indirectly topic).

I will then discuss discourse topicality and discourse prominence in more detail (section 6.3). The final experiment of this study (section 6.4) indicates that DOI is not associated with the most prominent (and discourse-topical) referent but with a second referent that had a medium-level prominence status lower than the most prominent or discourse topic element. The evidence presented in this chapter supports the perspective that DOI is more directly concerned with reference tracking in discourse and particularly the discourse prominence status of mid-level referents.

6.1 Sentence topics

6.1.1 Investigating topics

Topic tests. In chapter 4, I discussed problems with the notion(s) of topic and gave an overview of the many different attempts to define and capture this information-structural category (see also Birner, 2013, p. 212, for a general overview). The problematic definition of topic also provides a challenge to empirical research. Empirical studies often make use of different concepts of topicality. However, the majority of them, (at least loosely) associate with the notion of aboutness as I will shortly summarize in the following.

In the first two studies of this chapter, I explicitly focus on sentence topic. In line with the theoretical account given above, I understand sentence topic in the sense of aboutness (within a sentence) that are only applicable to referring expressions. Discourse topic, in contrast, is concerned with the aboutness at the level of discourse (Birner, 2013) and is related to keeping track of the information packaging over larger pieces of discourse and above the sentence level. In the past, a number of tests and designs were developed to investigate topicality in empirical linguistic research. In the following, I discuss some of these ideas before I report my own experiments.

Among the first attempts to systematically investigate topic was the idea to develop topic tests, in order to overcome sheer intuition of what classifies as topic in a sentence. A very simple example is the "*what-about* test" (Gundel et al., 1989). So as to assess which referent is affected by the event or new information of the sentence, we can simply ask "What about this entity?" and the referent put into the question is assumed to be the aboutness topic of the sentence. In a similar manner, we can transform the sentences, either with the "*say-about* test" (Reinhart, 1981) or with the "*as-for* test" (Gundel et al., 1989). The three tests are briefly illustrated in the following example (taken from Birner, 2013). Each test is applied to the target sentence and tries to test for the topic status of *Dorothy*:

(53) Dorothy is bringing chicken salad.

a. What about Dorothy? [She]TOP [is bringing chicken salad]COM

b. [Roger said that]NAI [Dorothy]TOP [is bringing chicken salad]COM

c. [As for Dorothy]TOP, [she is bringing chicken salad]COM

This test works well with simple examples and can also be applied to objects. Example (45), stated again as example (54) in the following, illustrates how the topic tests can be used to determine the (subject) topic of the main clause or the (object) topic of the subordinate clause.

In this example, the object referent *fabada* (a famous Asturian bean stew) was not mentioned before, but seems to be highly accessible due to its popularity. The *fabada* is overtly marked for definiteness by an article and cross-indexed. The sentence topic of the main clause is *the tourist*, but in the subordinate clause sentence (clause-level) topicality of *the fabada* is established by preposing the object. The elevation of a not directly active referent to a discourse prominent status is marked additionally by DOI.

(54) *Context: A side comment on a former costumer* (SDV04-BG/-ES)
turist janki ubeden če **fabadata** **ja** e
tourist yankee convinced COMP fabada-ART.SG.F 3SG.F.ACC be.PRS.3SG
izmislil Heminguej v San fermines
think_of-PTCP.SG.M Hemingway in San Fermines
'A yankee tourist convinced that the fabada was invented by Hemingway in San Fermines.'

If we wanted to test for the topicality of the subject, we could apply the following tests:

(55) A yankee tourist was convinced of something.
a. What about the yankee tourist? [He]TOP [was convinced of something]COM
b. [Fermin said that]NAI [the yankee tourist]TOP [was convinced of something]COM
c. [As for the yankee tourist]TOP, [he was convinced of something]COM

Applied to Bulgarian, we could transform the example in line with the second test, illustrated in the following example:

(56) Fermin kaza, če turistăt janki e ubeden v nešto.
Fermin say.PST.3SG COMP tourist-ART.SG.M yankee be.PRS.3SG convinced in something
'Fermin said that the tourist yankee was convinced of something.'

Similarly, we can also focus on the subordinate clause and determine the topic of this clause (for the purpose of illustration I use a passive sentence here):

(57) The fabada was invented by Hemingway.
a. What about the fabada? [The fabada]TOP [was invented by Hemingway]COM
b. [The yankee tourist believed that]NAI [the fabada]TOP [was invented by Hemingway]COM
c. [As for the fabada]TOP, [it was invented by Hemingway (according to the yankee tourist)]COM

Again, transforming the sentence to a relative clause, also works in Bulgarian:

(58) Turistăt janki vjarva če fabadata e
tourist-ART.SG.M yankee believe.PST.3SG COMP fabada-ART.SG.F be.PRS.3SG
izmislena ot Heminguej
think_of-PTCP.SG.F by Hemingway
'The tourist yankee believed that the fabada was invented by Hemingway.'

This short illustration shows how topicality can be tested by determining what information is conveyed (comment made) about which entity (topic) of a clause. These tests are far from perfect. If topicality is mainly concerned with information packaging, we could also turn the tests upside down and ask, for instance, for *Hemingway* if we believe that something is said about him. Additionally, using passives ("The fabada was invented by Hemingway") is probably not disallowed in English and Bulgarian as a response to a "*What about*-question asking about *Hemingway*. This shows that these tests cannot unambiguously test for topicality and that the application of topic tests still depends on some intuition, but is a simple tool to identify potential topics of sentences.

Topic questions. A closely-related approach is to paraphrase the proposition of a sentence as a question. By asking *who* or *what* is fulfilling or undergoing the action specified in the sentence, we might limit the number of elements that can be considered as a topic (Reinhart, 1981). This approach is somewhat fuzzy, since it is actually asking about the thematic role rather than topicality itself. Another problem is that this approach requires an additional assumption. In our first example, we have no further information about the situation in which the utterance was stated. If we had information on how much the interlocutors already knew about either *Dorothy* or *the chicken salad*, we could identify the appropriate interpretation more easily . For example, if we asked "who brought the chicken salad?", we would end up with *Dorothy* as the agent (and most likely topic) of the sentence. We might ask in reverse what *Dorothy* did to determine the comment (see also Reinhart, 1981, p. 58, on this context dependency), provided that *Dorothy* is a given referent.

An alternative option is that *Dorothy* is a newly-introduced referent that is specified later and therefore also topic of the first sentence of a discourse (see Reinhart, 1981, p. 77, regarding this point). The problem of probing agentivity rather than topicality can be circumvented (at least in a closely controlled experimental design) by contrasting it with a question ensuring focality. When we ask "What did Dorothy bring?", we assume that *Dorothy* is a given referent and the entity that is asked about is therefore brought to focus in the subsequent sentence.

By clearly stating the one entity as given and enforcing the other entity to be focal, it is safe to say that the first entity is therefore sufficiently established as topic. Givenness of a referent alone would not suffice to claim topicality, but by marking the other referent additionally as focal, it should be sufficient to claim topicality of this referent (again, this only works in closely controlled set-ups with a restricted number of referents).

A case in point is example (42), stated again as example (59) here. Here, DOI is used within a question. The question asks for something ("What do you feed?") and hence enforces an answer with a specification of what is fed being focal (as probed by the question structure). Interestingly, the other element of the question (*the kid*) is not only given, but already marked with DOI in the question and potentially marked for topic – if we followed the topic marker perspective.

(59) *Context: Barceló to the old Sempere (pointing at his son)* (SDV01-BG/ES)
Sempere, ama s kakvo **go** hranite **tova** **drebosăče**
Sempere but with what 3SG.M.ACC feed.PRS.2PL DEM.SG.N kidDIM
'Sempere, what are you feeding this little fellow?'

In this example, *the kid* is definitely topical, due to the givenness of this referent in combination with the focality of the other referent (that is asked for). In this example, we could interpret DOI as a marker of the topicality of *the kid*, but it is not the presence of DOI itself that is used as a diagnostics for the topicality of *the kid*.

Similarly, if we asked "Who invented the fabada?" in the previous example, the *fabada* would be established as given in a potential answer (e.g., "The fabada was invented by Hemingway"), whereas *Hemingway* would be focal due to the *wh*-question. In light of the givenness of the *fabada* and the focality of *Hemingway*, we could assume that the *fabada* is topical. In contrast, asking "What did Hemingway invent?" causes focality of the *fabada* in an answer like "He invented the fabada".

We can also apply this combined context manipulation with sentences where two referents (of equal rank) interact:

(60) Target: Yesterday, Peter hit Max in front of his friends.
a. Context A: Who hit Max in front of his friends?
Target structure: It was [Peter]FOC who hit [Max]TOP.
b. Context B: Whom did Peter hit in front of his friends?
Target structure: [Peter]TOP hit [Max]FOC.

In the first example, the object of the target is already given and the *wh*-question explicitly asks about another entity – hence inducing focality of that entity. In the second context, the subject (of the target) is given in the context and the object focussed by the *wh*-question.

There are basically two simple options to enforce a topical reading of a given entity, either directly with the "*what-about* question" or with the contrast of *who* and *whom*. In experimental designs, the use of these questions engenders a certain expectation for a particular focus or topic structure. These studies typically "assume that questions (i.e., context) allow the parser to generate predictions regarding how information should be packaged in the upcoming response" (Alemán Bañón & Martin, 2019, p. 3). It is basically tested if the information structuring in the target sentences matches the information structure imposed by the question-answer pair (Bornkessel-Schlesewsky & Schlesewsky, 2009a, p. 252-253).

As I have shown with the short illustrations, focality and givenness can directly be established with these types of question, whereas topicality is rather indirectly established with these designs (and requires basically additional assumptions about the nature of topic). Therefore, many empirical studies are mainly concerned with focus marking (and fewer with giveness) as induced by the question type rather than topic. Additionally, many studies use prosodical marking as the target manipulation.[55] I do not provide a

[55]In the following, I only focus on studies testing the matching of the question with morphosyntactic target structures and do not discuss analogous studies with prosodic realization (but see Bornkessel-Schlesewsky & Schlesewsky, 2009a, p. 252-255, Bornkessel-Schlesewsky & Schumacher, 2016, or Alemán Bañón & Martin, 2019, p. 3-4, for a discussion of some prosody studies manipulating focus).

full overview of all studies, but rather give some illustration of studies applying the topic testing/ manipulation as outlined above.

"*What about* ___?" studies. Some studies focussed explicitly on the *aboutness*-aspect of topicality and directly asked for that. A case in point is the study by (Hung & Schumacher, 2012). The authors used three different context questions, one directly asking "What about ___ ?" combined with the object of the target sentence, contrasted with a context question combining the *what about*-question with the subject of the target sentence and a neutral context ("What happened?"). This was followed by either an object-initial (object = topic) structure or a subject-initial (subject = topic) structure. Depending on the combination, this either led to a topic continutiy or a shift of the subject or of the object. This study basically is a matching-study as described above.

Influenced by this design, Burmester et al. (2014) used a context presenting two referents (e.g., *owl* and *hedgehog*), a neutral context ("What exactly is going on?") or a *what-about* question (e.g., "What about the owl?"), followed by a subject-initial or object-inital sentence. This design leads to either a neutral SO or OS order or (due to the context question) to a topical SO or OS order. Using the *what-about* question should result directly in a high construct validity with respect to aboutness topicality, but might only be used to assess clear cases of topic-marking.

"Who/whom" studies. Other studies used the *who/whom* contrast that is controlling for focus and givenness (and therefore, indirectly topicality). An example in this regard is Bornkessel et al. (2003). They investigated the processing of subject-initial versus object-initial sentences in German after presenting a *wh*-question either focussing the subject or the object of the subsequent response. In the following, the example stimuli from this study are given:

(61) Example stimuli from Bornkessel et al. (2003)

a. Klaus fragt sich, <u>was</u> am Sonntag passiert ist. (neutral)
   'Klaus asks himself what happened on Sunday.'
b. Klaus fragt sich, <u>wer</u> am Sonntag den Gärtner besucht hat. (subject focus, object given and topical)
   'Klaus asks himself who visited the gardner on sunday.'
c. Klaus fragt sich, <u>wen</u> der Lehrer am Sonntag besucht hat. (object focus, subject given and topical)
   'Klaus asks himself who the teacher visited on Sunday.'

In line with the description above, the authors of this study argue that the given referent can be considered being topic due to this design. Similarly, Xu and Zhou (2016a) also used a *wh*-question to either focus the subject or the object. However, this study is not directly concerned with the topicality of the non-focal element. I present another study (on Bulgarian) that applied a similar design below.

Other context manipulations. In addition to the two groups of studies shortly illustrated above, there are also other types of context or target sentence manipulations that can be applied to investigate the effect of information structure on the acceptability or processing of certain sentences. For example, Hirotani and Schumacher (2011) used an adoption of the "*say-about* test". Following a context overtly introducing one referent

and manipulating the givenness of a second referent (new, given, inferable), each target sentence started with "According to [referent 1], [referent 2] did ...". This design should sufficiently ensure the assumed information structuring.

Another option is to explicitly presume the information structural function of a linguistic element and use this element to establish the structure in a context sentence. Two examples with respect to focus clefting are the studies by Cowles et al. (2007) and Alemán Bañón and Martin (2019). Both used contexts introducing three referents (for example, the stimuli from Cowles et al., 2007: "A queen, an advisor, and a banker were arguing over taxes."), followed by a second context in form of a question ("Who did the queen silence with a word, the banker or the advisor?"). For a congruent response they used sentences that related to the focussing of two referents by picking one ("It was the banker that the queen silenced") or an incongruent situation where the queen was marked for focus by the *it*-cleft.

With respect to givenness and topicality, many studies use order alternations. For example, Weskott et al. (2011) conducted an acceptability and a SPR experiment with contexts introducing two referents (contrasted with no context) that is directly followed by a target sentence either in SVO or OVS order, in order to determine the acceptability (and processing) of SVO and OVS depending on the context. They show that OVS can be processed more easily and is more acceptable when an adequate context is used.[56]

Schumacher and Hung (2012) altered the givenness of a referent in the context followed by a sentence with the object either in sentence-initial or sentence-medial position. They explicitly assume that the sentence-initial position is a topic position. Similarly, Xu and Zhou (2016b) manipulated topic in their study on Chinese, by using the contrast between (topical) sentence-initial vs. non-initial position. Other studies also used elements that were previously described as marking topics (e.g., the Japanese *wa*-marker as in Hirotani & Schumacher, 2011).

In the first two studies of this chapter, I basically refer to the idea that manipulating the context questions does engender an expectation for a certain information structure. The structure of the target sentences is then matched to this context. In cases where the question and the structure of the sentence (argument marking, word order) point towards the same information structure, these trials should receive a higher acceptability than trials where the two are not in alignment. If DOI is a topic marker, it should be preferred with contexts that suggest a topical interpretation of the object (in contexts and sentences with two referents).

6.1.2 Topic studies on Bulgarian DOI

To my knowledge, Ivanov (2012) is the only study that applied experimental testing to the investigation of DOI in Bulgarian. This study basically combines givenness (as a context for topic) and a *wh*-question for focus and is therefore similar to the studies briefly mentioned above. In his study, he investigates to what extent (English native) L2 learners of Bulgarian have acquired the (pragmatic) function of DOI (clitic doubling) in Bulgarian. In terms of acquisition research, the study is concerned with the interface hypothesis, by focusing on "grammar-internal" and "grammar-external" domains (Tsimpli & Sorace,

[56] A similar design was used in Slioussar (2011), who tested sentences with different orders of three referents (A, P and R) in Russian. Vasishth et al. (2012) combined word order and clefting to test effects of givenness and focus in Hindi.

2006). He explicitly assumes the function of topic marker as the main function based on the analysis by Leafgren (1997) and claims that "doubling of topical objects in Bulgarian is pragmatically required" (Ivanov, 2012, p. 350).

Ivanov (2012) mentions both options with regard to DOI, namely DOI with a fronted (pre-verbal object) and in canonical word order. In his words, the first case is an instance of "double topicality marking" and the second case is a situation in which DOI alone marks the topic of an object in post-verbal position that would otherwise be interpreted as focal (Ivanov, 2012, p. 351). In other words, Ivanov treats sentence-initial order and DOI as topic marking strategies.

In his experiment, he tested if this acclaimed pragmatic function is available to intermediate and advanced learners. All learners were native speakers of English and except for one, all of them lived in Bulgaria at the time of the experiment. Relevant to our discussion here is the point that he also used a control group with 16 native Bulgarian speakers. The stimuli consisted of 10 short dialogues (in English) and a question licensing either a topical or a focal reading, followed by four answer options (either with an accusative or a dative object). Participants had to rate all the possible four answers on a scale from 1 (*unacceptable*) to 5 (*perfectly acceptable*). The topic questions mentioned a referent that was repeated in the answer. The focus question consisted of a *wh*-question that was answered by the object in the target sentence. Also, object order was manipulated with the factors *fronting* and *no fronting*.

Henceforth, the design was not actually 2x2, as stated in the article, but 2x2x2x2 (case x question type x presence of DOI x order with two factors each), leading to sixteen conditions (however, dative and accusative objects were analysed seperately). Based on the methods section, the design is not fully replicable. Examples are only given for the topic design with datives and for the focus design with accusatives. Therefore, it is not possible to completely reconstruct the design used for this study. In the following, I only focus on the results from the control group, since I am not concerned with acquisition, but only with the usage within Bulgarian. At this point it is clear that there are several limitations to this study. The sample is relatively small and skewed towards speakers from Sofia. If there are only 10 sentences used, also the number of trials is small.

In addition, it is problematic that all conditions were presented at once for the same lexical set. Also, the design of the study is not completely reported in a consistent way. This makes it impossible to assess the general rating of DOI by the speakers. The result is a problematic assessment of the reliability of this study. However, more relevant to our study it the validity of this study. Topic and focus are not controlled in a comparable way. Topic questions are qualified as such if they mention a referent. Focus in contrast is enforced by a *wh*-question. A systematic investigation should rather make use of parallel structures. In contrast to the procedure outlined above, this indirect contrasting of givenness versus focality does not equally allow for an interpretation of the given element as topical in the same way as outlined above.

Ivanov (2012) expected that, in the control group (and for learners who sufficiently acquired the acclaimed pragmatic function), the conditions of OVS and DOI (condition 1) and SVO and DOI (condition 4) should receive high ratings after a topic question and low ratings after a focus question, whereas option 2 (SVO) and 3 (OVS) without DOI should yield the opposite picture. This is precisely what he reported. In addition, he conducted

two-ways repeated-measures ANOVAs as well as one-way ANOVAs for the single groups rendering a significant main effect.

Ivanov (2012) argues that the preferred alignment of DOI with topicality (actually givenness, as I stated above) and dispreferred alignment of DOI with focus does support the notion of DOI as a topic marker. He also states that it complements the idea of OVS being concerned with topicality. In light of his design and analysis, this is a too strong claim. This study was problematic in several respects, particularly since the manipulation of topic and focus was not completely consistent and reported only few illustrations of this design. This study cannot be taken as the ultimate proof of the topic marker perspective. Additional – and particularly more systematic – investigations are necessary. This is the goal of the first two studies presented here.

6.2 Acceptability judgment studies

In the first two studies, I limit topicality closely to the notion of aboutness and only use simple (parallel) questions to probe for topic and focus. The difference between the first and the second experiment is order. As was mentioned above, order tends to be aligned with information structure, particularly topic. Information structuring typically follows an old-before-new principle in terms of the order, in which information is presented. This is also reflected in the ordering of topic.

A position at the left-edge of a sentence is typically associated with topicality in Slavic languages, both in form of left dislocation as well as the left edge within the clause (Sussex & Cubberley, 2006). Jasinskaja (2016) calls the first structure "(left-edge) topicalization". According to her, all types of topic (aboutness, new, shifted topics or contrastive topics) can appear in this position. In Bulgarian, object-initial orders are comparably rare (and marked) but clearly associated with topichood (Dyer, 1992, 1997) and often accompanied by differential object indexing (see the previous chapters).

In acceptability judgment study 3 of this work, I showed that this intuition of the (frequent) association of DOI and OVS-order is also reflected in the rating of this structure, in comparison to the (neutral) SVO-order. If both DOI and OVS are associated with topic-marking, this co-occurrence comes at no surprise. The Japanese topic marker (flag) *wa* is also most frequently found with sentence-initial objects (Heycock, 2008; Martin, 2003; Vermeulen, 2013), to give another example of the alignment of order and morphosyntactic topic marking.

The third study is different. Here, the structure of the target sentence (with/ without DOI) is not matched against a *who/whom* contrast. Instead, the object index is used as a potential topicalizing strategy by itself. The context itself only determines the givenness of the involved referents by using a version of the *what-about* question, namely by asking "Did you here the news about ... ?". Either one or two referents are introduced. Hence, in the case of two referents, the question does not contribute to the topicality of one of the two involved referents. It only established givenness (of one or both referents) in this regard. (Potential) topichood is only established in combination with the subsequent target sentence, one without DOI, the other with DOI. Hence, this experiment makes the clear assumption that DOI is a topic marker and therefore may establish topicality by its presence.

I attempt a first approximation to focus on the discourse level, since the interplay of context and target does play a role for the interpretation here (in contrast to the sole matching of context and target in the previous acceptability studies). With respect to DOI, this leads to two potential continuations: In the first combination, only one referent is given. This referent is only instantiated by a subject index, whereas a newly introduced referent is cross-indexed and hence made object. This is contrasted with sentences in which both referents are given. This is compared to a parallel case where the subject of the target is either introduced or new. With respect to the subject, no difference in rating is expected. However, if DOI is indeed a topic marker , marking a discourse-new referent should be highly dispreferred. If, in contrast, there is no change in preference this points in the direction that DOI is independent of givenness (and topicality).

In the following, I present the three acceptability studies related to topicality and givenness. In the second part of this chapter, I discuss the notion of topic with the perspective of empirical studies in more detail and elaborate on the idea to apply the concept of discourse prominence to investigate DOI, by providing evidence from a more profound web-based experiment.

6.2.1 Acceptability judgment study 4: Post-verbal DOI and topicality

Preliminaries and hypotheses. In the previous section I motivated the use of different *wh*-questions to probe for topic and focus in a closely controlled study with two referents. At the time of conducting this study, I was still convinced that DOI is a simple topic marker as was previously claimed for Bulgarian and this idea was also reflected in the pre-registration on aspredicted.org.

Nevertheless, my analysis outlined in chapter 4 challenged this perspective. In addition, there is little empirical work directly testing the claims of the topicality perspective. To my knowledge, only the study by Ivanov (2012) focusses directly on DOI and topicality in Bulgarian, but this study comes with limitations, as I pointed out above.

The present study tries to overcome some of these limitations by using new material and applying a more systematic procedure. I hypothesized that differential object indexing in Bulgarian is a topic marker and therefore sentences with cross-indexed objects should be preferred after questions inducing a topical reading of a given referent (see below for details). This should hold particularly in contrast with questions inducing a focal reading. If, however, no difference in acceptability was found, this would challenge the view that DOI is (directly) related to sentence topicality.

Participants. In total, 41 native (and monolingual) speakers of Bulgarian were recruited on *Prolific* (www.prolific.co) and conduced the survey on *Qualtrics* (Qualtrics, Provo, UT). Six of them had to be excluded, because they failed to answer the consistency checks appropriately. As in the previous three acceptability studies (see chapter 5), this was the case when they rated fillers with easy-to-detect grammatical errors with a rating of four or higher in more than three out of 12 filler sentences (33.3 % of the fillers with errors).

The remaining 35 native speakers of Bulgarian had a mean age of 33.91 (SD = 8.13) and the majority were women (n = 29, 82.86 %). All participants gave their voluntary consent to participate in the study and were reimbursed with an average payment of 8.27 Euro per hour.

Materials and design. The experimental data (stimuli, script and data lists) of this study are publicly available at https://osf.io/5mj6t/. The experiment consisted of a 2x2 design with the variables *question type* (with factors *topic question* and *focus question*) and *presence of DOI* in the target sentence (with factors *without DOI* and *with DOI*). Each trial consisted of a short context question, directly presented together with a target sentence containing either a sentence without or with DOI. Example stimuli are presented in (62).

The total make-up consisted of 48 lexical sets with 12 sentences per condition. All stimuli were distributed over four lists with a Latin square design and pseudo-randomized within each list. Additionally, 24 identical fillers were added to each list. Twelve of the fillers contained clearly grammatical sentences with masculine referents (marked for case) and the other 12 sentences contained easy-to-detect grammatical errors. The sentences with errors were also used as attention checks for the exclusion of participants who did not pay attention while conducting the experiment.

(62) *Context 1 (Topic question, i.e., object = topic): Who hit Radko yesterday?*

Context 2 (Focus question, i.e., object = focus): Whom did Nevena hit yesterday?

a. SVO without DOI
   včera Nevena e udarila Radko s dălga prăčka
   yesterday Nevena be.PRS.3SG hit-PTCP.SG.F Radko with long-F stick

b. SVO with DOI
   včera Nevena **go** e udarila **Radko** s dălga prăčka
   yesterday Nevena 3SG.M.ACC be.PRS.3SG hit-PTCP.SG.F Radko with long-F stick

   'Yesterday, Nevena hit Radko with a long stick.'

The context-question used a similar *who/whom*-contrast, as described in the introduction of this chapter. The question word *who* is used to ask for the subject of the target sentence that is hence expected to be focal. This sentence already introduced the object (e.g., Radko) and therefore licences an expectation for an object that is topical in the target sentence. In contrast, asking for the object with *whom* is assumed to engender a focal interpretation of the (new) object.

Procedure. The procedure of the main experiment was the same as for the previous acceptability judgment studies (see section 5.2.1 for details).

Additionally, participants were asked to take part in a very short (24 sentences) interpretation task with three conditions (8x Object as single clitic, 8x indexed object, 8x full NP object) after the actual study. This interpretation task served as a pilot study for the experiments presented in chapter 7. After completing the questionnaire, participants were thanked for their participation and re-directed to *Prolific*.

Statistical analyses. All calculations of this analysis were conducted in *R* (R Core Team, 2019) following the procedure used for acceptability judgment study 1 and the subsequent studies. The description of the analyses was outlined in detail in section 5.2.1 of this dissertation. In this and the following study, I used *z*-scores and additionally violin plots for the reasons outlined there.

Results. The means and standard deviations of the actual values and the *z*-scores are presented in table 19 and the mean *z*-scores are additionally plotted in figure 23. The ratings for DOI were comparably low in this study. No significant difference between DOI after a topic question (M = 2.33, SD = 1.88) or a focus question (M = 2.42, SD = 1.98) was found.

For sentences without DOI, there was a higher rating for sentences after a focus question (M = 5.66, SD = 1.96) than after a topic question (M = 5.43, SD = 2.04).

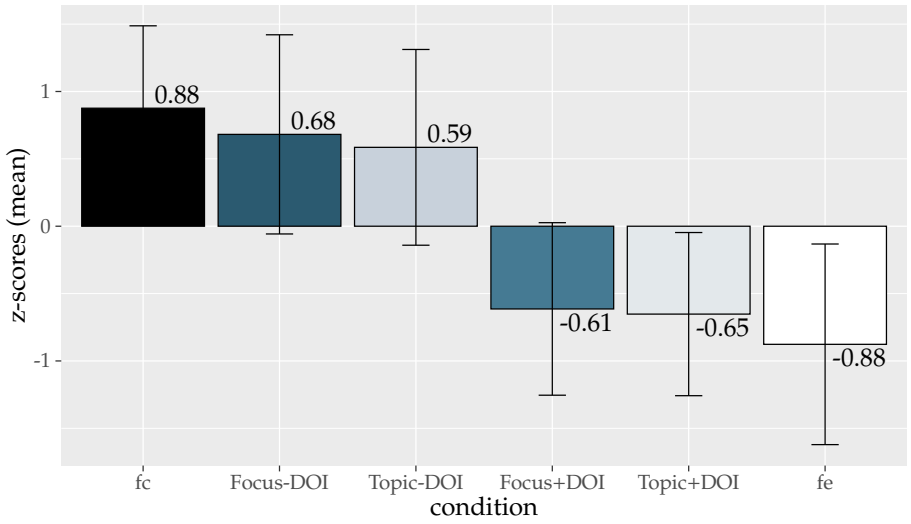
Table 19

Acceptability judgment study 4: Means and standard deviations

condition	Mean values	*SD*	Mean *z*-scores	*SD*
Topic without DOI	5.43	2.04	0.59	0.73
Topic with DOI	2.33	1.88	-0.65	0.61
Focus without DOI	5.66	1.96	0.68	0.74
Focus with DOI	2.42	1.98	-0.61	0.64
correct fillers	6.12	1.59	0.88	0.61
error fillers	1.83	1.73	-0.88	0.74

Figure 23

Acceptability judgment study 4: Boxplot of z-values



The results from the linear mixed effects model for all conditions are presented in table 20. The model revealed a significant effect for question type ($\chi^2(1) = 5.26$, $p = .022$) and a highly significant effect of DOI ($\chi^2(1) = 153.24$, $p = .000$) on the *z*-transformed ratings. However, the interaction of question type and DOI did not cause a significant effect on the

rating ($\chi^2(1) = 0.98$, $p = .323$). The main effects of the two variables are independent of each other.

Table 20

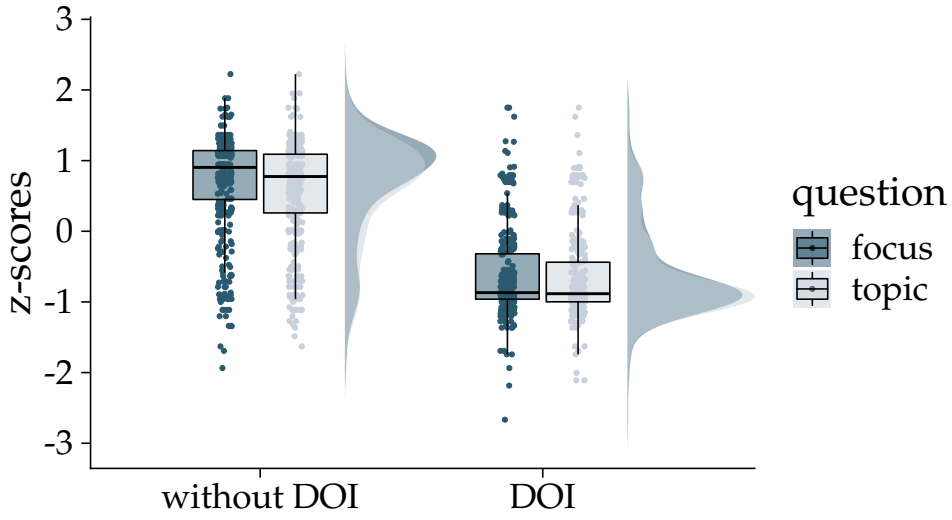
Acceptability judgment study 4: Analysis of deviance (Type II Wald χ^2)

condition	χ^2	df	p	
question type	5.26	1	.022	*
DOI	153.24	1	.000	***
question*DOI	0.98	1	.323	

The additional visual comparison with raincloud plots (see figure 24) confirms this pattern. The distribution is slightly higher for focus than for topic questions in sentences without DOI, but very much the same for sentences with DOI.

Figure 24

Acceptability judgment study 4: Raincloud plot of z-values



Discussion. The results from this study stand in stark contrast to previous claims and the older study by Ivanov (2012). No difference was found for the rating of DOI sentences after either a topic or a focus question, whereas this difference in context caused a significant effect, indicating that the questions themselves were sufficient in causing a slightly different interpretation of the overall discourse.

It comes as a surprise that there was no preference for sentences with DOI after a topic question relative to a focus question. Neither the interaction nor the group-level analysis identified any difference in this case. To the contrary, sentences with DOI were rated

somewhat better after the focus question (but this effect was not significant). Therefore, the present study does not support the idea that DOI serves as a topic marker (at least in this closely controlled setting).

The present study overcomes some of the limitations of the study by Ivanov (2012). The number of participants and trials was larger. Also, I restricted the design to a pure 2x2 design and ignored dative objects. Despite this, my study comes with some limitations, too. It is not clear if a short context in form of a question is really sufficient for manipulating the information structure of a subsequent sentence. At least – it appears – that using a contrast of a question asking for a new, not aforementioned subject referent (*who*) in contrast to a focal question (*whom*) is a more valid approximation. Arguably, the questions involving a *who*-question are instances of *in-situ-wh*-questions, whereas the same does not automatically hold true for the *whom*-questions.

Another limitation of this study is the restriction to the manipulation of DOI. Ivanov also investigated DOI in combination with OVS order. It is noteworthy that in his study sentences with combined OVS and DOI received higher ratings after a topic question than DOI alone. For this reason, I repeated this study by combining differential marking and order alternations.

6.2.2 Acceptability judgment study 5: Pre-verbal DOI and topicality

Preliminaries and hypotheses. As was described at several points in this book, DOI often co-occurs with an object-initial word order. In chapter 2, I summarized some of the facts distinguishing actual DOI with OVS from dislocation structures with a resumptive pronoun. In the following study, I use the former structure to see if it is sensitive to different question types introducing either a topic or a focus structure. Order is not only interesting because of the frequent co-occurrences with DOI, but even more so in light of the fact that order is quite often directly related to information structure (see the short discussion in the introduction of this chapter).

In the previous study, no evidence was found that DOI itself is sensitive to topicalization as manipulated with the short question context. Based on the general claims with respect to the combination of DOI and OVS order, I hypothesize that objects marked by both encoding strategies are indeed sensitive to information structure. I predict that sentences with DOI and OVS receive a higher acceptability after contexts, suggesting a topical interpretation of the object.

Participants. Thirty-nine speakers of Bulgarian were recruited for this study on *Prolific*. Nine participants had to be excluded because they failed on the attention checks in form of easy-to-detect grammatical errors. The remaining 30 participants (21 females) had a mean age of 32.24 (SD = 8.66). All participants gave informed consent and were reimbursed accordingly.

Materials and design. The material in this study resembled the previous study, with the difference that the order in the sentences with DOI was changed to object-initial order. Again, the experimental data are publicly available at https://osf.io/5mj6t/. Each object that was cross-indexed by DOI was fronted to the sentence-initial position. For the sake of convenience, the stimuli are presented below again (with the changed order in the respective condition. The experiment also consisted of a 2x2 design with the variables

question type (with factors *topic question* and *focus question*) and presence of DOI combined with OVS (with factors *without* and *with DOI/OVS*).

The study consisted of 48 lexical sets with 12 sentences per condition. The sentences were distributed over four lists with a Latin square design. Additionally, 24 identical fillers were added to each list. Twelve of the fillers contained grammatical sentences with masculine referents (marked for case) and the other 12 sentences contained easy-to-detect grammatical errors. The sentences with errors were also used as attention checks. The order of the 72 trials was pseudo-randomized within each list.

(63) *Context 1 (Topic question):Who hit Radko yesterday?*

Context 2 (Focus question): Whom did Nevena hit yesterday?

a. SVO without DOI
včера Nevena е udarila Radko с dălga prăčka
yesterday Nevena AUX hit-PTCP.SG.F Radko with long-F stick

b. OVS with DOI
včера **Radko go** е udarila Nevena с dălga prăčka
yesterday Radko 3SG.MACC AUX hit-PTCP.SG.F Nevena with long-F stick

'Yesterday, Nevena hit Radko with a long stick.'

Procedure. The procedure was the same as for the previous acceptability judgment studies (again, see section 5.2.1).

Additionally, as for the previous acceptability judgment study 4, participants were asked to take part in a short (24 sentences) interpretation task with three conditions (8x object as single clitic, 8x indexed object with preverbal object, 8x full NP object) after the actual study as a pilot study.

Statistical analyses. The statistical analyses of this study followed the procedure outlined in detail in the analysis section of acceptability judgment study 1 (see section 5.2.1).

Results. The means and standard deviations for the actual values and the *z*-scores are offered in table 21.

Table 21

Acceptability judgment study 5: Means and standard deviations

condition	Mean values	S*SD*	Mean *z*-scores	*SD*
Topic without DOI	5.34	2.11	0.46	0.80
Topic with OVS and DOI	3.64	2.39	-0.23	0.85
Focus without DOI	5.54	2.07	0.54	0.75
Focus with OVS and DOI	2.90	2.06	-0.55	0.73
correct fillers	6.14	1.59	0.80	0.66
error fillers	1.81	1.60	-1.03	0.70

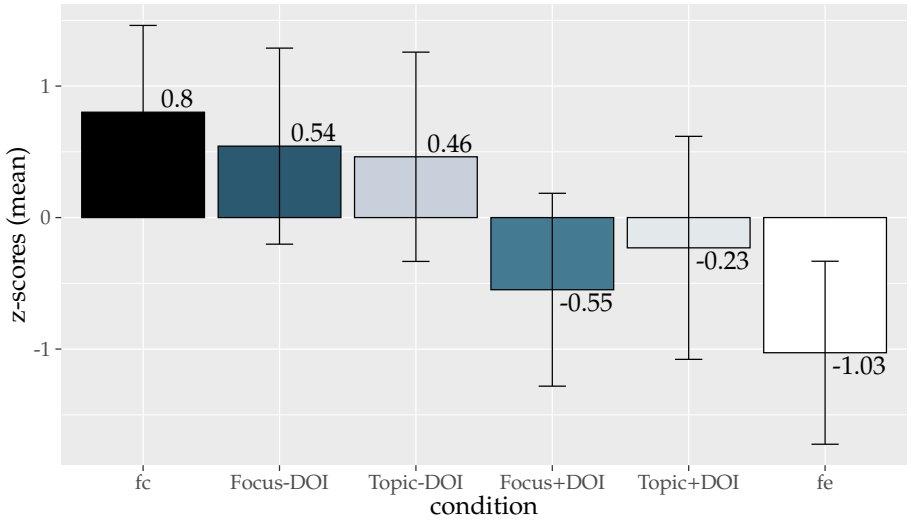
As in the previous study, sentences without DOI were rated slightly higher after a focus question (M = 5.54, SD = 2.07) compared to after a topic question (M = 5.34, SD = 2.11). Interestingly – in contrast to the previous study – sentences with DOI and object-initial order received a much higher rating after a topic question with a mean value of 3.64 (SD = 2.39) than after a focus question (M = 2.90, SD = 2.06).

This is also reflected in the z-scores, where sentences with DOI and OVS were on average only -0.23 (SD = 0.85) standard deviations below the mean rating. This result is similar to the finding of acceptability judgment study 3 in which DOI with OVS received a similar rating. In contrast, the same sentences were rated comparably low when presented after a focus question (z-transformed M = -0.55, SD = 0.73).

The z-scores for each condition are additionally plotted as boxplots in figure 25. Here it becomes visible that the sentences with DOI (after both question types) were rated higher than the error fillers (that can serve as negative baseline in this respect). However, the data also show a clear difference between the question types for the sentences with DOI and OVS (but not for the sentences without DOI in SVO).

Figure 25

Acceptability judgment study 5: Boxplot of z-values



The results from the linear mixed effects model for all conditions are given in table 22. The models revealed a highly significant main effect for question type ($\chi^2(1) = 12.04$, $p = .001$) and a highly significant main effect of DOI/OVS ($\chi^2(1) = 104.82$, $p = .000$) on the z-transformed ratings. Also, the interaction of the two variables DOI/OVS and question type was highly significant ($\chi^2(1) = 23.25$, $p = .000$). Remember that no such interaction effect was found in the previous study.

The visual inspection of the raincloud plots (see figure 26) confirms this pattern. For sentences without DOI, the distributions are comparable. For sentences with DOI the density of the distribution indicated that there are potentially two groups. For some

subjects, DOI was rated equally (low) after a topic question as well as a focus question. For another group, DOI was rated much higher after a topic question. This could indicate that, for people who reject DOI in total, no difference is made with respect to the pragmatic differentiation, whereas for people who accept DOI a clear difference is made – hence for this speakers who have the structure at its disposal, there is a clear preference for the structure after a context that triggers a topical interpretation of the object.

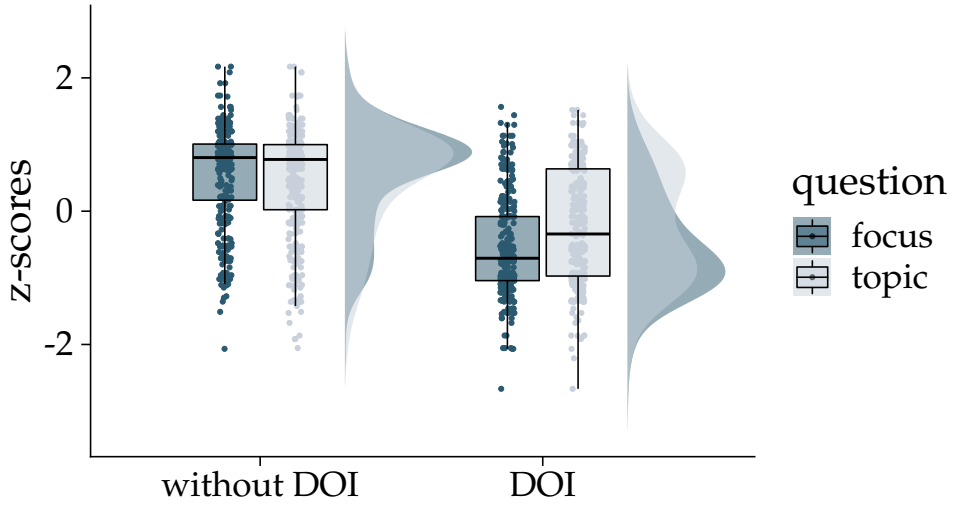
Table 22

Acceptability judgment study 5: Analysis of deviance (Type II Wald χ^2)

condition	χ^2	df	p	
question type	12.04	1	.001	***
DOI/OVS	104.82	1	.000	***
question*DOI/OVS	23.25	1	.000	***

Figure 26

Acceptability judgment study 5: Raincloud plot of z-values



Discussion. This study discovered an interesting – and in light of the previous study somewhat surprising – finding. In the present study, sentences with DOI and OVS that were presented after a topic question were rated much higher on average than was the case for the same sentences after a focus question. This suggests that DOI in combination with OVS is correlated to the function of topic. According to the distribution analysis, this holds true at least for those people who do not generally or globally reject DOI altogether.

However, when the results from this study are compared to the results of the mainly parallelly designed study presented before, the result does suggest a new interpretation.

In acceptability judgment study 4, ratings for DOI were closely comparable and there was no significant interaction. However, in this study – when it was combined with an object initial order – DOI yielded a highly significant effect and was rated much higher after a topic question. Given that the only difference in the independent variables is the order, it is at least a good guess that it is not DOI that caused the different effect on the ratings but order. If the two studies are compared and combined, this clearly suggests that order caused the difference – and, as I explained above, DOI only accompanies the order alternation for other reasons which are not directly affected by information structure.

6.2.3 Acceptability judgment study 6: DOI and givenness

Preliminaries and hypotheses. The last studies gave some indication that marking topics might not (fully) capture the function of DOI in Bulgarian. At least, DOI was not directly affected by the *who/whom* contrast (in contrast to order). Another way to look at topicality is from the perspective of givenness. As was discussed in the theoretical part of this book, topicality typically affects given referents and is rather uncommonly associated with new referents (Erteschik-Shir, 2014; although new topics arguably exist, see the same reference and Krifka & Musan, 2012). This perspective was also (implicitly or explicitly) stated by previous studies on information structure (see above).

In the previous chapters, I presented some examples of DOI with referents that were not previously mentioned. However, the examples typically referred to referents that were accessible either by being cases of generic or globally known entities or by entailing a certain connection to referents mentioned before. Remember the example from Leafgren (2002), in which a comrade of the narrator showed up and was mentioned by name although no previous mention was given. The use of the name in combination with a modifier seemed to be sufficient for establishing reference, even if the referent itself was not mentioned before. Leafgren interpreted this finding as an instance of non-contrastive focus.

Hence, it is interesting to contrast instances in which one referent is introduced by name and another referent is only related to this referent (and cross-indexed with DOI), in contrast to cases in which both referents are introduced by name. If DOI is strictly used only for given (and topical) elements, the use of DOI with new referents should be dispreferred.

This contrast is used in the current experiment. Here, either one or two referents are introduced in the context. The referent that is always introduced is only instantiated by the least explicit marking (in form of a subject or object index). The other referent that is either not introduced in context or also introduced is either serving as a subject instantiated as a full NP or as object with a full NP and DOI. This contrast is used to control if there is a preference for the cross-indexing of a referent that was formally introduced earlier in context.

Based on the topicality perspective of Bulgarian (e.g., Leafgren, 2002), I hypothesize that DOI should be clearly preferred with the referent being introduced before (hence given), instead of a situation where it is just introduced directly combined with a cross-index. However, the previous two studies challenge this perspective. Therefore, no clear hypothesis can be stated at this point and the present study is explorative to some extent. In addition, note that this study also served as a pre-test for the EEG experiment presented in chapter 6.

Participants. Thirty-one Bulgarian native speakers participated in this experiment. One participant had to be excluded from the analysis because she failed on the attention checks in form of easy-to-detect grammatical errors. The remaining 30 participants had a mean age of 31.17 (*SD* = 7.53). Twenty-three women (76.66 %) participated in this study. All participants gave informed consent before starting the experiment and were reimbursed for their participation.

Materials and design. I used a 2x2 design with the factors *number of referents introduced* (one vs two) and *presence of DOI* (+/-). In sentences without DOI, a short clitic pronoun referred to the referent that was introduced continuously ("Stefan" in the example, see example 64 for an illustration of the context and target sentences). In this study, I used masculine and feminine referents. Since I only used proper names – as inherently definite nouns – for the referents, case-marking as a confounding factor of masculine NPs in Bulgarian did not play a role here. For details, see the experimental data at https://osf.io/5mj6t/.

In total, 48 context - answer pairs were created. In addition, 12 trials introduced one referent and instantiated two referents as full NPs in the target sentence. These sentences with absence of any differential marking served as a comparison baseline of grammatical sentences, hence they were (grammatically) correct fillers. Another set of 12 sentences contained easy-to-detect agreement violations in number and served as a negative baseline of definitely ungrammatical sentences (error fillers).

Every lexical set was checked for consistency and naturalness in the canonical and no-DOI condition by two native speakers and later transformed into the other conditions. In terms of creating the four conditions, only two features were changed, namely gender agreement on the clitic (object index) and on the verb inflection (subject index). The lexical sets were distributed into fours lists with the help of a Latin square design, hence 12 sentences per condition were part of each list. The fillers were always the same. The order of the 72 trials was pseudo-randomized for each list.

(64) *Context 1: Did you hear the news about Stefan?*

Context 2: Did you hear the news about Stefan and Ana?

a. Subject - Object index - Verb
predi malko Ana go e udarila s dălga prăčka
before shortly Ana 3SG.M.ACC AUX hit-PTCP.SG.F with long-F stick
'A moment ago, Ana hit him with a long stick.'

b. Subject - object index - verb - object index
predi malko **Ana ja** e udaril Stefan s dălga prăčka
before shortly Ana 3SG.FACC AUX hit-PTCP.SG.M Stefan with long-F stick
'A moment ago, Stefan hit Ana with a long stick.'

In context 1, givenness is established for one referent (*Stefan* in this example). Continuation (a) matches this by using the highly explicit (object) short pronoun for this entity, whereas a new referent is instantiated by a full NP (as subject). In continuation (b), the second (and new) referent is marked by OVS and DOI. The (topical) marking of a new referent should be dispreferred if DOI is associated with this function. In contrast, context

2 does not enforce a particular topicality of one of the two referents, they are both given and of a comparably high rank.[57]

Here, in theory, all continuations should be acceptable if we follow the assumption that the morphosyntactic marking within the target sentence is providing a certain information structure. In other words, the first context rather enforces a matching of context and target, whereas the second context rather is a type of neutral context in the sense that it establishes givenness of two referents involved.

Additionally, participants were asked to take part in a very short (24 sentences) interpretation task with three conditions (8x object as single clitic, 8x objects with DOI and OVS, 8x full NP object) after the actual study that serves as a pilot study for later experiments.

Procedure and statistical analyses. The procedure and the statistical analyses were the same as for the previous acceptability judgment studies (for details, see section 5.2.1). The linear mixed effects models included the fixed factors NUMBER OF (GIVEN) REFERENTS and DOI (presence of DOI), random effects for subject and item as well as random slopes for DOI. As before, *z*-scores were calculated as dependent variable and an additional visual analysis was conducted with a violin plot.

Results. The means and standard deviations for the actual values and the *z*-scores are presented in table 23. There was no difference in the ratings of sentences without DOI. Sentences with DOI were rated slightly more acceptable after a context that introduced both referents (M = 1.97, SD = 1.76), in comparison to a context introducing only the non-cross-indexed referent (M = 1.90, SD = 1.72). The difference in mean values does not point towards a real difference between the two contexts.

The *z*-scores for each condition are additionally plotted in form of boxplots in figure 27. Here it is visible that the only actual difference was caused by the presence or absence of DOI.

Table 23

Acceptability judgment study 6: Means and standard deviations

condition	Mean values	S*SD*	Mean *z*-scores	*SD*
one referent without DOI	5.09	2.17	0.66	0.82
two referents without DOI	5.09	2.24	0.63	0.85
one referents with DOI	1.90	1.72	-0.64	0.64
two referents with DOI	1.97	1.76	-0.62	0.61
correct fillers	5.34	1.99	0.75	0.75
error fillers	1.57	1.36	-0.78	0.63

The results from the linear mixed effects model for all conditions are given in table 24. The model revealed no significant main effect for the number of referents introduced in context ($\chi^2(1) = 0.012$, $p = .912$). Only the presence of DOI yielded a highly significant main effect ($\chi^2(1) = 127.63$, $p = .000$). The interaction of the two factors did not cause a significant effect ($\chi^2(1) = 0.43$, $p = .513$).

[57] Note, however, that at least some ranking can be assumed here, due to the order of mentioning.

Figure 27

Acceptability judgment study 6: Boxplot of z-values

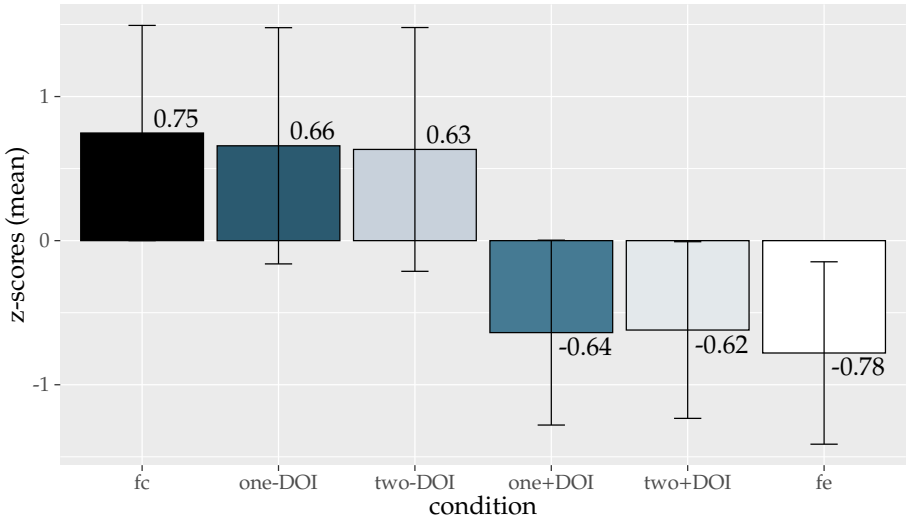


Table 24

Acceptability judgment study 6: Analysis of deviance (Type II Wald χ^2)

condition	χ^2	df	p	
number of referents	0.012	1	.912	
DOI	127.63	1	.000	***
no. of referents*DOI	0.43	1	.513	

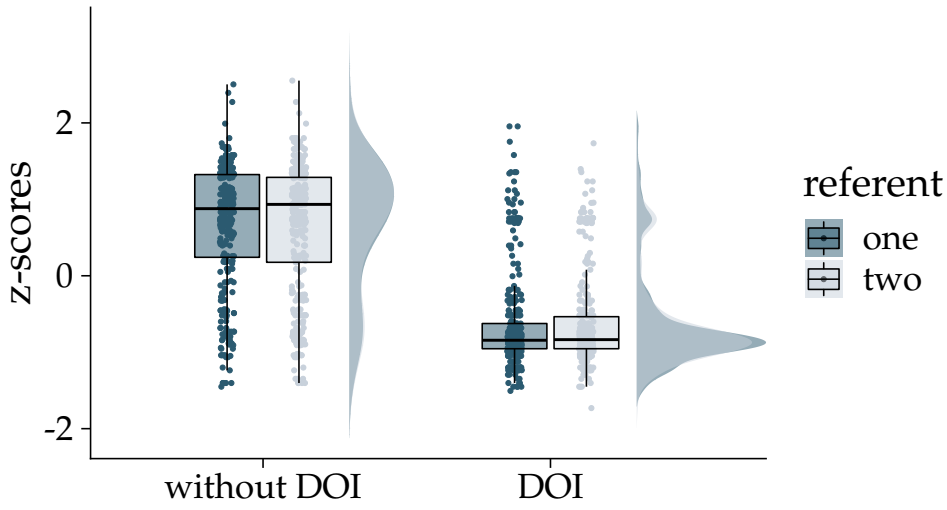
The raincloud plots in figure 28 suggest that there were two groups among the subjects. For one (large) group DOI mostly received a rather low rating, whereas for a smaller group, DOI received a rating that was almost as acceptable as sentences without DOI. However, for none of the two groups a difference in the rating of DOI dependent on the context was found, thereby confirming the statistical analysis.

Discussion. The present study did not reveal a difference in the rating of DOI dependent on the givenness manipulation. Particularly, there was no difference in the rating if a referent was either given in the context or newly introduced in the target sentence. Both versions received a comparably low rating. In addition, no difference was found for the sentences without DOI. In line with the idea that DOI is a topic marker, marking a newly introduced referent should be highly disfavoured. Hence, this study complements the consideration that there is no overall preference for DOI with a situation that enables topicality (or givenness), in contrast to cases that do not directly require topicality.

Based on the last three studies, it turned out that there are some clear problems with the idea of DOI being a pure topic marker. In chapter 4, I already summarized counter-

Figure 28

Acceptability judgment study 6: Raincloud plot of z-values



arguments and examples against this perspective. In the last three studies, I additionally provided empirical evidence that challenges this claim further. If DOI were exclusively a topic marker, there should have been at least some effect. However, the only effect in this direction found is in combination with order. There was absolutely no preference for sentences with DOI in a context that triggered a topical reading or established givenness.

In previous research, some authors tried to overcome these limitations by refining the notion of topic or by claiming a narrower topic-related function (e.g., the notion of *secondary topic* by Dalrymple & Nikolaeva, 2011). However, other accounts tried to locate the function at the level of discourse, instead of information structure in the narrow sense. In discussing these accounts, I took up recent proposal in this regard and suggested that topicality might be a related concept, but not the underlying parameter of DOI in Bulgarian. Rather, there seems to be close connection to the discourse prominence status.

However, the previous studies are not sufficient to argue for a closer connection with discourse prominence due to the limited context. Therefore, I try to overcome this limitation by using broader context in the following study. Additionally, I use some more profound measurements by also testing accuracy and reaction time. The last study of this chapter provides evidence that DOI is clearly related to some patterns of activation, which can be captured more systematically by the notion of discourse prominence.

6.3 Discourse topic and discourse prominence

So far, I presented corpus data (see chapter 4) and evidence from three acceptability studies that challenged the view that differential object indexing serves as a topic marker in Bulgarian. I also discussed some of the problems with the notion of topic in general

and with respect to DOM in particular. Topic is traditionally conceptualized as a binary category in most accounts. Typically, one element is topical whereas the other is not. This applies to both the sentence level as well as discourse. At the discourse level, there is most likely one discourse topic over larger stretches of this particular piece of discourse. Similarly, at the sentence level, there is ideally one topic per sentence (as I mentioned before, some authors challenge this perspective, by allowing for more than one topic per sentence, but this approach is not discussed further here).

In contrast to this allocation of topichood, there are most often several referents in a given discourse. As was outlined before in chapter 4, topic is a means of information packaging and not directly concerned with the management, tracking and ranking of referents in discourse. In a strict sense, information structure is only concerned with the information packaging in a narrow sense, i.e., the way how and in which order information is presented. In this perspective, topic specifies the entry under which subsequent information on this entry is presented and stored. It is not directly concerned with the inter-relation of referents (even though these two functions might interact and correlate).

6.3.1 Reference tracking and discourse prominence

Many discourse-oriented approaches assume a mechanism that contains the tracking and ranking of referents, formally independent of information packaging. It seems that humans are not only concerned with the ordering of information itself, but also with the generation of accurate dependencies and relations between referents involved in an event in language. In order to be attributable to further communicative application and linguistic manipulation, a referent receives a certain cognitive status as part of its mental representation when acted upon in discourse by means of language. Earlier approaches tried to model this cognitive status in terms of activation or accessibility of a referent in discourse.

In section 4.1, I summarized some of the recent criticism of these (and related) accounts, based on von Heusinger and Schumacher (2019). The latter highlight that the activation account applies a rather static notion and it is left unspecified to an extent at which level activation is attributed to a referent. In their account on discourse prominence, they adopt the notion of activation but refine it in a sense that it is relational and dynamic (in the sense of the prominence principles stated before). Also, different contextual and structural parameters and categories might interact and jointly contribute to the prominence of a particular referent.

Ariel (1990) (and similarly Gundel et al., 1993) approached the cognitive status or activation from another angle, namely by correlating the (presumed) status with the type of referential expression (or degree of explicitness) used to instantiate a particular referent. I described the scales related to these accessibility or givenness accounts above and – following Leafgren (2002) – showed that they can be adopted for capturing the different marking types of objects in Bulgarian as well.

However, on the one side, it became clear that these scales capture a broad perspective on referential expressions, but do not explain all instances accurately (the predictive value of explicitness might be overruled by other factors). On the other hand, these accounts are also static and non-relational, since they are mainly concerned with one particular referent in one specific instantiation without particular emphasis on the (inter-)relation with other

referents and the dynamic shifting of all referents. The idea of scaling different forms of referential expressions was also adopted for the prominence framework – in line with the notion that prominent elements are structural attractors and allow for more operations than less prominent or not prominent ones. Here, the alignment between form and status is not as strict as postulated by accessibility accounts and allows for the modelling and prediction of the form of several referents based on their individual prominence statuses (that are build up dynamically as discourse unfolds and in relation to each other).

In contrast to topicality accounts as well as in elaboration of activation and accessibility accounts, (discourse) prominence does not capture elements (referents) in a binary sense (prominent vs not-prominent) but instead can assign different prominence levels for several referents at the same time and allows for a flexible shifting in prominence at short time-scales. Based on the notion of relation-orientation and dynamicity, prominence is more equipped to investigate linguistic encoding strategies that operate at a very specific, narrow contextual setting in which several elements are processed and where fine-grained differences are very much relevant for the representation. This is particularly true with differential marking systems, especially when they cannot be attributed to one of the traditional (semantic) features (e.g., animacy for Spanish *a*-marking or definiteness for Macedonian DOI).

6.3.2 Discourse prominence and topicality

So far, I established the view that DOI in Bulgarian cannot be accounted for by (sentence) topicality. A closer examination of the function in terms of empirical investigations revealed a more complex picture than previously assumed. In addition, using only simple manipulations of short contexts (one or two referents, mentioned only once in context) did not yield an effect with respect to DOI (with the sole exception of order, but probably independent of DOI in this regard). One problem might be that I only used referents that were at the extreme ends of a scale, either by contrasting topical versus focal elements or by comparing the presence and total absence of a referent.

In focusing on strong binary oppositions, no (context) effect was found for Bulgarian DOI. Prioritizing a more fine-grained ranking of referents in discourse – as offered by the prominence perspective – could shed light on the function in a clearer way and help identify the function I postulated based on theoretical grounds. For this purpose, I am concerned with a more complex contextual manipulation in the remainder of the chapter.

By using a more fine-grained distinction of referents, the question if DOI (at all) is related to representations at the discourse level is scrutinized. Consequently, the category most strongly associated with DOI is identified. There are several potential outcomes of this design, but in line with our discussion I focus on two aspects. Either the result is that DOI is concerned with discourse topicality (since so far we only dealt with sentence topic) or a more complex pattern emerges (potentially pointing at discourse prominence in line with my assumptions from above). There are good reasons to assume the latter case. If discourse topicality were related to DOI, this might have been detected by one of the topic-oriented experiments (since sentence topic most often correlates with discourse topic).

Additionally, in chapter 4, I presented larger pieces of discourse from a corpus showing that it was not necessarily the discourse topic that was cross-indexed. There are even (few)

instances of cross-indexing focal elements, a fact that should be ruled out when DOI was closely associated with discourse topic. On the other hand, many of the corpus examples suggested that DOI was associated with some notion of elevation or (re-)activation of a referent in discourse.

Hence, DOI potentially contributes to the discourse topicality of a referent, by making the referent more likely to become discourse topic – but it is not the marking of discourse topicality itself that is achieved by the object marking. This particular situation can be captured more precisely by the notion of discourse prominence, in turn, this reconceptualization allows for a more direct investigation.

It is important to note that topic marking and prominence are not mutually exclusive. To the contrary, markers of (sentence-level) topicality (e.g., the Japanese *wa*-marker) can elevate the prominence status of a given entity (Wang & Schumacher, 2013). In general, referential and topical chains prototypically align, but are formally distinct. On the one hand, "although prominent entities are structural attractors for topicality, less prominent entities can still serve as topics under certain circumstances" (von Heusinger & Schumacher, 2019, p. 125). On the other hand, prominent elements must not be topic.

This is distinct from the claims of accessibility theory (for details on the accessibility theory, see chapter 4). Ariel (1990) claims that discourse topics have the highest level of accessibility. Local discourse topics entail a medium level. Remember that she based her analysis mainly on the level of referential marking (hence structural) that is used to assign a certain accessibility rating. Based on the claim by Levy (1982), Ariel argues that discourse topics can be identified by the number of times a referent is referred to by means of a short form (i.e., pronoun or zero-marking, if available).

The idea of the following experiment is basically to influence the ranking of the referents involved. This ranking is conceptualized in the sense of prominence, leading to different prominence statuses of each referent. In the particular design used, the most prominent element is also the discourse topic of each trial. However, the contrast of different referents is not only tested against the discourse topical element, but among each other. This context manipulation is influenced by some previous studies (not directly related to discourse prominence).

6.3.3 Studies with broader context (Givenness and discourse topic)

Many empirical studies applied more complex context manipulations, particularly with the goal to establish a discourse topic. Such context manipulations provide a means to test if DOI is associated with the discourse topic or elements of another prominence level.

The classical studies include Kaiser and Trueswell (2004), who used a larger context to determine if OVS-order is more easily processed when the context supports the use of this non-canonical order. Their study is not concerned directly with topicality but rather focusses on givenness of the object of the subsequent (target) sentence. Despite using a wider context, this study only manipulated givenness of two possible referents.

A more fine-grained contrast of givenness was achieved in Burkhardt (2006) (and subsequent studies, e.g., Hirotani & Schumacher, 2011). She manipulated the situation depicted in the context in order to affect the givenness of a referent.

(65) Example stimuli from Burkhardt (2006)

a. Peter besuchte neulich einen Redner in München.
'Peter has recently visited a speaker in Munich.'

b. Peter besuchte neulich einen Vortrag in München.
'Peter has recently visited a lecture in Munich.'

c. Peter traf neulich Hannah in München.
'Peter has recently met Hannah in Munich.'

d. Er erzählte, dass der Redner sehr nett war.
'He said that a speaker had been very nice.'

The target referent of all sentences is *the speaker*. In the first version, this referent was directly introduced with the same NP. In the second version, the referent is argued to be inferable from the context (a lecture typically has a speaker). In the last version, *the speaker* was neither introduced nor inferable, hence the referent was discourse-new. This is an example how different givenness levels can be manipulated easily in an experimental setup. Yet, this design also utilizes simple context-target sentence pairs and only allows for the givenness manipulation of one referent.

Vogelzang et al. (2020) used a more complex context to establish the discourse topic in each experimental trial. Drawing on the assumptions by Ariel (1990), Chafe (1976), Givón (1983b), Gundel et al. (1993), they assume that a discourse topic can be established by repeated mentioning and is most preferably marked with the least explicit form (e.g., a short pronoun). They contrasted this with a more explicit form (a full NP). In the following, I do not repeat a full set of stimuli as used in this study (with the original material in Dutch and Italian). I only present a short illustration of their material.

(66) Example stimulus (translation) from Vogelzang et al. (2020)

Context: The hedgehog goes with the airplane to England. Earlier the hedgehog asked the mouse what time it was in England, while ...

a. the hedgehog hurried to the airplane.

b. he hurried to the airplane.

In this design, one referent (*the hedgehog*) is repeated two times (or three times if we count the subject index *-(e)s*). Another referent is also introduced in the discourse. In the continuation, the discourse topic is either instantiated by a full NP again or in form of a pronoun, the latter being arguably preferred when the discoursed topicality is sufficiently established. Based on the insights from the other studies mentioned above, we could also imagine that a third referent could be used in the target sentence.

If we assume that the setting (e.g., airport/ airplane) activates certain schemes of the situation, we could assume that it is also possible to infer additional referents from this situation (e.g., a flight attendant, a pilot etc.). I draw on these two aspects (establishing discourse topicality by repeated mention of a referent and inference of a referent from a particular setting) in the design of the following study.

In the experiment that I present in the following I used three referents. One referent is established as the discourse topic by repeated reference (mentioning it three times). A

second referent is introduced but only mentioned once (as in the study by Vogelzang et al., 2020). In addition, I allow for a potential inference drawn from the situation presented (as in the studies by Burkhardt, 2006, and following research). The first entity is introduced and mentioned several times, sufficiently establishing discourse topichood of this referent – in line with the accounts and assumptions outlined above. The second referent is mentioned, but not made discourse topic. This referent entails the same semantic features as the discourse topic and is also mentioned (given), but not established as a discourse topic.

In contrast to static accounts of topicality or activation, the different ranking of referents can be conceptualized with the notion of prominence. Hence, I assume that the second referent receives some level of prominence, but at a lower rank than the most prominent, discourse-topical entity. This study investigates a potential link between prominence and DOI, by testing which association of different prominence levels and differential object indexing is preferred (in terms of acceptability) and processed more easily (in terms of reaction time and accuracy).

6.4 Discourse prominence experiment

Preliminaries and hypotheses. In theory, there are two potential outcomes of this study. It could turn out that DOI is not associated with sentence topic, but directly related to discourse topic. This would suggest that the previous studies with short context manipulation were not sufficient to probe for that association. If the discourse topic is clearly preferred with DOI, this would indicate that DOI is connected to topicality, but at a discourse level that goes beyond the sentential level (see the discussion in chapter 4).

In contrast – and in line with my analysis of corpus examples – it is very likely that DOI is not automatically associated with the discourse topic, but rather aligns with an entity that has a lower prominence ranking and is subsequently elevated by the differential marking in relation to the prominence level of a higher-ranking element (= discourse topic). It is still an open question whether each prominence level is a potential target for DOI or if only elements of a particular (e.g., medium-level) discourse prominence can be elevated by this operation.

Based on the (indirect) evidence so far, I hypothesize that referents with a medium level of prominence (e.g., given but not discourse-topical) that are about to be promoted (or reactivated) to a higher prominence level are the prototypical targets of DOI. In this line of thought, associations with topicality could be explained by an epiphenomenal association between topic and prominence in a similar vain how definiteness as a pre-condition for DOI is an epiphenomenon of this core function.

Participants. Thirty-two native speakers of Bulgarian were recruited for this experiment on *Prolific*. Two participants did not finish the experiment and their data were excluded from the analysis. The remaining 30 participant (19 females, 63.33 %) had a mean age of 32.03 (SD = 9.95). All participants responded accurately to the attention checks in form of an overt task testing if they read the sentence ("If you read this sentence, please press A") and answered comprehension questions about the remaining fillers accurately.

In total, the response accuracy for the fillers and attention checks ranged from 76 to 100 % with a mean of 94 % (SD = 6.28), indicating a thorough engagement with the tasks. Participants received an per hour payment of 10.50 Euro with the time ranging from 24 minutes to 1 hour 23 minutes (the latter being an outlier).

Materials and design. The experimental data (raw data and analysis scripts) of this experiment are publicly available at https://osf.io/52y3v/. In this study, a larger context was combined with a shorter target sentence. Each context first introduced a referent by stating "This is a story about ..." with a proper noun (e.g., *Peter*) – with proper nouns being higher in prominence than definite NPs. In a second context sentence, the referent was taken up by the proper noun again, a specific location or situation (e.g., *a party*) was mentioned and a second referent was introduced (as an object) in a coordinate or subordinate sentence by means of an indefinite, common noun of the opposite gender (e.g., *a woman*). Mentioning the first referent three times (two times by the proper noun and one time in form of a subject index/ inflection ending of the same gender) should suffice to assign a very prominent status and establish the discourse topic, whereas the second referent should be established as less prominent (given, accessible but not topical).

In the target sentence – containing a transitive predicate –, the continuation of the story depended on the four conditions. In condition 1 (*prominent without DOI*), the second referent (instantiated by a short pronoun) was acted upon by the second referent instantiated by the same common noun as in the context (now with definite marking). Condition 2 (*prominent with DOI*) was similar to condition 1, but the prominent referent was instantiated both by the proper noun as well as the short pronoun, hence leading to the cross-indexing of an object (DOI). In condition 3 (*less prominent with DOI*), the prominent referent served as the subject and was instantiated by the proper noun itself, whereas the second referent served as the object and was instantiated by a definite, common noun and object indexing). In condition 4 (*not prominent with DOI*), the highly prominent referent again served as subject, but this time a not previously mentioned yet in context of the situation/ location inferable referent (e.g., *the host of the party*) was introduced as a common noun with definite marking and object indexing. An example for this design is given below in example 67. Colour codes indicate which element refers to which referent.

(67) *Context (translated): The next story is about Peter. Yesterday, Peter was at a party and ∅ talked to a beautiful woman for a long time. Suddenly, ...*

a. ženata **go** celunala. **prominent without DOI**
woman-ART.SG.F 3.SG.M.ACC kiss-PTCP.SG.F
'the woman kissed him.'

b. ženata **go** celunala Petăr. **prominent with DOI**
woman-ART.SG.F 3.SG.M.ACC kiss-PTCP.SG.F Peter
'the woman kissed Peter.'

c. Petăr **ja** celunal **ženata**. **less prominent with DOI**
Peter 3.SG.F.ACC kiss-PTCP.SG.M woman-ART.SG.F
'Peter kissed the woman.'

d. Petăr **ja** celunal **domakinjata**. **not prominent with DOI**
Peter 3.SG.F.ACC kiss-PTCP.SG.M host-ART.SG.F
'Peter kissed the (female) host.'

Due to the more complex task and the use of more detailed contexts, the number of sentences per condition was reduced to ten sentences. In total, the participants read

40 context – target sentence pairs, 20 context – filler sentence pairs and five attention checks in the form described above.The 40 lexical sets used in this study were equally distributed over the conditions in four lists using a Latin square design. The order of elements was randomized by generating random numbers of the same length until a well-distributed, non-structured order of DOI and non-DOI sentences emerged. All the material was assessed and checked for grammaticality and consistency by two native speakers of Bulgarian.

Procedure. As with the cue validity experiment in chapter 5 and the combined reaction time and acceptability judgment study in chapter 6, this study was developed using the *jsPsych* package (de Leeuw, 2015) and hosted on *www.pavlovia.org*. For the purpose of this study, a new plugin was developed (*jspsych-wordbyword*) with the help of the developers of *jsPsych*. The remaining general procedure was comparable to the previous studies and I only report the features different from the other web-experiments in the following.

During the actual experiment, participants read 65 sentences with a subsequent comprehension question and acceptability rating. Each trial started with a fixation cross (size: 50 points, duration: 500 ms) on a white screen followed by a blank screen for 500 ms. Then, the first context sentences were presented for 3000 ms, followed by a short inter-stimulus-intervall (ISI) of 200 ms. After that, the second context sentence was presented for 6000 ms. Between the context and the target sentence, another ISI was presented for the same duration. Then, the target sentence was presented word-by-word with a duration of 700 ms per word and was presented followed by a third ISI. After the sentences, a question mark appeared for 700 ms, indicating that the task was showing up now. Firstly, participants had to answer a comprehension question (always focusing on the most prominent referent, e.g., "Did Peter kiss somebody?"; depending on the condition, this question had to be answered with *yes* (condition 3 and 4) or *no* (condition 1 and 2).

Reaction time was measured from the beginning of the presentation of the comprehension question to the moment a choice was made by keypress (with e for *yes*, or i for *no*; order changed for every second participant). The question trial ended after a choice was made and the acceptability judgment was presented. People had to judge to which degree the sentence was adequate in the continuation of the story (on a Likert scale from 1 for *absolutely incorrect* to 5 for *absolutely correct*). In this study, I actively decided to not use a phrasing that strongly points at grammatical judgment, in order to enable a more spontaneous, less normatively biased rating of the target sentences. After they pressed a number from 1 to 5 for providing their judgment, the next trial started. Each stimuli list was sub-divided into four blocks, each block consisting of 15 or 16 trials. Between each block, participants could take a break of individual length.

Statistical analyses. The pre-processing of the raw data as well as the statistical analyses and the plotting were conducted in *R* (R Core Team, 2019). Trials with a reaction time (to the comprehension question) of more than 5000 ms were excluded from the reaction time data (leading to the exclusion of 164 trial of the 1200 trials in total; causing an exclusion rate of 13.67 % for this dimension). Additional columns were added containing the new variables SUBJECT (with the factors most prominent, less prominent and not prominent), OBJECT (with the same factors as for SUBJECT) and presence of DOI (yes and no) for additional analyses. Additionally, the choice for the comprehension question was recoded based on which combination was correct (e.g., answering *no* for the sentences with the

most prominent referent was correct; correct answers were recoded to the value 1 whereas incorrect answers were recoded to 0).

Based on the data, means and standard deviations were calculated for each independent variable (choice, reaction time to choice and acceptability) per subject and condition. Additionally, the acceptability ratings were transformed to *z*-values (based on the procedure described in previous experiments in this book). Additionally, adjusted acceptability ratings (with the actual values and the *z*-scores) were calculated with the consideration solely of trials that had an accurate response to the comprehension question. In the same way, reaction time was adjusted in a second step.

Each of the independent variables (choice, reaction time to choice, acceptability, adjusted acceptability, *z*-values of the acceptability rating as well as adjusted *z*-values of the acceptability ratings) was entered into linear mixed effects model using the lmer() function from the *R* packages *"lme4"* (D. Bates et al., 2015). Each model included the fixed factor CONDITION, random effects for subject and item as well as random slopes for the presence DOI, to account for different general rating scalings per subject. The accuracy means and the means of adjusted reaction time and acceptability *z*-scores were plotted in form of barplots.

Additional group-level models were calculated by way of these three variables for the three conditions with DOI, to investigate the contrasts between the three referent types in more detail. In these models, DOI was not used as a random slope anymore, since all conditions in these comparisons consisted of sentences with DOI. For the adjusted *z*-scores for acceptability, a raincloud plot was drawn to emphasize the difference further.

Results. The means and standard deviations for all dependent variables (both in original and adjusted form) are presented in table 25. In the following, I only discuss the variables accuracy (see also figure 29), adjusted reaction time (figure 30) and adjusted, *z*-transformed acceptability ratings (figure 31). The adjustment made sure that only trials that were accurately comprehended were included in the subsequent analyses.

Table 25

Discourse prominence experiment: Means and standard deviations

Variable	prominent without DOI		prominent with DOI		less prominent with DOI		not prominent with DOI	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
accuracy (in %)	93.33	24.99	89.67	30.49	91	28.67	85.67	35.10
reaction time (in ms)								
non-adjusted values	2486	882	2498	995	2436	917	2541	930
adjusted values	2505	874	2513	1002	2396	882	2552	930
acceptability								
ratings	3.92	1.23	2.90	1.22	3.02	1.29	2.50	1.29
adjusted ratings	3.93	1.23	2.83	1.20	3.10	1.28	2.53	1.32
z-scores	0.67	1.01	-0.13	0.80	-0.06	0.85	-0.47	0.92
adjusted *z*-scores	0.67	1.00	-0.17	0.80	-0.01	0.82	-0.45	0.93

Figure 29

Discourse prominence experiment: Boxplot of mean accuracy

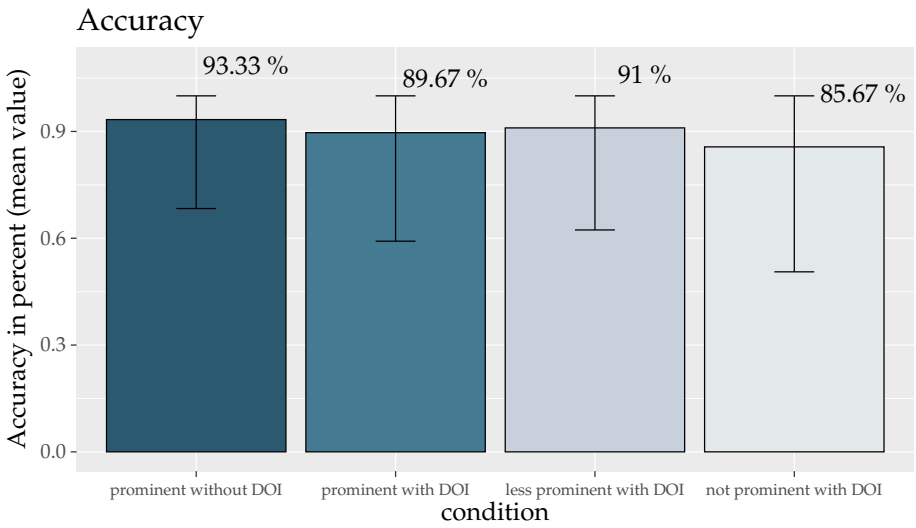
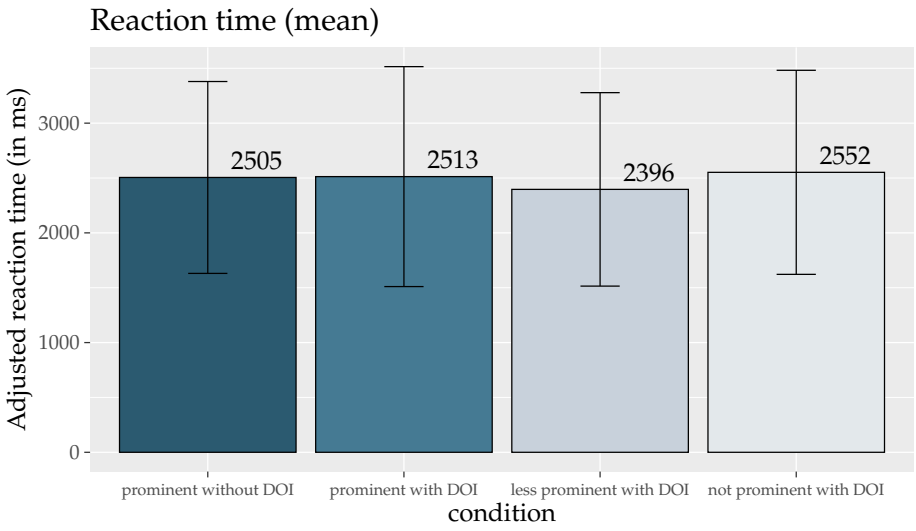


Figure 30

Discourse prominence experiment: Boxplot of (adjusted) mean reaction time

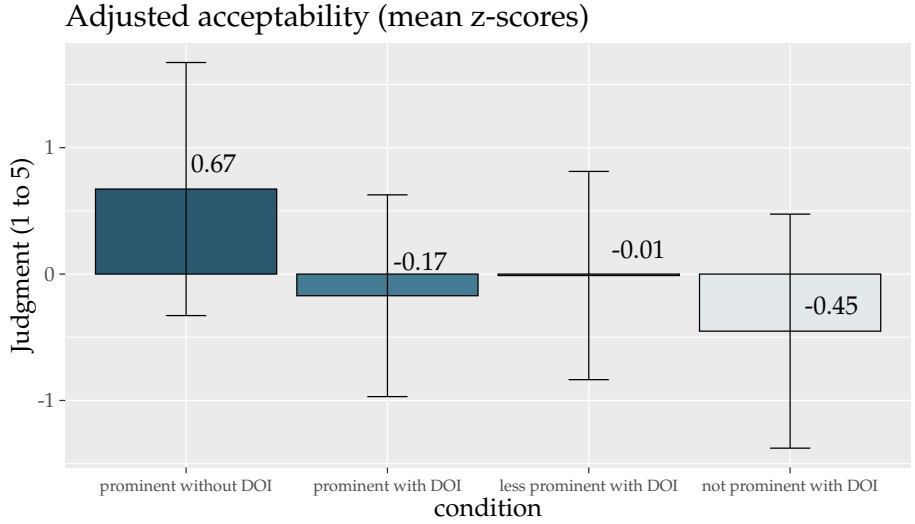


As was expected based on the previous experiments, marking a prominent referent without DOI received the most accurate (M = 93.33 %, SD = 24.99 %) and most acceptable (M = 0.67, SD = 1.00) response. However, in terms of adjusted reaction time to (correct) choices, the less prominent referent with DOI (M = 2396, SD = 882) received the fastest

response, even 109 ms faster than for the first condition (M = 2505, SD = 874) and also in comparison to the remaining two conditions (condition 2: M = 2513, SD = 1002 and condition 4 (M = 2552, SD = 930).

Figure 31

Discourse prominence experiment: Boxplot of (adjusted) acceptability z-scores



Among the three conditions with differential marking, the less prominent referent condition received the most acceptable rating (M = -0.01, SD = 0.82) as well as the most accurate response to the comprehension question (M = 91 %, SD = 28.67 %). In contrast, the non-prominent (inferable) referent received the lowest rating (M = -0.45, SD = 0.93) and caused a less accurate answering (M = 85.67 %, SD = 35.10 %). The condition in which a prominent referent was marked by a DOI received a rating between these two conditions (M = -0.17, SD = 0.80) and accuracy of response to the comprehension question was in between the other two conditions (M = 89.67 %, SD = 30.49 %).

All conditions triggered a comparably high accuracy and a similar reaction time. In terms of acceptability, sentences with less prominent referents and DOI received a comparably high rating (close to the overall mean, as can be seen by a z-value of -0.01). This rating was the highest rating of DOI in all the experiments in this study, providing additional evidence that the combination of DOI with this particular context is preferred by Bulgarian speakers.

Linar mixed effect models were calculated for each dependent variable in the adjusted form (see table 26). Except for reaction time (in both variants), all models were significant with condition as dependent variable. In the following, I restrict the presentation of the results again to the three dimensions accuracy, adjusted reaction time and adjusted acceptability z-scores. The differences in accuracy between the conditions yielded a highly significant effect ($\chi^2(3) = 18.10$, $p = .000$). Adjusted reaction time did not yield a significant effect ($\chi^2(3) = 6.33$, $p = .097$), despite the aforementioned fast response in condition 3. The

strongest effect showed up for acceptability. Adjusted acceptability was associated with a highly significant main effect of condition ($\chi^2(3) = 72.74$, $p = .000$).

Table 26

Discourse prominence experiment: Analysis of deviance (Type II Wald χ^2)

model	χ^2	df	p	
Accuracy	18.10	3.00	.000	***
Reaction time	5.56	3.00	.135	
Reaction time (adjusted)	6.33	3.00	.097	
Acceptability	73.32	3.00	.000	***
Acceptability (adjusted)	69.66	3.00	.000	***
Acceptability z-scores	75.55	3.00	.000	***
Acceptability (adjusted) z-scores	72.74	3.00	.000	***

So far, only the effect of all conditions was evaluated. In the following, pair-wise differences are investigated for the conditions with DOI only. The group-comparison of condition 2 and 3 (prominent vs less prominent) is given in table 27. Reaction time was excluded from this analysis, since it yielded no significant interaction effect.

Table 27

Discourse prominence experiment: Analysis of deviance (Type II Wald χ^2): Prominent vs. less prominent

model	χ^2	df	p	
Accuracy	32.70	1.00	.000	***
Acceptability (adjusted) z-scores	2.91	1.00	0.09	

Accuracy was significantly higher for DOI with the less prominent referents than with the most prominent referent ($\chi^2(1) = 32.70$, $p = .000$). However, in this case the higher acceptability of DOI with the less prominent referent was not significant in comparison ($\chi^2(1) = 2.91$, $p = .09$). This shows that DOI marking with a less prominent referent caused a more accurate response, however the choice was not quicker and the combination was not evaluated as more acceptable in a significant way.

Table 28

Discourse prominence experiment: Analysis of deviance (Type II Wald χ^2): Prominent vs. not prominent

model	χ^2	df	p	
Accuracy	61.74	1.00	0.00	***
Acceptability (adjusted) z-scores	11.19	1.00	0.00	***

For the contrast between the prominent and the not prominent referent (see table 28 above), the prominent one received the more accurate and more acceptable (and faster) rating. The difference in accuracy ($\chi^2(3) = 61.74$, $p = .000$) and acceptability ($\chi^2(3) = 11.19$, $p = .000$) was significant. As was said before, the less prominent referent caused the most accurate, most acceptable and fastest response of all conditions with DOI. In contrast, the not prominent referent yielded the most inaccurate, least acceptable and slowest response. Hence, it comes as no surprise that the difference between these two conditions did yield significant effects on each variable. All three models were significant (see table 29).

Table 29

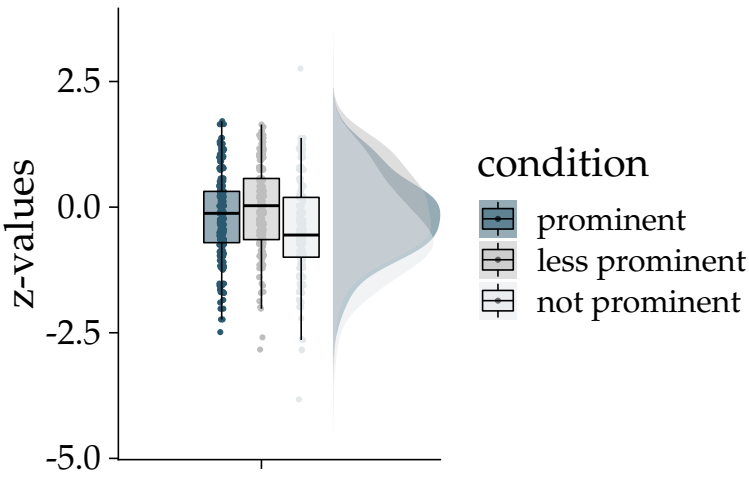
Discourse prominence experiment: Analysis of deviance (Type II Wald χ^2): Less prominent vs. not prominent

model	χ^2	df	p	
Accuracy	48.93	1.00	0.00	***
Acceptability (adjusted) z-scores	39.34	1.00	0.00	***

It is noteworthy that the less prominent referent received a (significantly) more accurate, (not-significantly) more acceptable and faster response in comparison with the most prominent referent. In figure 32, the z-transformed acceptability ratings are plotted per subject in form of a raincloud plot. Despite the non-significance of the effect, there is a slightly higher distribution for marking the less prominent referent in comparison to the other two DOI-conditions.

Figure 32

Discourse prominence experiment: Raincloudplot of z-values



Discussion. This study provided evidence that DOI is associated with the marking of referents of a particular, medium-level prominence status. Cross-indexing less prominent referents yielded the strongest behavioural response in comparison to indexing the most prominent or a non-prominent (but inferable) referent. Responses to the comprehension question were more accurate, the reaction times were quicker and the accessibility judgment higher for the referent with a medium-level prominence level. In direct comparison to the most prominent referent, the less prominent referent caused a more accurate response, however, the choice was not quicker and the combination was not evaluated as more acceptable in a significant way.

Nevertheless, the visual inspection did support the idea that less prominent ones tend to be more typically associated with DOI, also in terms of acceptability. Both, the most prominent and the less prominent element received a more accurate, more acceptable and faster rating in comparison to an inferable (not prominent) referent. This result supports the theoretical analysis presented in chapter 4.

However, there are some limitations to this study. The experiment was web-based. Therefore, I had to ensure that it was not too time-consuming or strenuous for the participants. For this reason, the number of trials was reduced. Future research should also contrast the missing combinations (e.g., DOI with the less prominent element in comparison to sentences without DOI etc.), in order to determine the association of prominence levels and explicitness of different object markings in more detail. The difference between prominent and less prominent did not reach significance in the acceptability rating. However, there was a clear and significant difference in accuracy. Also, there seems to be a systematic difference in terms of acceptability, at least based on the actual data and the visual inspection.

Finally, this experiment also compared the DOI-marking of a prominent element to a more explicit means of marking (namely the short pronoun only in condition a). This condition did receive a much higher rating, indicating that marking the most prominent element with DOI is not a typical association. The fine-grained difference between these two higher levels of prominence needs to be addressed by future research. I assume that marking the elevation of a less prominent referent is the core function of DOI in Bulgarian and this pattern is reflected in the experiment. Potentially, elements that still can be considered to be discourse topic might also receive DOI under more specific conditions (when the status is potentially unclear in the opinion of the speaker). I believe that this is a peripheral application of DOI and not the core function of this construction.

To conclude, this study provided evidence that DOI serves as a prominence-lending cue for referents that initially have a lower rank in terms of discourse prominence based on the previous context and that are elevated by this operation. At this point, one could ask why particularly referents at a medium-level of prominence are selected by this operation. In chapter 3 and 4, I elaborated on the idea that differential marking is associated with the predictability of an argument or referent. In other words, those elements are differentially marked which are brought to a discourse status that is (potentially) less expected (esp. in the case of DOI) or which entail certain features that are less expected in this discourse status (esp. in the case of DOM).

Applied to the present study, this could explain why a less prominent referent is preferably marked with DOI in this setup. There is arguably a strong expectation that the

previously established discourse topic is continued as the most prominent element in the subsequent sentence. If there is an alternative subject (as in condition a and b of this experiment), a strong likelihood for the discourse topic (the most prominent element) being instantiated by the least explicit object form is given, due to the inverse relationship between degree of explicitness and prominence. This prediction is reflected in the clear preference of condition (a) over condition (b). However, it became clear that there are not only predictions with respect to the most prominent element, but also to the other referents involved. When another element is also referred to, this potentially affects its prominence status. This is precisely the case in condition (c) and (d), where another referent is (differentially marked) object. If DOI was only marking any unexpected prominence shift, there should be no difference between condition (b) and (d). However, DOI in combination with the instantiation of the less prominent referent is even preferred over the cross-indexing of the discourse topic. Hence, DOI does not mark for example the unexpectedness of the discourse topic becoming object, but rather is a marker of a prominence shift of an element that has a lower prominence level but is elevated in the course of discourse.

At this point, there is no clear definition of predictability in language and the description of this situation is primitive. At least, it should be clear at this point that DOI is not just a marker of (any) prominence status change. Instead it is related to a particular situation where a referent has a (relative to another referent) lower prominence level but is potentially brought to a higher prominence level (particularly when there is some competition or uncertainty at the higher end of the ranking). A more detailed account of this requires more complex designs and particularly more fine-grained accounts of the role of predictability in language (and particularly in discourse). In the final chapter of this book, I discuss this aspect by way of a more general perspective and make some initial suggestions as to how to include predictability in a more systematic way.

These studies provided additional evidence supporting the idea that the marking of an element with a (less expected) prominence level is the core function of DOI in Bulgarian and there are most likely applications of DOI that are more at the periphery of this function (e.g., the cross-indexing of the actual discourse topic when there is only a weak uncertainty with respect to discourse topicality). Bear in mind that there is also a notion of subjective evaluation in deciding on the use of DOI at the side of the speaker (a view also stated by Dalrymple & Nikolaeva, 2011 and Schikowski & Iemmolo, 2015). The speaker basically keeps track of the cognitive status of elements and propositions that were brought forward in the ongoing discourse.

If the speaker assumes that a certain shift in terms of prominence is not directly predictable or violates a certain level of predictability, additional marking is added to facilitate the reference tracking in discourse. This explicates that there is probably much variation surrounding the core function. In the following studies in the next chapter, I provide some initial evidence that predictability of an element is involved in the processing of DOI.

6.5 Chapter conclusion

Differential object indexing in Bulgarian and other languages was often described as a topic marker. The evidence presented in this chapter challenges this claim for Bulgarian. In chapter 4, I presented more theoretically oriented arguments and examples as to why DOI should rather be treated as a marker of discourse prominence, instead of topicality.

The present chapter contributed to this new account by providing evidence against the topic marker perspective (acceptability judgment studies 4, 5, and 6) and in favour of the discourse prominence perspective (combined reaction time and acceptability judgment experiment).

The first three studies made clear that DOI cannot be (directly) related to the sentence topic (in the sense of aboutness) or to givenness (and indirectly topic). This contributes to the earlier finding that DOI might appear with focal elements and adds to the questioning of a pure topic marking function by others (Leafgren, 2002; Ovcharova, 2018).

The second part of this chapter was more directly related to discourse prominence. Discourse prominence is a concept that captures the activation, accessibility and operations of referents in discourse in a more dynamic and relational way than previous accounts (e.g., accessibility theory) or related – but static – concepts (e.g., discourse topic). This allows for the investigation of more fine-grained differences between discourse referents. In the last experiment presented in this chapter, I approximated such a more fine-grained differentiation of referents in discourse, by manipulating some aspects of discourse topicality, givenness and structural marking combined. This fine-grained difference revealed that DOI is not associated with the most prominent (and discourse-topical) referent, but with a second referent that had a medium-level prominence status lower than the discourse topic.

In this study, differential object indexing was clearly preferred with a less prominent referent, instead of the most or the least prominent referent. Neither the notion of discourse topicality nor the concept of sentence topic could have captured these results in a satisfying way. This complements the strength of applying a dynamic and relational perspective such as prominence to the data, since DOI is clearly concerned with a dynamic ranking of referents, rather than a strictly categorial grouping (such as +/- discourse topic).

The reinterpretation of a marker that was formerly described as a topic marker in terms of prominence is not without precedence. In chapter 4.1, I gave an example of a marker that was reinterpreted as a discourse prominence marker in contrast to older accounts classifying it as a topic (or agentivity) marker. Riesberg (2018) convincingly shows that the "unergative marker" in Yali is not a marker of topicality or agentivity as previously assumed, but rather associated with marking the discourse prominence of (agent) referents.

Of course, this is no evidence that DOI does not affect or interact with topicality. A less prominent referent that is singled out by a DOI encoding strategy is elevated in its prominence status. Elements higher in prominence are also more likely to become (discourse) topic (von Heusinger & Schumacher, 2019). Yet, it is the prominence that makes them applicable for topicality rather then the other way round. If it were the case that DOI were a topic marker and aligned most preferably with the most likely topic of a given discourse, there should have been a clear preference for DOI with the discourse topic. However, the results of the previous experiment clearly stated that it is the less prominent, not discourse-topical referent that is preferred and processed more easily (hence, arguably in line with discourse expectations build up during the trial).

Additionally, this explains some of the findings with respect to the corpus examples and previous findings from the literature. On the one side, focal objects might (rarely) receive a differential indexing. In most illustrations however, there was either a competition of elements or a (re-)activation of a discourse referent.

Taken together, it is safe to conclude that DOI is not a topic marker in a strict sense.

Most likely, topicality is epiphenomenal to DOI in the same way that definitness is. In some cases, there might be an overlap of topicality, definiteness and object-indexing (as well as agent features and animacy). However, if object-indexing were aligned completely with one of these categories, it should appear much more frequently (as in Macedonian, the closest language to Bulgarian in terms of structure and genealogical proximity). But since Bulgarian DOI is only weakly grammaticalized (esp. in contrast to other topicalization strategies) and restricted to rare cases, it is plausible to assume a more particular function, namely the elevation of less prominent objects to a higher prominent status.

This chapter supported the perspective stated in the definition of DOI as a type of differential marking of a P referent, by means of a person index in cases when there is a certain level of unexpectedness with respect to the discourse prominence status of this referent. The association with discourse prominence and the notion of unexpectedness also gives rise to a more profound investigation of the processing of DOI. By marking a particular prominence status (or shift), we could also focus on the processing of DOI. Among the most basic questions is, what happens when the discourse prominence status is established by an object index in terms of processing? Arguably, there should be some involvement in terms of modulating (discourse-based) expectations and most likely, there should be some traces of discourse updating that necessarily is initiated.

I identified two main functions in Bulgarian DOI, namely (re)establishing the (discourse) prominence status of a referent whose status is uncertain or unexpected and elevating the (discourse) prominence status of one out of several almost equally ranking referents. For a close-up investigation of "DOI at work", it makes sense to focus on the second aspect in terms of processing. This is done in the next chapter in form of an EEG experiment.

In a similar vein, it could be interesting to investigate the activation aspect in more detail. As I described before, prominence is to some extent the linguistic analogue of salience, or its grammaticalized manifestation in language. For this reason, it could be interesting to focus on activation by means of salience, particularly not from a linguistic perspective, but by focusing on the cross-modal influence of salience on language. For this purpose, I designed a (web-based) combined visual cueing and self-paced reading study that investigates the establishment of prominence, by means of DOI with a focus on the interaction of visual cues and grammatical encoding within a cross-modal context.

Both studies provide additional evidence for the discourse prominence perspective as developed thus far. In a final step, the notion of predictability has to be addressed in more detail, both from a theoretical as well as an experimental perspective. To some extent, I continue this discussion in the next chapter and relate this aspect to experimental work. I approximate this issue also from a theoretical perspective in more detail in the final chapter, where I provide a brief outlook of how this question could be addressed by future research.

At this point, it is sufficient to state that DOI is not a topic marker in the classical sense, as was previously claimed in the literature. Applying the concept of discourse prominence provided a better means to capture the function of DOI in Bulgarian in some detail. Future research should continue in this direction and test for even more fine-grained prominence level differences in determining the full set of functions performed by differential object indexing in Bulgarian and beyond.

7 Empirical evidence: Discourse updating and visual salience

The main purpose of this last empirical chapter is to approximate processing patterns and the time course of differential object indexing – with particular focus on the singling out and activation of a referent in discourse. Therefore, this chapter is conceptually different from the previous two. Here, the focus lies less on the representational side of DOI with respect to its primary function. Rather, the experiments in this chapter tackle the question as to which patterns emerge or are affected when DOI is processed online.

Of course, some insights from this perspective also contribute to the understanding of function – but primarily concerns the question how DOI behaves with respect to discourse processing and attention allocation (derived from the primary function). To address this issue, two different methods were selected.

In the first experiment of this chapter, an event-related potential (ERP) experiment was conducted, in order to investigate the time-course of processing object indexing and to dissociate different processes involved in this pattern. Particular attention is paid to neurophysiological components that were previously associated with discourse updating, reanalysis and predictability.

The second experiment addresses the interaction of DOI as a prominence-lending cue with visually established salience, with the help of a combined visual cueing and self-paced reading web-experiment. This experiment focusses on the association of salience and prominence with attention allocation toward one out of two referents in a closely defined event depiction.

In the following, I shortly review some of the relevant insights from previous ERP research on agreement and discourse processing (section 7.1) before presenting an ERP experiment on DOI in Bulgarian (section 7.2). In the second part (section 7.3), I highlight the relation of salience and prominence in more detail and present the experiment (section 7.4) that investigated this association with focus on DOI in more detail.

7.1 Neural correlates of indexing, discourse updating, and predictions

7.1.1 The processing of (differential) indexing

Until today, object indexing (and particularly cross-indexing) is widely under-represented in neurolinguistic research. In contrast, there is a whole line of research concerned with the investigation of subject indexing, typically conducted under the traditional term "(subject) agreement". Many of these agreement studies used a violation paradigm for investigating the processing of agreement relations between subjects and verbal inflection endings (i.e., subject cross-indexing or gramm-indexing in the sense of Haspelmath, 2013 outlined in chapter 3).[58]

In such designs, the establishment of agreement is violated by manipulating the features number, gender, case or person. For example, Kutas and Hillyard (1983) used a violation of number agreement between verbs and nouns, illustrated in the following example (68). They contrast this type of violation to semantic anomalies ("The leopard is a very good napkin") and other structural violations, e.g., progressive tense.

[58] Additionally, there is also a significant amount of research concerned with agreement relations between nouns and adjectives. See the overview of studies concerned with this agreement relation in Molinaro et al. (2011).

(68) Agreement violations via number (Kutas & Hillyard, 1983)

a. *Then **she dig** a hole with her rear feet.

b. *Turtles will spit out things **they does** not like to eat.

Studies on agreement violations typically reported a left anterior negativitiy (LAN) / N400 - P600 ERP pattern (e.g., Kutas & Hillyard, 1983). Within agreement violation research, it was shown that semantic violations elicit a monophasic N400 while morpho-syntactic violations elicit a biphasic LAN/P600 and the "traditional" LAN/N400 - P600 pattern is engendered by combined violations with the additional observation that the P600 component is larger if the sentence is semantically congruent but syntactically violated (Gunter et al., 1997). Also, it was shown that early syntactic violation blocks later semantic interpretation (Hahne & Friederici, 2002).

Molinaro et al. (2011) reviewed thirty ERP studies investigating grammatical agreement violations. The general picture Molinaro et al. (2011) describe is in line with the earlier studies. They argue that the underlying LAN-P600 pattern reflects "rule-based computations sensitive to formal covariations", whereas the sometimes observed additional N400 effect reflects the "recruitment of ... additional non-syntactic information" (Molinaro et al., 2011, p. 908).

In general, LANs are characterized by a left-anterior negativity (with a peak latency of approximately 400 ms) typically associated with morphosyntactic processing, especially at earlier stages (Molinaro et al., 2011). In some work, focal and sustained LANs are distinguished based on their latency (around 300 ms for the former and around 450 ms for the latter) with the focal one being more associated with morphosynatic processing and the sustained one with working memory (Bornkessel-Schlesewsky & Schlesewsky, 2009a; Molinaro et al., 2011).

The P600 is a centro-parietal positivity peaking at around 600 ms and generally associated with syntactic processing and reanalysis, more broadly "reanalysis that could operate on qualitatively different sources of information" (Molinaro et al., 2011, p. 916). P600 components are probably a sub-component of a larger group of late positivities (LPS) that can be associated with reanalysis processes in different linguistic domains (Bornkessel-Schlesewsky & Schlesewsky, 2009a, p. 88) (see below for a discussion of late positivities in the context of discourse updating and Bornkessel-Schlesewsky & Schlesewsky, 2008, for a review on the P600). On a broader level, the P600 belongs to the P3 component family that is associated with behavioural shifts after "motivationally significant events" (Sassenhagen et al., 2014, p. 29). At times, an early stage (500-750 ms) and a late stage (750-1000 ms) are distinguished for the P600, with the former being related to integration within the previous sentence and the latter with reanalysis processes (Molinaro et al., 2011).

In contrast to the LAN, the N400 is generally described as a "centro-parietal negativity with a peak latency of approximately 400 ms" and typically associated with "lexical-semantic processing and the integration into a meaningful context" (Bornkessel-Schlesewsky & Schlesewsky, 2009a, p. 10). Importantly, the N400 was traditionally associated with semantic processing, but this view was discarded in the light of more extensive research and it is now clear that this component rather reflects contextual information that range from pragmatics and discourse information to world knowledge and particularly deviances from expectations associated with these information (Molinaro et al., 2011; see the next para-

graph for a more generalized account of the N400 as a reflection of "precision-weighted prediction error signals" in language processing as outlined by Bornkessel-Schlesewsky & Schlesewsky, 2019).

It is commonly argued that the centro-parietal N400 and the left anterior LAN components can be distinguished by their topographical distribution. However, the distinction of the two cannot always be achieved. On the one hand, they have a comparable peak latency. On the other hand, the topographical distribution is not always as straight-forward as claimed by the general description of the two ERP components. The distribution of the LAN is sometimes not strongly oriented to the left, making it hard to distinguish from the central N400 (for a discussion of the two components with respect to gender agreement violations, see Guajardo & Wicha, 2014). In more recent accounts, both components are considered to belong to one functional group, for example in Bornkessel-Schlesewsky and Schlesewsky (2019, p. 10), who argue that "the LAN could be afforded a similar functional interpretation to the MMN [= mismatch negativity] and the N400, with the topographical and latency differences between the three components reflecting differences in the input features that are relevant for engendering the prediction error".

Regarding person features, only five studies discussed in Molinaro et al. (2011) investigated violations of this type of agreement. The N400 with respect to this feature is argued to reflect "the fact that Person requires a direct link to discourse-level representations" (Molinaro et al., 2011, p. 922) and particularly "contextual expectations in which a qualitatively different discourse-level representation was activated" (Molinaro et al., 2011, p. 923). When dealing with person forms in the sense of the indexing account, one should expect that such an effect is engendered for all of these agreement relations when they are person forms.

In theory, the N400 effect should arise when the violation actually affects one of the interface levels, as is the case for "true" person-related indexing violations that are interfering with the discourse representations. Arguably, this can be distinguished from "pure" agreement violations in a morphosyntactic sense that are reflected in LAN components. Similarly, more complex reanalysis mechanisms that operate at levels above the sentence-level or morphosyntax could be responsible for more pronounced or prolonged late-positivities.

Importantly, most of the studies discussed here and by Molinaro et al. (2011) emphasize the agreement relation between the elements – and particularly the establishment of agreement via number, gender and person – and not the indexing function of person forms (for a discussion of agreement and indexing, see chapter 3). These accounts often treat person as a feature alongside number or gender (but not as the underlying function of many verbal agreement markers). However, Molinaro et al. (2011) acknowledge the more prominent position of person (at least as a feature), by reference to the *feature hierarchy* presented by Greenberg (1963) (person > number > gender). They take up the idea that these features are differentially sensitive to agreement violations (as reflected in the ERP components).

In their conclusion, Molinaro et al. (2011) stress the need for agreement studies focusing on generalizations across languages and particularly mention object agreement in this respect. They refer to the study by Zawiszewski and Friederici (2009), who investigated – as one of the few studies – object indexing in Basque and reported a N400-P600 pattern for object agreement violations. Interestingly, the same effect was found independently of word order – suggesting the independence of order effect of these processes.

Interestingly, there is also an agreement violation study on object indexes in Croatian. Pavlinušić and Palmović (2016) investigated the neurophysiological effects of gender, case and combined violations of Croatian object pro-indexes. In their study, gender violations elicited a late positivity, whereas case violations yielded the "typical" biphasic "early negativity"[59] - late positivity effect. Double violations engendered a similar effect, but here the distribution of the "early negativity" matched the typical N400 pattern more closely.

Studies of case violations in flagging (i.e., markers in the nominal domain) elicit comparable patterns. For example, when both arguments are marked with the same case, a N400-P600 pattern emerges (Frisch & Schlesewsky, 2001; Frisch & Schlesewsky, 2005). Often, a modulation at the level of the late positivity is reported – depending on different features, e.g., animacy (Frisch & Schlesewsky, 2001) or dative case (Bornkessel et al., 2004; Frisch & Schlesewsky, 2005). Also, the presence or modulation of the late positivity can be influenced by the (incorrect) presence of a particular flag. For example, Choudhary et al. (2009) reported a N400 in response to incorrect subject case in Hindi, followed by a late positivity when the noun was (incorrectly) marked with an ergative marker. Similarly, an electrophysiological study by Nieuwland et al. (2013) showed that the (incorrect) occurrence of the Spanish differential flagging *a*-marker in front of an inanimate referent elicits a P600 component, whereas the (incorrect) omission of the same marker before an animate referent only elicits a N400 effect.

Case and agreement patterns also tend to be related to order alternations. Many studies investigated the reanalysis of a sentence toward an object-initial structure determined by these encoding strategies. To just give a basic example, Haupt et al. (2008) reported biphasic N400-late positivity patterns for reanalyses towards object-initial structures in German – irrespective of case (accusative or dative). Several studies confirmed the aforementioned subject preference in the interpretation of sentence-initial nominal phrases which automatically causes a dispreference for object-initial orders (Bickel et al., 2015; Demiral et al., 2008; Wang et al., 2009). Components from the late positivity/ P600 family can equally be associated with reanalysis processes in order reversals. The potentially co-occurring N400 effects can arguably be attributed to interpretative effects associated with the order reversal.

In my study, I am concerned with a person form that is differentially used to cross-reference objects and often found with objects that are moved to a pre-verbal (topical) sentence position. Applying the violation paradigm to the investigation of DOI should engender a pattern that is comparable to the aforementioned findings on agreement violations. Particularly, it is expected that (object) indexing violations yield a N400 effect, due to the strong interpretative function with respect to the discourse representation. For the same reason, there should be some elaborate reanalysis reflected in a late positivity. Prior to outlining the design of my ERP experiment, I would like to discuss these two components in the light of two accounts that capture the N400 and LPS with respect to predictability and discourse management.

[59] Pavlinušić and Palmović (2016, p. 179) argue in regard of the negativity elicited in their study that "the distribution of the early negativity in our study does not correspond to the typical (L)AN or N400 distribution, even though it more resembles the latter." In my opinion, this is rather a reflection of the typical variation found with these negativities and I would treat their component as an instance of the N400, as indicated by the authors themselves.

7.1.2 The neurophysiological profile of linguistic predictions

N400 components received much attention in linguistic research, mostly associated with expectation violations (frequently in terms of semantics). Kutas and Hillyard (1984) were the first to identify this particular electrophysiological component related to the violation of lexical (semantic) anticipations. Subsequent research showed that the N400 is not exclusively sensitive to semantic violations, but can also be elicited by expectation violations on different linguistic levels (such as morphosyntax or discourse).

More generally, N400 ERP responses in linguistic processing were identified upon discovery of unexpected elements or features during language processing (e.g., for morphosyntactic manipulations: Choudhary et al., 2009, Frisch & Schlesewsky, 2005, and the studies mentioned above; for inflection violations: Gunter & Friederici, 1999, and the studies above; for word order: Bornkessel et al., 2004, and many more). The N400 can thereby be altered as reported by Wang and Schumacher (2013), who found a marker-based modulation of the N400 correlated with different degrees of predictability based on context informations affecting structural marking.

All those findings were generalized in recent accounts to the general statement that the amplitude of the N400 component correlates with the predictability of a stimulus (in language processing) (Bornkessel-Schlesewsky & Schlesewsky, 2019). They suggest that the amplitude of the N400 directly "reflects precision-weighted prediction error signals, i.e., prediction errors weighted by the relevance of the information source leading to the error" (Bornkessel-Schlesewsky & Schlesewsky, 2019, p. 1). This generalized perspective is an attempt to expand the understanding of this ERP component from functional interpretations to more neuro-biologically grounded explanations.

The N400 is particularly suited for such an explanation, given that its characteristics and associated functions can be related to more recent accounts emphasizing the role of predictive processing in the brain (and cognition) (esp. the predictive coding framework, Friston, 2010, Rao & Ballard, 1999). With respect to language processing, it is widely acknowledged that "language users predict upcoming language input" (Huettig, 2015, p. 119). Despite this general acknowledgement, there is a large debate concerning the question to what extent predictions are used in language processing, ranging from the anticipation of specific elements (e.g., words) in highly restricted contexts to the constant generation of predictions in the course of processing, "typically conceptualized in terms of the preactivation of stimulus features" (Bornkessel-Schlesewsky & Schlesewsky, 2019, p. 3).

In line with the predictive processing framework that assigns predictive top-down mechanisms a central role in human cognition (see for instance Hohwy, 2013, for a general introduction), I assume that language processing is highly affected and constantly accompanied by the generation of forward models at several levels that try to account for upcoming input; i.e., in my view, no processing takes place without the generation of predictions. However, the investigation of predictive processing in language requires more empirical research as well as cognitive modelling, in order to account for the role and contribution of these mechanisms in language. For the purpose of this study, I share the general intuition voiced by Bornkessel-Schlesewsky and Schlesewsky (2019), DeLong et al. (2014), and others that predictive (top-down) and integrative (bottom-up) mechanisms in-

teract in sentence processing similarly to the way they interact in other cognitive domains – and this perspective can arguably be integrated in a predictive processing framework.

Consequently, the link between the two mechanisms is achieved in form of prediction errors. Prediction errors are basically the proportion of the sensory input that was not predicted by the top-down generative models. In the strict sense of the predictive coding framework, only the prediction error (and not the actual sensory input) is "propagated up the cortical hierarchy via feedforward connections, thus serving to update the predictive model at each level and determine priors for the next prediction" (Bornkessel-Schlesewsky & Schlesewsky, 2019, p. 4). Thus, predictions are hierarchically organized from lower to higher cortical (or cognitive) levels. The system constantly tries to reduce prediction errors, by updating and refining the models at each level (Friston, 2010).

This cascading process of model updating should be reflected in the neurophysiological profile and Bornkessel-Schlesewsky and Schlesewsky (2019, p. 4) argue that "we should not necessarily expect to observe a 'special' (e.g., neurophysiological) error signal for an unpredicted input, but rather an attenuation of the signal accompanying a sensory input when that input is predicted." They postulate that the N400 reflects this mechanism (similarly to the more widely examined mismatch-negativity in other cognitive domains) by stating that "N400 amplitude differences appear to result from an attenuation of the N400 for predicted stimuli rather than augmentation of the N400 for unpredicted stimuli" (Bornkessel-Schlesewsky & Schlesewsky, 2019, p. 4). With respect to discourse, the size of the N400 amplitude is higher "the more demanding the access to information in the discourse model is" (Hirotani & Schumacher, 2011, p. 278). I agree with this perspective, considering that it offers a more general perspective on the N400 beyond a characterisation within the limits of traditional sub-divisions into syntactic or semantic processes.

I argued before that differential object indexing (or DOM in general) must entail some notion of predictability. With respect to structure, this notion of predictability is associated with conventionalized biases that shape differential marking. However, the involvement of some level of structural predictability should also be reflected in processing. Therefore, I expect DOI to interfere with predictions at the level of discourse representations. Especially with respect to discourse referents, there should be some tendency to use strong predictions, for example in line with the subject-first or agent-first preference assigning a prominent position to one of the referents. Deviances from these patterns should be reflected in the (discourse-driven) modulations of the N400 (as was shown already by Burkhardt, 2006).

However, prediction errors in this regard signal merely the deviance from a previously predicted structure, but do not tell us much about repair mechanisms associated with these deviances. With respect to discourse, "[t]the difficulty of establishing a dependency relation between incoming information and information already available in the discourse model is reflected in modulations of the N400" (Hirotani & Schumacher, 2011, p. 278). Subsequent repair mechanisms that follow the detection of deviances from the (discourse-based) predictions are reflected in another component that I discuss in more detail below.

7.1.3 The neurophysiological profile of discourse updating

As was mentioned before, DOI is directly related to the level of discourse representations, due to the person index involved in these structures. Therefore, the processing of DOI should be associated with known mechanisms associated with the discourse-level. Of

particular interest are reanalysis processes concerned with the discourse representations and their neural correlates.

In general, the establishment of new information or of a representation of a new entity in the discourse model was shown to be reflected in a late positivity (or P600) and this component can be modulated by different inferential relations (e.g., an inferable or new referent contrasted with a given referent) (Burkhardt, 2006, 2007). In this context, the P600 or late positivity is a reflection of discourse integration and discourse-internal reorganization and was shown to emerge for referents that cannot be linked to previously established discourse information and triggered the establishment of a new and independent discourse representation (Burkhardt, 2006; Schumacher, 2009).

Schumacher (2009) and Hirotani and Schumacher (2011) argue for a neuro-cognitive model of discourse processing that proceeds in two steps, namely *discourse linking* (or *dependency formation*) and *discourse updating*, the former being reflected in the N400 component and the latter in the late positivity. The two processes are described in some detail in Hirotani and Schumacher (2011, p. 279-280):

> • During 'Discourse Linking', discourse representation structure is accessed with the aim of establishing dependency relations on the basis of information available in discourse. This process is guided by various salience [i.e. prominence] relations and driven by the system's desire to construct a coherent discourse representation
> • During 'Discourse Updating', information from different domains is assessed and potential clashes ... are resolved by introducing a new discourse referent or restructuring information in discourse representation

Interestingly, these mechanisms are also at work at discourse-related relation establishments, e.g., topichood. Hirotani and Schumacher (2011, p. 280) argue that "[d]iscourse Updating might also be required when the focus of attention is shifted to a new topic" and present results that discerned a late positivity for topic shifts induced by the Japanese topic marker *wa*. Similarly, Hung and Schumacher (2012) report a more pronounced late positivity for topic shifts in Chinese.

Remember that prominence structure is assumed to be represented in the discourse representation and contributes to the dynamic linking and updating. In this perspective, "the functional significance of the discourse representation is twofold. It encodes the current state of the discourse, including potential shifts and updates in the discourse structure and the ranking of entities. At the same time, discourse representation structure is the basis for the generation of predictions for the next discourse units and discourse segments." (von Heusinger & Schumacher, 2019, p. 125)

In my analysis, I argue that DOI is operating on the discourse prominence structure and activates the status of a referent that was not central or salient shortly before, but accessible because it was prominent at an earlier stage of discourse or can be singled out based on a sufficient level of activation. Therefore, DOI should directly affect the discourse representations. Associated with this reactivation function should be some processes of linking (to a medium-level prominent element) and discourse updating (due to the raise in discourse prominence).

In order to shed light on the involvement of these processes, a violation paradigm is used that triggers different discourse representations of two discourse-given referents. This study is to some extent novel in that it focusses primarily on the processing of object indexes in the context of differential object indexing. I look primarily at the two mechanisms of discourse updating and linking-related predictability in a situation where the discourse prominence status of one out of two previously equally ranking referents is elevated by DOI.

7.2 ERP experiment

Preliminaries and hypotheses. The main question asked in this experiment is what is the basic mechanism underlying the processing of pre-verbal DOI in relation to referent management (discourse updating) and role assignment, taking into account the association with the discourse prominence function of singling out a referent from a set of almost equally ranking referents, in order to activate it for further operations.

The underlying idea of this experiment was to closely control for the interpretational behaviour and associated processing patterns when different combinations of different or same gender subject and object indexes occur in a sentence, after two almost equally ranking referents of different gender were introduced in a context sentence. With the different combinations of the two indexing types, four conditions were constructed that helped to investigate the processing of object indexes in light of previous agreement research and recent accounts on the neural correlates of discourse updating and predictability.

As was outlined above, objects in the pre-verbal position are frequently marked with an object index in Bulgarian (traditionally known as clitic doubling but called pre-verbal DOI throughout this study). In general, these object indexes can either serve as stand-alone pronouns (quasi-pro-indexes) in subject-clitic-verb (SCV) constructions or as object indexes cross-indexing a (pre-verbal or post-verbal) object NP in the same sentence.

In line with my previous analyses and the results from chapter 4 and 6, I assume that pre-verbal DOI is a means to mark the topicality of an object via order and to signal a change in discourse prominence via DOI of the object or patient referent of that sentence. Although DOI turned out to be a comparably strong encoding mechanism that can easily override other cues in assigning roles in a sentence (particularly in interaction with order), there should be an interpretational conflict if one out of referents of comparable prominence status is singled out as topical and prominent object in a sentence-initial position via DOI. In line with the subject-first preference (Bickel et al., 2015), I assume that in the case of two referents of similar rank (based on the context), an initial NP in a sentence is always interpreted first as the subject of a sentence. Based on the evidence so far, I assume that the presence of DOI (cross-indexing the first NP) can override this interpretation and can enforce a reanalysis towards an object-initial interpretation. This reanalysis should be reflected in the neural pattern.

In addition, due to the normatively marked nature of DOI and despite the high cue reliability of the object cross-index, the availability of the object index as an attentional cue in prominence and role interpretation is subject to variation. This lower availability – at least when DOI is encountered in overriding the subject-first interpretation – should be reflected in the neural correlates of predictability. However, given the high reliability, the predictability-associated response is expected to be modulated throughout the course

of interpretation, i.e., after the object index is encountered, the re-interpretation should become more likely and facilitated.

To investigate the precise time-course of the DOI (re-)interpretation and processing pattern associated with the singling-out of an object referent as prominent entity via pre-verbal DOI, I conducted an ERP study in which I contrasted sentences with object pro-indexes (SCV) and pre-verbal object cross-indexing (DOI). Furthermore, I compared the patterns of the two to reference mismatches (RFM) and agreement violations (AGV) as baselines for the identification of discourse-related and re-analysis-associated processing patterns.

For this purpose, different indexing relations are controlled for by gender (agreement) marking on the clitic (object index) and on the verbal inflection (subject index). The exact design of the stimuli material is presented in detail below. NPs are unambiguous male and female proper names. I hypothesize that, after introducing two referents with different features (gender) to a context, the occurrence of the one referent (e.g, male) in a full NP leads to the prediction that the next referent (realized by an object index) is most likely of the other feature (e.g., female). At this sentence position, I compare two types of sentence structure in which the object index refers to the 2nd referent from discourse who was not already mentioned in the NP of the target sentence (SCV and AGV) to sentences in which the object index co-refers to the 1st referent who was already overtly presented by a NP or a referent of the same feature not present in discourse (DOI and RFM).

When the subject index (verbal inflection ending) is encountered, the final analysis becomes available. Pre-verbal DOI should trigger a reanalysis towards a discourse-coherent interpretation. This new interpretation is only available in DOI. Since there is no other referent of the same feature, RFM violates the discourse linking by creating a reference to a non-present 3rd referent. In contrast, AGV sentences which were also initially at the first position interpretable lead to an unresolvable crash of the derivation at the verb.

Previous ERP research found that cross-linguistically reference mismatches and agreement violations typically engender an N400 followed by a late positivity (LPS) (Bornkessel-Schlesewsky & Schlesewsky, 2019) and particularly with expectation-based linking mechanisms with respect to referents (Hung & Schumacher, 2012). The LPS is associated with reanalysis, also during referent shifts and discourse updating (Hung & Schumacher, 2012). In general, I assume that DOI engenders a similar pattern, due to its lower cue availability (reflected in the N400 pattern) and subsequent reanalysis (reflected in the LPS). However, these effects should be less pronounced in comparison to AGV and RFM and should be different depending on the interpretation of the sentence.

I predict that the appearance of an – at first sight – in-congruent (i.e., unexpected due to the subject-first preference) object index in the pre-verbal domain (DOI, RFM) engenders a N400-LPS pattern in comparison to a congruent index – reflecting the prediction error and immediate attempts to recover a meaningful interpretation. At the post-verbal position (verbal inflection/ subject index), I assume distinct outcomes for the conditions RFM, DOI and AGV. For AGV, I expect a pronounced N400-LPS pattern reflecting the prediction error and failed agreement computation. For RFM, I hypothesize a N400 indicating unsuccessful context integration, due to the absence of an appropriate third referent and a LPS, indicating attempts of discourse updating (however, less pronounced than for AGV). In contrast to RFM and AGV, I predict that DOI yields a clearly reduced N400 – reflecting the

increased availability of the object-initial structure at this point in time – but a pronounced LPS reflecting a costly, new agreement computation and reanalysis towards a successful discourse-coherent interpretation.

This experiment is conceptually different from the previous studies. On the one hand, the associated process is investigated when DOI is used to single out one of two almost equally ranking referents (to shed light on the processing correlates of this prominence-associated function – particularly when competing with another strong principle, namely subject-first). On the other hand, the focus is particularly on the two indexing positions rather than a comparison of the full structure in this regard – providing more detailed insights on the online processing of these elements.

Participants. In total, 30 monolingually raised speakers of Bulgarian living in Cologne (Germany) were recruited for the experiment, with the help of a Bulgarian student association and private contacts in Cologne. 10 participants had to be excluded from the data analysis because they failed on attention checks in form of fillers with easy-to-detect errors. No participant had to be excluded because of poor data sampling quality.

The remaining 20 participants (10 women, 50 %) had an age range from 20 to 32 with a mean age of 25.35 (SD = 3.73). Thirteen participants were living in Germany for more than five years and seven for less than five years at the time of the experiment. All participants were right-handed and reported normal or corrected-to-normal visual acuity. They gave informed consent prior to the experiment and were debriefed on the purpose of the study after the experiment. All participants were paid for their participation according to the German minimum wage per hour.

Materials and design. The experimental data (stimuli, raw and preprocessed data, preprocessing and analyses scripts) of this experiment are publicly available at https://osf.io/nxqr4/. The target stimuli were constructed with 160 different transitive verbs and 80 pairs of male and female proper nouns. Each sentence concluded with an adverbial or prepositional phrase which typically can occur with the respective verb (based on dictionary entries, corpus results and speaker elicitation). Every lexical set was checked for consistency and naturalness in the canonical SCV condition by two native speakers and later transposed into the other conditions.

For creating the four conditions, only two features were changed, namely the gender of the object index or of the subject index. By altering gender (agreement) on one of the two spots or on both, the four conditions came into being. Each trial started with a context question which always contained the phrase "Ču li novinite za" (trans. 'Did you hear the news about ...?') and a pair of one male and one female proper name (e.g., Petar and Gergana) or only one proper name in the case of certain fillers. Example stimuli in each condition are given below in table 30.

The fillers contained different types of canonical sentences without object indexes. Sixty filler sentences contained canonical subject-verb or subject-verb-object sentences without object indexes. These sentences were expected to be judged as suitable by the participants (and serve as a positive baseline). The remaining 20 fillers contained obvious and easy to detect grammatical errors that served as attention checks and negative baseline. Each participant received one out of four item lists, including all four conditions respectively (40 sentences each; in total 160 target sentences) and 80 filler sentences (240 sentences in total per participant). The distribution to the lists was equalized by applying a latin square

design and the sentences pseudo-randomized in each list.

Table 30

ERP experiment: Illustration of target stimuli per condition

Context: Did you hear the news about Petar and Gergana?

Condition	Position 1	Example	Translation
SCV	congruent	**Petar ja e napusna-l sled sporovete.** *Peter she.*ACC *leave-*PTCP.M *after the argument*	'Peter left her ...'
DOI	incongruent	**Petar go e napusna-la sled sporovete.** *Peter he.*ACC *leave-*PTCP.F *after the argument*	'She left Peter ...'
RFM	incongruent	**#Petar go e napusna-l sled sporovete.** *Peter he.*ACC *leave-*PTCP.M *after the argument*	'Peter left him ...'
AGV	congruent	***Petar ja e napusna-la sled sporovete.** *Peter she.*ACC *leave-*PTCP.F *after the argument*	'Peter (she) left her ...'

The setup of this experiment is different from previous experiments (partly due to the need to use comparable trigger points for the ERP analysis). Therefore, I briefly discuss the underlying idea behind the conditions in some more detail. In the current experiment, the design captures the options to use an object index either as stand-alone (pro-) index or as a cross-index in (pre-verbal) DOI. Using the two options by enforcing the participant to either interpret the sentence as consisting of a pro-form in a regular object anaphora, either with a resolvable antecedent (condition SCV) or a non-resolvable antecedent (condition RFM). Resolvability was controlled by gender.

In the doubling condition (DOI), in theory, two options were possible for the speaker: To either interpret the sentence as a pro-index (similar to condition RFM) with no previously introduced (third) antecedent to refer to or by interpreting the clitic as a cross-index to the sentence-initial NP in the target sentence. This design provides us with the means to investigate how the speaker processes the two different options. Differences in the processing pattern of RFM and DOI shed light on the processing of the cross-indexing function. Additionally, this design made possible a fourth condition, consisting of a typical agreement violation. This serves as a negative baseline in contrast to the positive baseline SCV. Also, the direct comparison of SCV and AGV provides additional evidence for our understanding of agreement violations during processing.

Similarly, the use of the perfect tense and the exclusion of masculine referents requires some more explanation. There are two reasons for using the perfect tense in the experiment, one being functional and another being methodological. In order to generate agreement violations, one could manipulate number, gender or case (only with masculine referents). Number could be manipulated in every tense form. However, it is more difficult to create equal pairs of referents and the use of the plural could lead to a strong confound.

Since the other referent in the sentence is indicated by a singular clitic, we cannot be sure that the speaker is not constructing some inferred interpretation. Especially in the reference mismatch condition, we cannot exclude the possibility that the singular reference to a missing referent is somehow filled with referring to one person within a perceived

group of referents encoded in plural. Therefore, I decided to use the gender contrast, considering that it is unambiguous in combination with referents indicated by proper names.

Case is ruled out here as well for two reasons. On the one hand, we would have to limit our discussion to masculine referents. Also, since reference is always to the male in the context, this could provoke the subjects to develop a certain masculine-oriented interpretation strategy and therefore change the processing. Also, from a structural perspective, this would lead to sentences with two entities carrying (unambiguous) case-marking.[60]

The gender contrast is only visible in the perfect tense and therefore this tense form is used. Also, the perfect often carries some association with a mirative or evidential reading (see Friedman, 1999 for instance) and is therefore natural in a context in which a reported information is asked or presented.

Procedure. After giving informed consent, participants were asked to fill out the first part of a complementary survey asking for demographic information and language background. During the EEG experiment, sentences were presented visually in the centre of a computer screen. Prior to the experimental session, participants exercised the procedure in a practice session with 15 trials, in order to become familiar with the task.

Each trial started with the presentation of a fixation star in the centre of the screen for 450 ms before the context question was presented as a single chunk for a duration of 2000 ms. After the presentation of the context, another fixation star appeared for 450 ms. In order to see the answer to the context question, the participants were asked to press any button on the joystick. Then the sentence was presented. The first part of the sentence, containing the critical elements NP1, object index and verb (incl. subject index) were presented word-by-word for 450 ms with an inter-stimulus interval of 150 ms. The additional elements of the sentences contained either an adverbial or prepositional phrase to make the sentences more natural and coherent. These parts were presented in one chunk for 450-650 ms (depending on the number of words per chunk).

After 150 ms, three question marks appeared indicating the judgment task. Participants were asked to decide if the answer to the question is appropriate and could be uttered in a possible real life conversation ("Podhodjašt li e otgovorăt na văprosa ot poslednoto izrečenie?", lit. 'Is the answer appropriate to the question in the last sentence?'). The question marks remained until participants pressed a button or 3000 ms had passed (time out). Trials were separated by a blank screen pause of 1000 ms.

Participants were instructed to avoid eye-blinks and excessive movement when reading the sentences. They were also instructed to not think too much about their evaluation and decide on their judgment quickly. All sessions were divided into 8 blocks with 30 items, with breaks of variable length in between. At the end, participants filled in the second part of the complementary survey that tested for interpretation and evaluation of object indexing constructions (not presented in this book). Finally, participants were debriefed and could ask questions about the experiment. Each session lasted for about 2 to 2.5 hours (including a complementary survey and electrode preparation.)

[60] This is basically also one of the reasons why I excluded indirect object doubling in my empirical investigation, due to the unambiguous dative case marking indicated by the preposition *na*. The interplay of other case-marking entities such as the nominative vs oblique marking on masculine gender and the *na*-marking for indirect objects with clitics carrying case requires further investigation.

EEG recording and preprocessing. The electroencephalogram was recorded from the following 32 Ag/ AgCl scalp electrodes mounted on the scalp by an elastic cap (*Easycap*): FPZ, FZ, CZ, PZ, FP1, FP2, F3, F4, F7, F8, FC3, FC4, FT7, FT8, C3, C4, T7, T8, CP5, CP6, P3, P4, P7, P8, O1, O2. The EEG was digitised at a rate of 500 Hz and amplified by a *Brain Vision Brain-Amp* amplifier with impedances <4 kOhm. Trigger points for event-related potentials were set at the position of the object index and the verb (incl. the subject index).

EEG data were preprocessed using *MNE Python* (Gramfort et al., 2013) in version 0.21.0. The EEG was referenced online to the left mastoid and re-referenced offline to linked mastoids (ground: AFz). Eye-movement artefacts are controlled for by three electrodes, placed around the participants right eye and one electrode at the temple next to the left eye. The data were processed offline with a 0.3 to 45 Hz bandpass filter and checked manually. Automatic rejections based on the eye electrodes were performed to exclude trials containing ocular or other artifacts prior to averaging. Blinks were excluded from the epochs. The EEG was epoched time-locked from -200 to 1000 ms, relative to the trigger events. Epochs were then transferred to a *.csv* file for further analyses in *R* (R Core Team, 2019).

Data analysis. In this study, accessibility was assessed on a binary (nominal) scale (with "yes" and "no"). In order to allow for statistical analyses of these data, I recoded the judgment to quasi-ordinal (but still binary) values (1 and 0) and then transformed them into *z*-values per subject, following the procedure described by Schütze and Sprouse (2018). Transforming the data with the individual mean and scaling them with the standard deviation allows for a better account of inter-individual variation that is expected with respect to differential object indexing in Bulgarian. Also, *z*-scores are more robust to scale compression or skew (Schütze & Sprouse, 2018). *Z*-scores indicate to what extent (quantified as standard deviation) the actual value per subject and per rating was either below or above the mean rating of a particular value, indicating which ratings were generally above or below the mean (see Gries, 2013). Then, the means and standard deviations of the *z*-scores were calculated for every condition and filler type.

Each of the independent (behavioural) variables (judgment *z*-scores and reaction time to judgment) was entered into a linear mixed effects model using the *lmer()* function from the *R* package *"lme4"* (D. Bates et al., 2015). The models include the fixed factor CONDITION as well as random effects for subject and item and random slopes for CONDITION.

For the EEG analysis, event-related potentials were computed, calculating linear mixed effects models by subject, channel and sample (i.e., for time points in 10 ms steps) for the comparison of two different object indexes at the object index position (RFM/ DOI vs. SCV/AGV) and for the comparison of all conditions at the position of the subject indexes at the verb. All models were again calculated with the *lmer()* function in *R*. Mean fitted values from 0 to 1000 ms in steps of 100 ms were included in the model as dependent variable. The models include the fixed factor CONDITION as well as two continuous factors SAGITTALITY and LATERALITY, based on the planar (x and y) coordinates of the standard BESA coordinate system.

For model comparison, I used a backward approach in each time window, starting with maximally specified random effects until a converging model was identified. Significant main effects and interaction effects with sagittality and laterality were extracted and will be presented below. Data are plotted in groups of electrodes according to their position

(left, midline, right and anterior, midline and posterior).

In order to focus further on the comparison of DOI with SCV and RFM and pre-verbal DOI, additional sub-group comparisons were conducted (with the same procedure as before). Two additional analyses were conducted on the time-window from 300 to 500 ms and 700 to 1000 ms of position 2 (verb). Here, two generalized linear mixed effects models (using the *glmer()* function from the *"lme4"* package) were calculated to determine to which extent single-trial acceptability ratings can be predicted by single-trial N400 or LPS means. For the components, *z*-transformed mean amplitudes were applied for each window and sagittality and laterality used as fixed effects in interaction.

In the first model, condition was included and then compared to a model without condition as a potential effect. In these models, only random effects for subjects could be used, because models with items as random effects or condition as random slopes did not converge. Significant interactions are visualized with estimated marginal means and 83 % confidence intervalls whose non-overlap corresponds to a significant difference at a 5 % level (following a suggestion from Bornkessel-Schlesewsky et al., 2020).

Results: Behavioural data. The behavioural data were measured respectively at the end of each trial. The means and standard deviations of the ratings, the *z*-transformed values of the ratings and reaction times (to judgment) are provided in table 31. Additionally, the *z*-scores are plotted in figure 33.[61]

Table 31

ERP experiment: Means and standard deviations of the behavioural data

condition	acceptability		*z*-scores		reaction time	
	M	*SD*	*M*	*SD*	*M*	*SD*
SCV	0.89	0.31	1.22	0.74	665.00	555.00
DOI	0.25	0.44	-0.22	0.78	736.00	586.00
RFM	0.13	0.34	-0.46	0.62	677.00	534.00
AGV	0.09	0.29	-0.55	0.60	655.00	502.00

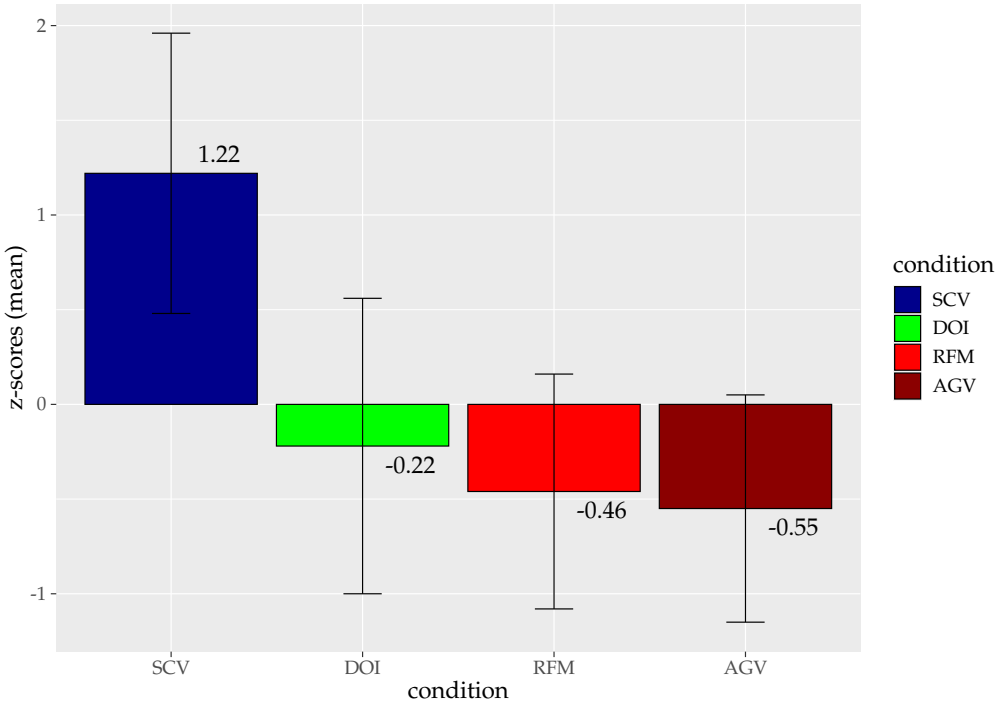
The canonical SCV condition received the highest rating on average (M = 0.89, SD = 0.31) and is 1.22 SDs above the mean rating for all conditions. Agreement violations received the lowest rating. DOI received a comparably low rating with a *z*-score of -0.22 (SD = 0.78), but was rated better than reference mismatches.

In general, condition yielded a highly significant main effect ($\chi^2(3) = 747.6$, $p = .000$) on *z*-transformed acceptability ratings. For reaction time, no significant main effect of condition was found ($\chi^2(3) = 4.727$, $p = .193$). AGV and SCV received the quickest reaction time closely followed by reference mismatches. Reaction time to DOI, in contrast, was slower than for all the other conditions.

[61]Note that I apply a consistent colour code throughout the presentation of the results. When the full condition is evaluated, blue is used for SCV, green for DOI, light red for RFM and dark red for AGV. Given that only the first position is discussed (where SCV and AGV both show a congruent object index and RFM and DOI show a potentially incongruent index), congruent trials are coloured in black and incongruent ones in grey.

Figure 33

ERP experiment: Barplot of the acceptability judgment z-scores



In order to evaluate the differences between DOI and the other conditions in more detail, group-wise comparisons were conducted (see table 32).

Table 32

ERP experiment: Group-level comparison of the acceptability z-scores

group	z-scores				reaction time			
	χ^2	df	p		χ^2	df	p	
DOI - SCV	99.82	1	.000	***	1.90	1	.168	
DOI - RFM	6.37	1	.012	**	4.37	1	.037	*
DOI - AGV	8.10	1	.004	***	4.03	1	.045	*

The group-wise comparison shows that each difference in the evaluation of DOI and another condition reached significance. For reaction time, the same picture emerged – except for the difference in reaction time between DOI and SCV that reached no significance.

Results: ERP data at position 1 (object index). Grand-average ERPs at different topographical regions for position 1 are shown in figure 34. Note that negativity is plotted down (following Luck, 2014). An overview of statistically significant effects is presented in table 33. Effect plots for each of these analyses can be found in appendix A.

Figure 34

ERP experiment: Grand-average ERP plots for position 1 (object index)

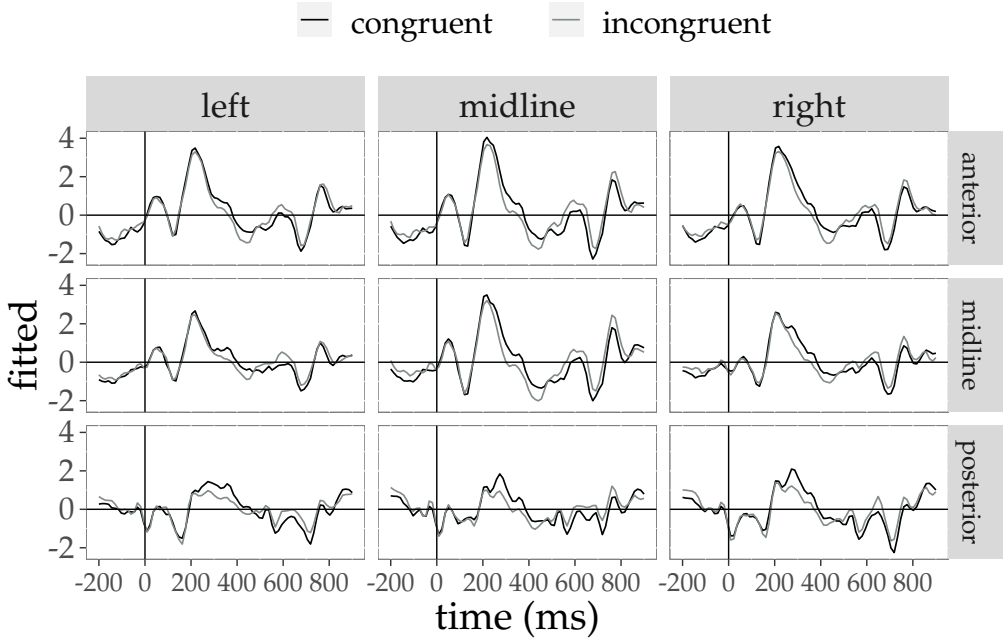


Table 33

ERP experiment: Main and interaction effects at position 1 (object index)

time window	main effect	interaction effects sagittality	laterality
0-100 ms			
100-200 ms			
200-300 ms	$\chi^2 = 6.7$, $p = .010$ (NEG)		$\chi^2 = 4.49$, $p = .034$ (right neg.)
300-400 ms	$\chi^2 = 10.32$, $p = .001$ (NEG)		
400-500 ms		$\chi^2 = 18.56$, $p < .001$ (anterior neg.)	
500-600 ms	$\chi^2 = 7.2$, $p = .007$ (POS)		
600-700 ms	$\chi^2 = 7.27$, $p = .007$ (POS)		
700-800 ms	$\chi^2 = 6.34$, $p = .012$ (POS)	$\chi^2 = 4$, $p = .046$ (posterior pos.)	
800-900 ms		$\chi^2 = 6.27$, $p = .012$ (posterior neg.)	
900-1000 ms			

Incongruent object indexes (i.e. that do not match the gender of the none-mentioned referent) show a negative pattern in the time-window of approximately 200 to 500 ms and a positivity from 500 to 800 ms. The ERP data were analyzed using linear mixed models.

In the following, I provide a brief summary of some of the pronounced effects from the effects table. For the time-window from 300-400 ms, a significant main effect for condition ($\chi^2 = 10.32, p = .001$) was found with a more negatively going pattern for in-congruent object indexes (inc: beta = -0.51, t = -3.2), see also the effects plots in appendix A.

In the following time-window from 400-500 ms, the interaction of sagittality and condition was highly significant ($\chi^2 = 18.56, p < .001$) with a more negative pattern for in-congruent object indexes particularly in anterior regions (inc:sag: beta = -0.19, t = -4.3).

In the later time-windows (600-700 ms and 700-800 ms) a significant, positively going pattern emerged for in-congruent indexes that was more pronounced in posterior regions in the time-window from 700 to 800 ms (interaction of condition and sagittality: $\chi^2 = 4, p = .046$, inc:sag: beta= -0.12, t = -2). Note that the direction of significant effects with respect to position can be seen more easily in the effects plots presented in the appendix.

Results: ERP data at position 2 (verb). At the second trigger position, the full interpretation of the sentence becomes available. The ERP grand-averages for each region are illustrated in figure 35. As can be seen in the plots, there is a graded negativity effect around 400 ms (SCV < DOI < RFM < AGV), particularly in posterior regions, and a graded positivity from 700 to 900 ms (SCV < DOI < RFM < AGV), more pronounced in posterior regions. As for the first position, linear mixed effects models were calculated for each time-window. The significant effects are portrayed in table 34.

As is visible in the table, there is a particularly significant effect peaking in the time-window from 300-400 ms ($\chi^2 = 26.11, p < .001$) and 400-500 ms ($\chi^2 = 16.03, p < .001$). Similarly, a pronounced positivity was found in the time-windows 600-700 ($\chi^2 = 18.74, p < .001$) and 700 - 800 ms ($\chi^2 = 24.8, p < .001$) with a more posterior distribution. Effects plots for this position are given in Appendix B. The direction of the effects in terms of sagittality and laterality differ with respect to the group-level difference per condition and are not discussed in detail here (but see the following paragraph for the comparison of reference mismatches and DOI).

Results: Group-level comparison of SCV and DOI. Particularly the behaviour of DOI in comparison to reference mismatches and the SCV condition is of interest. Therefore, the analyses stated before were repeated with a subset only containing the two conditions. The grand-averages of SCV and DOI at position 2 are plotted again in figure 36. In table 35, significant differences of the contrast of these two conditions are given for each time window.

With respect to the relevant windows, the difference for SCV and DOI was significant in the time window 400-500 ms ($\chi^2 = 7.74, p = .005$), with DOI engendering a more negatively going effect, particularly pronounced in right anterior regions. This effect sustains to the time window 500-600 ms. In the time-window 700-800 ms, statistical analyses revealed a signficant effect ($\chi^2 = 7.03, p = .008$), with DOI yielding a more pronounced positively going effect, more pronounced in right regions.

The plots additionally show that the negativity in the described time window is particularly pronounced in central regions, whereas the late positivity is more subtle (and more pronounced in central and right regions).

Figure 35

ERP experiment: Grand-average ERP plots for position 2 (verb) – All conditions

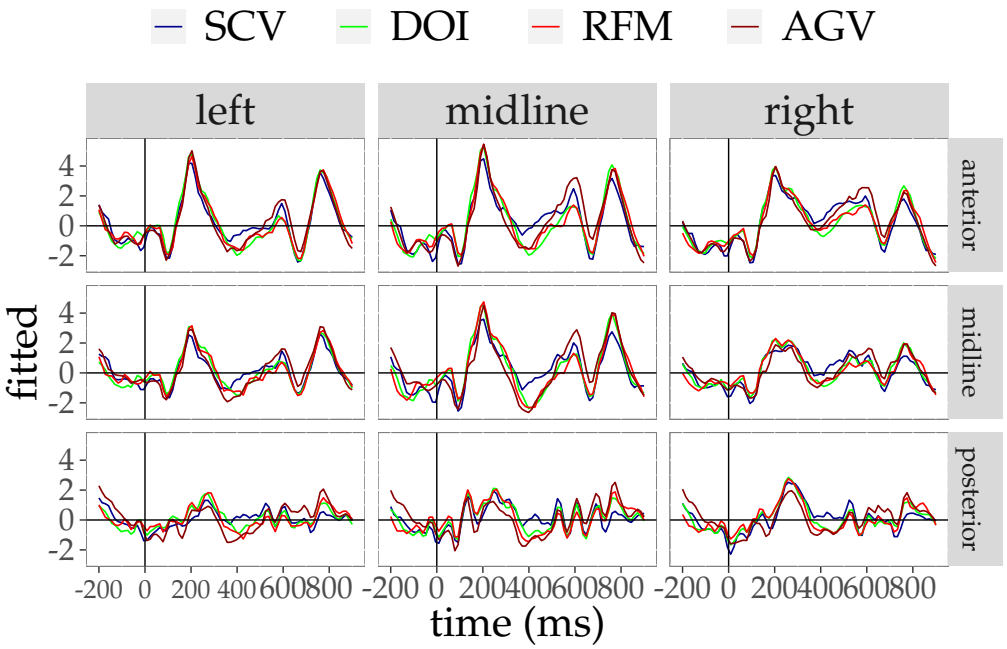


Table 34

ERP experiment: Main and interaction effects at position 2 (verb) – All conditions

time window	main effect	interaction effects	
		sagittality	laterality
0-100 ms		$\chi^2 = 12.21, p = .007$	$\chi^2 = 17.25, p = .001$
100-200 ms	$\chi^2 = 13.28, p = .004$ (POS)	$\chi^2 = 26.01, p < .001$	$\chi^2 = 13.28, p = .004$
200-300 ms	$\chi^2 = 14.05, p = .003$ (POS)	$\chi^2 = 41.46, p < .001$	$\chi^2 = 17.92, p < .001$
300-400 ms	$\chi^2 = 26.11, p < .001$ (NEG)	$\chi^2 = 59.3, p < .001$	$\chi^2 = 18.2, p < .001$
400-500 ms	$\chi^2 = 16.03, p = .001$ (NEG)	$\chi^2 = 171.03, p < .001$	$\chi^2 = 23.25, p < .001$
500-600 ms	$\chi^2 = 9.69, p = .021$ (NEG)	$\chi^2 = 176.66, p < .001$	
600-700 ms	$\chi^2 = 18.74, p < .001$ (NEG)	$\chi^2 = 26.55, p < .001$	$\chi^2 = 8.59, p = .035$
700-800 ms	$\chi^2 = 24.8, p < .001$ (POS)	$\chi^2 = 100.15, p < .001$	$\chi^2 = 23.69, p < .001$
800-900 ms		$\chi^2 = 47.48, p < .001$	
900-1000 ms		$\chi^2 = 33.56, p < .001$	

Figure 36

ERP experiment: Grand-average ERP plots for position 2 (verb) – SCV vs. DOI

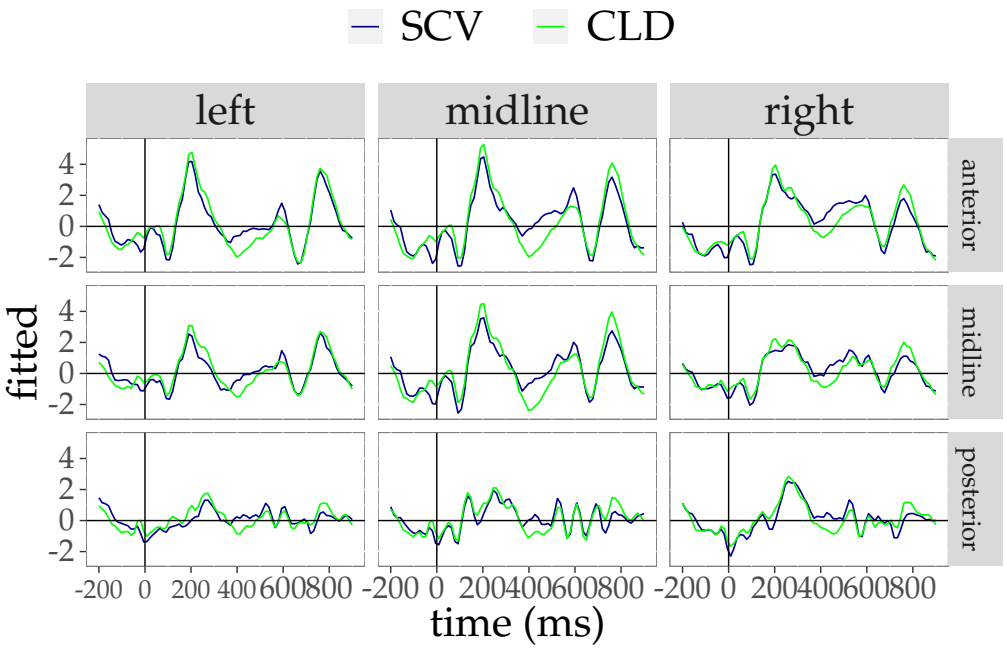


Table 35

ERP experiment: Main and interaction effects at position 2 (verb) – SCV vs. DOI

time window	main effect	interaction effects sagittality	laterality
0-100 ms		$\chi^2 = 4.52$, $p = .034$ (anterior pos.)	
100-200 ms	$\chi^2 = 5.02$, $p = .025$ (POS)		
200-300 ms		$\chi^2 = 4.79$, $p = .029$ (anterior pos.)	$\chi^2 = 11.6$, $p = .001$ (left pos.)
300-400 ms			$\chi^2 = 15.66$, $p < .001$ (right neg.)
400-500 ms	$\chi^2 = 7.74$, $p = .005$ (NEG)	$\chi^2 = 51$, $p < .001$ (anterior neg.)	$\chi^2 = 5.22$, $p = .022$ (right neg.)
500-600 ms	$\chi^2 = 3.92$, $p = .048$ (NEG)	$\chi^2 = 17.7$, $p < .001$ (anterior neg.)	
600-700 ms			$\chi^2 = 4.98$, $p = .026$ (left neg.)
700-800 ms	$\chi^2 = 7.03$, $p = .008$ (POS)		$\chi^2 = 21.53$, $p < .001$ (right pos.)
800-900 ms			
900-1000 ms			

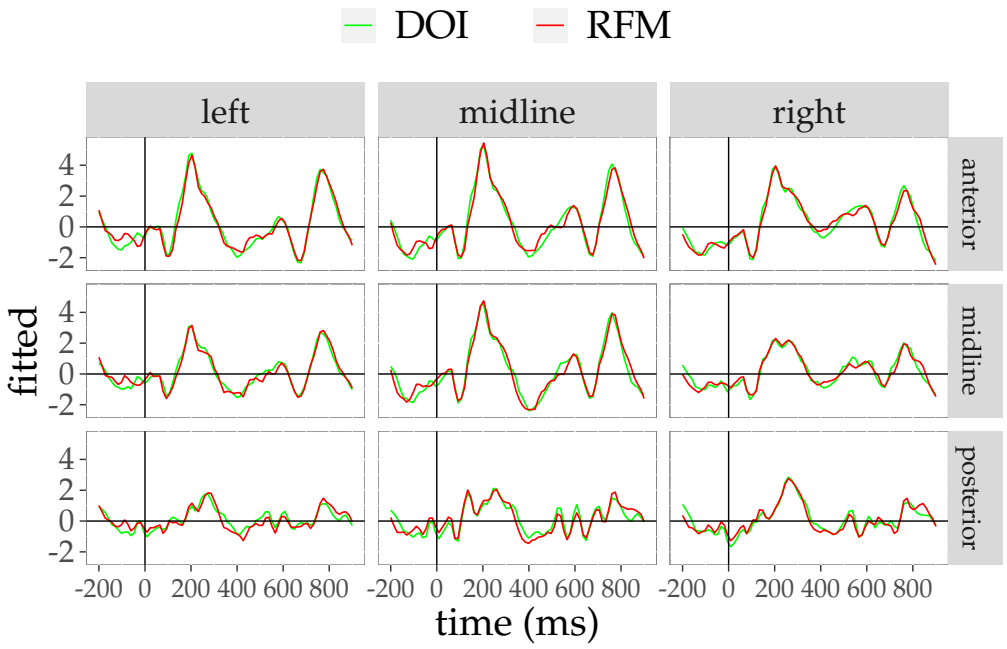
Results: Group-level comparison of RFM and DOI. For the sake of illustration, another plot is given showing the behaviour of DOI and RFM at position 2 (see figure 37). In the table below, only significant differences are given for each time window.

With respect to the relevant windows, the interaction of sagittality and condition was significant for the time-window 300-400 ms ($\chi^2 = 18.49, p < 0.001$), with RFM engendering a more negatively going effect, particularly pronounced in posterior regions (rfm:sag: beta = 0.29, $t = 4.3$). In the time-window 800-900 ms, statistical analyses revealed a signficant main effect for condition ($\chi^2 = 3.89, p = 0.049$), with RFM yielding a more pronounced positively going effect than DOI.

However, the differences between these two conditions are more subtle, even though the difference in acceptability judgment clearly suggests that the two were interpreted differently. These differential sensitivity of the two conditions to acceptability judgment is modulated by the two components, as is visible in the following analysis.

Figure 37

ERP experiment: Grand-average ERP plots for position 2 (verb) – RFM vs. DOI



Results: Acceptability-contingent of the ERP components. Among the models of the acceptability rating as a function of the mean amplitude values in the N400 time-window, the model that included the interaction of the mean amplitude with condition had a much better fit ($AIC = 55{,}452$) compared to a model without condition as a factor ($AIC = 104{,}575$). An ANOVA comparison of the two models showed a highly significant effect ($\chi^2(24) = 49171$, $p < .001$). With regard to the LPS model, the pattern was similar. The model that included condition had a better model fit ($AIC = 55{,}261$) than the model without accounting for condition ($AIC = 104{,}895$). The difference between the two models was comparably significant ($\chi^2(24) = 49681, p < .001$).

Table 36

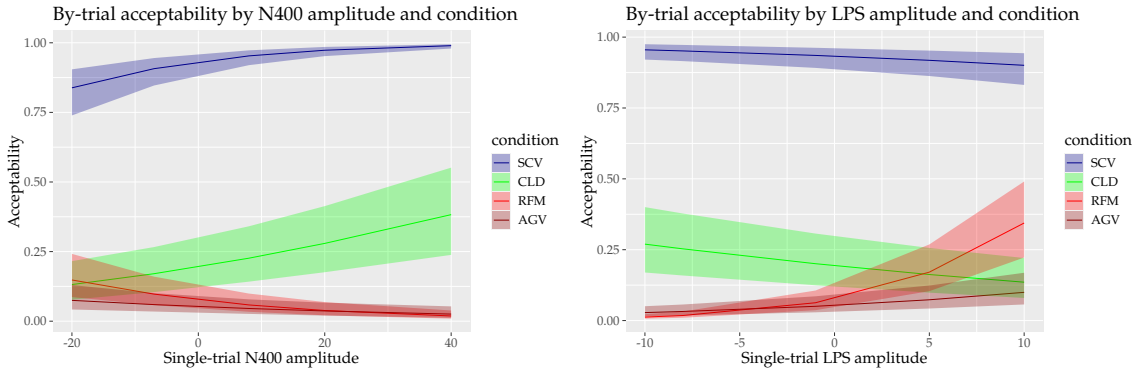
ERP experiment: Main and interaction effects at position 2 (verb) – RFM vs. DOI

time window	main effect	interaction effects sagittality	laterality
0-100 ms		χ^2 = 10.92 ,p = .001 (posterior pos.)	χ^2 = 8.17 ,p = .004 (right pos.)
100-200 ms		χ^2 = 12.51 ,p < .001 (anterior neg.)	χ^2 = 5.49 ,p = .019 (left neg.)
200-300 ms			
300-400 ms		χ^2 = 18.49 ,p < .001 (posterior neg.)	
400-500 ms		χ^2 = 67.97 ,p < .001 (anterior pos.)	
500-600 ms		χ^2 = 5.25 ,p= .022 (posterior neg.)	
600-700 ms		χ^2 = 4.36 ,p = .037 (posterior neg.)	
700-800 ms		χ^2 = 5.23 ,p = .022 (anterior neg.)	χ^2 = 6.54 ,p = .011 (right neg.)
800-900 ms	χ^2 = 3.89 ,p = .049 (POS)		
900-1000 ms		χ^2 = 6.94 ,p = .008 (ant. neg.)	

The interaction of the acceptability-contingent analysis is visualized in the two plots in figure 38 for the N400 time-window and for the late positivity window. In the first figure, it becomes evident that the rating of SCV and DOI is lower when the N400 effect is more pronounced. In other words, when the target sentence did not engender a strong N400 effect, the rating improved in both conditions (with DOI being at a lower level than SCV).

Figure 38

ERP experiment: Acceptability-contingent analysis of the ERP components



The opposite is true for reference mismatches and agreement violations. Here, the

rating improves when the N400 is more pronounced. A similar effect can be observed for the late positivity window. When the positivity is more pronounced, the rating for SCV and DOI decreases, whereas the rating for RFM and AGV increases (particularly for RFM). This final result suggests that the acceptability judgment did not only depend on the actual condition itself, but was also influenced by the way the conditions were processed (reflected in language-associated components).

Discussion. As predicted, the initial occurrence of the "in-congruent" (i.e., less expected) object index (in RFM and DOI) engendered an N400-LPS pattern at the position of this index, indicating a prediction violation followed by an attempt to resolve the interpretation by searching for a new referent. The N400 reflects issues with discourse linking, given that an object index occurs whose gender does not agree with the gender of the referent that is expected to be the object (namely, the referent that is not already instantiated in the sentence with a nominal phrase). At this point, it seems, that a reinterpretation toward an object-initial order via pre-verbal DOI is highly unlikely and not taken into consideration. This is also indicative of the strong agent or subject-first preference at work at this point of time. The pronounced LPS suggests that the system initiates discourse updating at this moment.

As I described in the results section, at the subject index position, a graded N400 effect (object pro-index (SCV) < pre-verbal DOI < reference mismatch < agreement violation) and a graded LPS effect (SCV < DOI < RFM < AGV) emerged for the non-canonical conditions. The strong N400-LPS effect for agreement violations replicates previous findings on agreement violations in other languages. For the processing of reference mismatches and DOI, a more fine-grained picture emerged at this processing stage.

For DOI, a less pronounced N400 occured at this later stage. This indicates that DOI became arguably more available at this stage once the full interpretation was available. In other words, discourse linking seems to be more easily achieved now (by linking the object index to the first NP in the target sentence when the subject index is linked to the other referent at this position). Also, discourse updating seems to be more easily realized now in comparison to reference mismatches (where a representation of a new, not introduced 3^{rs} referent is established) and to agreement violation (where arguably discourse representation fails to being established).

The results support the idea that DOI is acting upon discourse-related predictions – as can be seen in the smaller N400 at the second position in comparison to a reference mismatch – and initiates successful discourse updating with respect to the discourse representations – as is visible in a larger late positivity in contrast to SCV. This supports the claim that DOI is related to the discourse representation and its dynamic build up by means of prominence.

DOI appears to be a strong cue in this respect, since it initially causes a costly suprisal and updating response when encountered in a non-supporting context with two almost equally ranking referents. DOI successfully singles out one of the two referents as a prominent object, even when another structure was initially taken into consideration (the first NP being subject and agent).The modulation of the two components also suggests that the processing of DOI is concerned with the discourse prominence structure and the role assignment, because both referents were previously introduced to discourse and the use of DOI (and the subject index) alters the way in which both referents are established with respect to their relation toward each other and their prominence as indicated by the

indexes.

Additional support of the idea that this association with discourse is reflected at the representational level can be seen in the interaction of the components with the acceptability rating. Less pronounced N400 and LPS effects of the DOI condition at the second position are associated with a higher acceptability of this condition (the same pattern was found for the canonical SCV, yet the opposite pattern was found for RFM and AGV). In other words, the more successful or easily the discourse linking and updating is achieved (as reflected in the N400 and LPS modulation), the more acceptably the structure is evaluated.

As with all ERP studies, my study is accompanied by a number of limitations. With respect to the task, a potential limitation of this study is that participants were not asked to state their interpretation of the target sentences (with an interpretation task or a comprehension question), but instead rate the acceptability of the sentences. This requires some more justification. It is important to remind us that there is indeed a strong variation in making use of the cross-indexing function and using acceptability ratings definitely increased the variability on the behavioural level. As was shown before (in chapter 2), object marking constructions have a lot of variability in usage as well as acceptability, especially in the written mode. Also, participants were not pre-screened for their regional variety, allowing potential confounds of dialectal variation. In contrast, age and level of education was comparable for most participants.

With respect to the design, some additional limitations ought to be mentioned. To achieve the comparable structure as used in this experiment, I had to use pre-verbal DOI. On the one hand, this limits the transfer of the results to post-verbal DOI and potentially raised confounds with topic structure. Also, this particular design engendered several violations at different levels (order reversal, agreement (expectation) violation, argument structure reversal, topic structure reversal etc.) that cannot be distinguished in this design based on the neurophysiological patterns or behavioural response. Also, the context-sensitivity of DOI was not tested in this study, since I was interested in observing DOI when it singles out one out of two almost equally ranking referents.

With respect to the interpretation, the negativity reported for the first (object index) position could also be interpreted as a LAN – suggesting "pure" morphosyntactic errors – since there is some indication that it is more pronounced in anterior regions. However, this interpretation is not fully verified, given that the effect seems to be more prominent in the midline region. Subsequent research is needed to identify these effects in a more fine-grained manner.

Nevertheless, this study replicated some of the well-known patterns found with agreement violations of subject agreement in previous studies (see Molinaro et al., 2011, for a review of previous studies). Even more, this pattern was also shown for the violation of object indexing. Also, the effects can be plausibly attributed to mechanisms of discourse linking and discourse updating, as brought forward by previous accounts with different designs. Therefore, this study supports the idea that DOI directly operates on discourse representations and can dynamically shift the discourse representation of previously established referents. Thereby, it can override previously established predictions and initiates discourse updating toward a shifted representations, most likely affecting the prominence assignment of the respective referent. In this experiment, this was shown to be attributed in cases for which two more or less equally ranking referents were given in the context,

without any strong difference in the prominence status.

It is of particular interest if subtle differences in the prominence assignment of referents interact or interfere with DOI. The reaction time study in chapter 6 supports this view. Hence, the assignment of prominence is related to the notion of attentionally centring one (or more) referents. The notion of attending to a referent requires further analysis. A particularly interesting question is if cross-modally induced attention shifts (or allocations) affect language processing with respect to prominence assignment of referents. The following study addresses this issue with respect to visually induced salience.

7.3 Cross-modal effects of visual salience

7.3.1 Cognitive salience and linguistic prominence

In the section on prominence in chapter 4, I pointed out that the recent concept of *prominence* bears some association with the cognitive concept of *salience* – being related to the cognitive notion of *attention* (Himmelmann & Primus, 2015). In a general sense, attention is understood as the "mental ability to select stimuli, responses, memories, or thoughts that are behaviourally relevant among the many others that are behaviourally irrelevant" (Corbetta, 1998, p. 831).

This association of salience and prominence is widely acknowledged in the prominence framework and, to some extent, insights from salience research serve as role models for the notion of prominence. As I pointed out before, the assumption of *a-centres* in language is directly inspired by the idea of attentional centres and constitute their "linguistic correspondent" according to Himmelmann and Primus (2015).

In their discussion of the relation of salience with prominence, these authors highlight three aspects that characterize this association. Firstly, "the attentional centre is not necessarily tied to a certain salience-lending property or the most salient stimulus" (Himmelmann & Primus, 2015, p. 42). Both in perceptual salience and linguistic prominence, different cues contribute in varying degrees to the actual attentional centring highly dependent on the context these cues are presented in. In other words, no single cue or marker can fully cause attentional centering; instead, different cues may operate and interact on salient stimuli.

Secondly, "attention is guided by the observer's interest (Himmelmann & Primus, 2015, p. 43). This accounts for the important insight that attention is not always uniquely drawn to the most salient stimulus in the environment. To the contrary, directing attention is highly dependent on the perceiver and the way attention is directed by humans is subject to certain species-specific (or anthropocentric) principles. For example, Himmelmann and Primus (2015) discuss the strong sensitivity in human cognition for turning to (ideally animate or human) agents in an event, rather than focussing on other roles. This seems to be an example in which a general cognitive constraint (attending to agents) is conventionalized in the way how languages are organized (see also Alday et al., 2014, on the reflection of actor-oriented processing in language). The agent-principle or actor-strategy is among the most well-known principles or mechanisms shaping grammar and language processing. Arguably, there are more of these constraints in cognition and language.

Such constraints have in common that they bias the way in which we interpret and process language – in line with our (species-biased) view of entities, events and relations

in the external world. In general, biases are the result of heuristics (sometimes described as "mental shortcuts") that are used to reduce the amount of information that needs to be assessed in order to make decisions or interpret events (for an overview and some insights into recent work on the neural basis of such mechanisms, see Korteling et al., 2018). Biases are well-known to be at work in human decision-making, but arguably this mechanism is also reflected in human information processing, including language processing. However, the notion of *bias* in accounting for linguistic structure goes beyond the "traditional" perspective of the cognitive-psychological (so-called "heuristics and biases") perspective (e.g., Tversky & Kahneman, 1974, for a discussion of different perspectives on this type of biases, see the introduction of the article by Korteling et al., 2018) that assumes biases and heuristics to be at work in case of uncertainty (particularly in decision-making processes).

Arguably, biases shape the way in which language is processed and this should also be reflected in structuring of language. In this sense, linguistic principles entail some notion of conventionalized biases that are species-specific (quasi-universal), tightly connected to cognition and reflected in predictions of upcoming linguistic input. Therefore, this type of (wide scope) biases should probably appear in form of high-level predictions underlying some aspects of how events and relations of participants are structured in language, i.e., affect argument structure and discourse relations. I cannot elaborate on this issue further, yet I would like to stress that models of language should develop a notion of conventionalized biases that are in line with recent cognitive notions and the understanding of the mechanisms of biases in human thinking. Also, biases are another aspect that needs to be included in a broader model of prediction in language. Finally, biases and bias-based predictions clearly influence the prominence assignment of linguistic elements and should also be considered in more detail.

The third aspect highlighted by Himmelmann and Primus (2015) is that attention (as well as prominence) typically selects among a group of equal elements, with respect to prominence equally ranking linguistic elements. Importantly and in line with the first aspect, there is not one single function or form that can independently establish salience or prominence. Rather, the interplay of different cues (at different levels), the general context and the perceiver as "participating observer" with human-specific (and arguably in addition individual) biases determines the attentional centring to particular elements.

These ideas are also in line with the broader discussion in the cognitive sciences, arguing against pure (bottom-up) feature-detection models of perception. In simple terms, such models would predict that the most salient stimulus in the environment is the stimulus that humans attend to, i.e., the perception of an element depends largely on its externally established salience. As was outlined above, more recent accounts emphasize the role of top-down inferential processes (in cognition and the brain) that largely control and identify what is being perceived. In such accounts, not the most salient element from the environment receives our attention, but rather those elements that are not in line with our pre-determined models of the external word.

Thereby, the purpose of attention is to reduce deviations between our models and the incoming sensations (for a general introduction to the theories and cognitive mechanisms associated with these accounts, see Hohwy, 2013). These top-down mechanisms are constantly evaluated in the light of incoming information. As was said above, different cues shape the perception of elements as being salient (or prominent in the linguistic sense). A

particularly interesting line of research in this regard is the question as to what extent different modalities interact in determining attention, i.e., if cross-modal cues affect language processing, in light of which general salience might affect how linguistic prominence is processed. A well-suited candidate for such cross-modal investigations of language is the visual domain.

7.3.2 Visual attention and structural choice

In general, it is widely acknowledged nowadays that language is a complex cognitive system that interacts closely with other cognitive domains (and not a stricly modularly operating system). Interestingly, this is not only true in regard of perception and attention-orienting in the auditory domain; it also holds in regard of processing visual information of the environment. There is some evidence that (non-linguistic) attention-orienting processes and language are closely interconnected: "Directing attention via referential and perceptual priming causes people to construe a scene in a particular way and typically this is reflected in the linguistic structures people use" (Ibbotson et al., 2013, p. 457). In describing the real world with language, visual cues ("stimuli" in that sense) can affect the choice of an appropriate linguistic response. The way we perceive our surrounding world visually can affect the way we describe the world with language. This even goes to the level of linguistic structural choice (hence, choice of particular grammatical constructions) in language production.

For example, if you watch a real life situation (e.g., you see a dog chasing a cat in the park) differences in how you attend to this event and how you perceive it might alter the way you describe the event to another person. In English, most people would probably use an active voice sentence ("The dog chased the cat") when they observed the whole event at once. If, however, attention is focused on particular parts of the event or shifted while perceiving the event, it is possible that these differences in attention are also reflected in the structural choice of linguistic constructions to describe the event. If the cat is seen first and the chasing by the dog is just perceived consecutively, chances are that English speakers would rather use a passive voice sentence ("The cat is chased by the dog") instead of an active sentence. This example suggests that subtle nuances in attention (driven by visual and contextual factors) can impact not only how we perceive events, but also how we describe them. This intuition is used in visual cueing paradigms testing the impact of visual cues on the structural choice in language (typically in production).

7.3.3 Visual cueing paradigms

Visual cueing (or perceptual priming) studies show that visual attention can directly affect language production (for example Gleitman et al. (2007), Tomlin (1997)). These experiments are a linguistic adaptation of Posner et al. (1980)'s visual cueing paradigm (Myachykov et al., 2018). In the classical Posner paradigm, an object (a box or circle, for instance) appears either on the left or on the right side of the screen in an experimental setting. The position of the object is cued by a star or arrow before appearing. In a typical experiment of that kind, the position is most often validly cued beforehand, whereas in a smaller number of cases, the position indicated is not the real position at which the actual object appears. Congruent cueing (i.e., high cue validity) of the position leads to faster and more accurate responses.

Similarly, in the *fish film* experiment by Tomlin (1997), participants see two fish approaching each other from two sides of the screen and finally one swallowing the other. Visual attention is cued by an arrow pointing to the eating fish (agent) or the eaten fish (patient). Participants have to describe the event in the trial. It was shown in various languages that cueing the one or the other fish led to significant different sentence choices: In English, when the patient fish was cued as the (visual) centre of attention, participants used more likely a passive construction, in Russian (topical) object-first sentences were selected (Myachykov & Tomlin, 2008).

Two recent studies investigated the effect of visual cueing on sentence production in German in more detail (Esaulova et al., 2019, 2020). In both studies, participants were presented visually with depicted event scenes showing two referents in a transitive situation. Participants were asked to describe the event with one-sentence descriptions (and additionally, their eye movement was measured). The pictures either showed two animate referents or one animate referent acting upon an inanimate referents. In half of the trials, the patient of the event was cued with a small circle appearing in the position of this referent, before the actual image was shown. Esaulova et al. (2019) report that events with animate patients received more looking (in terms of eye movement) and elicited more passive sentences. Visual cueing also caused more looks to the cued referent, but did not affect the structural choice (did not cause more passive sentences).

In contrast, Esaulova et al. (2020) used a more explicit patient cueing, by presenting an image of the patient referent before the event image was shown. This type of cueing elicited more passive sentences (however, a difference was reported depending on the position of the patient in the depicted event with the passive-production effect only occurring for left-positioned referents). They concluded that German has a comparably strong agent-preference and argue that visual cueing is less effective in eliciting non-canonical structures in comparison to the previous studies on English or Russian.

These studies suggest that attentional cueing even causes the participants to use more complex structures, despite their lower occurrence in non-cued language production.[62] This is also curious with respect to prominence. The latter is perceived as a conventionalized (linguistic) process, i.e., it is acquired in the course of language acquisition.

The studies shortly mentioned so far were all concerned with language production with focus on a speaker describing an event. However, a particular event and the cueing of a referent of this event should also engender certain (structural) expectations on behalf of the listener. In particular, when visual cueing influences the perceived salience of a participant in an visual event description, it could be the case that this interacts with the role and prominence assignment in a matching sentence. Since I am concerned with a linguistic encoding strategy that seems to be intimately associated with the (perceived) prominence of a particular referent, one could expect that visually cueing the salience of this referents

[62]Interestingly, the sensitivity for attention-dependent structural choice was already shown to be present in 5-year old children (Ibbotson et al., 2013). Processing the visual cues as well as choosing the appropriate structure requires a sufficiently functional (visual) attentional system as well as advanced language acquisition to perform the typical (language-specific) pattern. It is still an open question how this interface evolves over time and how attention development and language acquisition contribute to this particular outcome. In order to shift attention to various details of an event and to consequently choose an appropriate linguistic structure to describe the event requires both elaborate development of the cognitive attention system as well as successful acquisition of the respective linguistic structure (Myachykov et al., 2018).

causes some interaction with this strategy.

Therefore, the final experiment of this dissertation is concerned with the visual cueing of referents in an event in which two participants interact. In contrast to previous studies, I did not focus on the production of an event description of the subject, but rather investigated their behaviour when they encountered different types of event descriptions (with two different linguistic structures). I measured the effect on accuracy in comprehending the sentence after they were presented with a visual cue and the depicted event, the reaction time to the choice and – to shed some light on the "on-line" behaviour of the cueing when they read the sentence – the reaction time per word with the help of self-paced reading.

7.4 Visual cueing experiment

Preliminaries and hypotheses. For the purpose of this study, I adopted the visual cueing paradigm presented above and used the visual stimuli material from Esaulova et al. (2019, 2020). At the beginning of each trial, participants saw one of two referents of an event (as an overt visual cue), then they saw the depicted event and read a sentence matching the event description in a self-paced reading (SPR) format. The respective sentence either used an agent-oriented form (canonical SVO) or a patient-oriented structure (pre-verbal DOI/ OVS).

In addition, either pairs of masculine referents or pairs of feminine referents were used. Due to the remains of the case system, masculine referents are overtly flagged for nominative or accusative case. The reading reaction time per word was measured in form of a self-paced-reading button press format. In addition, participants had to answer a comprehension question to evaluate the accuracy in correctly assigning roles based on the event description.

This study deviates from previous visual cueing paradigms in two ways. On the one hand, referents were not cued by indicating their position with a symbol before the depicted event was presented. Referents were cued by presenting them for a short amount of time prior to the event itself being presented as another picture (a procedure similar to Esaulova et al., 2020, but with larger presentation times in my study). The underlying idea of this procedure was to match what could as well have been achieved via textual context more closely. In textual context, prominence of a referent can be established by repeated mention and by singling out either of two or more referents.

By presenting one of the two referents beforehand, I assumed that this leads to a slight cueing effect with respect to making this referent more salient (and therefore, making it more licensable for prominence-related operations). On the other hand, I did not use a production paradigm. I presented the participants with sentences that matched the event description. Half of the sentences were simple canonical SVO sentences with the agent inhabiting the subject position. This was contrasted with event descriptions that put the patient in the sentence-initial position and used differential object indexing for this patient (for details, see the materials section below).

The primary focus of this study was to investigate the interaction of visual salience (triggered by the visual cue) and linguistic prominence (triggered by DOI as a potential prominence cue). Therefore, this last study is highly exploratory in scope and design. I hypothesize that object cueing affects the processing of pre-verbal DOI in several ways. Object cues should arguably improve accuracy and reduce reaction time to giving an

answer to the comprehension question (since the visual cueing and the linguistic cueing match this interpretation). With respect to self-paced reading reaction times per word, a mixed pattern should emerge. Arguably, object cues should improve the reaction time when the first NP presented is the patient of the sentence. After a matching of the visual cue and the first NP, the presence of the object index should reduce reaction time to this element.

It could be the case that the pattern described is different for masculine and feminine referents, since masculine referents are additionally flagged within the nominal phrase. However, since I did not investigate the association of flagging and cross-indexing so far, I cannot formulate clear predictions with respect to that. This study is a first attempt to investigate the interaction of visual salience manipulated by visual cueing and differential object indexing in Bulgarian.

Participants. In total, 38 native speakers of Bulgarian were recruited for this experiment on *Prolific*. Unfortunately, twelve participants had to be excluded from the analysis because they failed on attention checks in form of easy-to-answer grammatical filler sentences with unambiguous event descriptions. The remaining 26 participant (15 females, 57.69 %) had a mean age of 28.96 (*SD* = 6.12). Participants received a per hour payment of 10.50 Euro.

Materials and design. For this study, I used visual material adapted from Esaulova et al. (2019, 2020). The visual stimuli are illustrated in figure 39 and the respective two sentence options presented in example 69. The experimental data (raw data and analysis scripts) of this experiment are publicly available at https://osf.io/c9wjb/.

Figure 39

SPR experiment: Illustration of visual stimuli

Object cue *Subject cue*

Depicted event

(69) SPR experiment: Illustration of target sentence stimuli

a. Canonical SVO condition
Vešticata e butala friz'orkata
witch-ART.SGF be.PRS.3SG push-PTCP.F hairdresser-F-ART.SG.F
'The witch pushed the (female) hairdresser.'

b. OVS condition (pre-verbal DOI)
Friz'orkata ja e butala vešticata
hairdresser-F-ART.SG.F 3.SG.F.ACC be.PRS.3SG push-PTCP.F witch-ART.SGF
'The witch pushed the (female) hairdresser.'
(theoretically also: 'The (female) hairdresser pushed the witch.')

In total, I used 48 different visual event descriptions. 12 pictures showed feminine referents and 12 pictures showed masculine referents interacting with each other. These 24 pictures were also rotated as mirror-images, leading to 48 visual target stimuli for the experiment (with each event being used twice in different directions). The additional 24 filler pictures always combined a human referent and an inanimate entity, with the person operating on the inanimate object. In total, each participant saw 72 events. For the creation of visual cues, the respective referent (incl. the inanimates) were extracted and additionally presented as stand-alones (see procedure section below).

Based on the visual events, textual event descriptions were developed for the purpose of this study. Each sentence contained a very simple structure, consisting of a first NP, an object index (in the OVS) condition, an auxiliary, a participle verb and a second NP. After the event picture, the respective sentence was presented (either with SVO order or OVS/ pre-verbal DOI). In the example set, there are two different single-referent pictures (either the *hairdresser* or the *witch*). One of the two is the subject-to-be of the event (in this example, the *witch*), the other one being the object of the event (*hairdresser* in this example). In each event, either feminine or masculine referents were paired (not mixed). The event descriptions in the fillers were matched by unambiguous sentences that also served as attention checks.

The combination of two different visual cues (either cueing the subject-to-be or the object-to-be of the event picture and target sentence) with two different sentence structures (SVO and pre-verbal DOI/OVS) led to four different conditions. In addition, since masculine referents and feminine referents were used, two different groups are included in this study. Masculine referents were overtly marked for case by flagging (both on the subject and the object, in both target sentence types), whereas feminine referents were unflagged. For the overall analysis, gender was included as a factor. Subsequently, analyses were conducted for both groups separately. Technically, this experiments contains 2 times a 2x2 design with the factors CUE and ORDER (with order entailing DOI) or a 2x2x2 design in the full analysis with the factors GENDER, CUE and ORDER.

Procedure. The general procedure using Prolific, jsPsych and Pavlovia was the same as in the previous cue validity and the reaction time study. For details, see section 5.4. For the purpose of this study, a particular plugin for self-paced reading was used based on the course by Kenny Smith (https://kennysmithed.github.io/oels2021lot/oels_practical_monday_part2.html).

On the first page of the study, participants were informed about data stored and processed in this study. In order to proceed, people had to give their consent. Thereafter, a few demographics were collected (gender, age, second mother tongue, if applicable). When participants started the experiment, the screen automatically changed to full-screen mode. Consecutively, the instructions were presented and participants were asked to start the four exercise trials. After the exercise, participants could take a short break and then start the actual experiment where they saw 72 visual cues, event pictures and 72 sentences with a subsequent comprehension question. The presentation of the stimuli was fully and individually randomized by *jsPsych*.

Each trial started with a fixation cross (size: 50 points, duration: 500 ms) on a white screen, followed by a blank screen for 500 ms. Then, the visual cue (either cueing the subject or the object) was presented for 700 ms, followed by a short blank screen for another 500 ms. Then, the event picture was presented for 3000 ms, after which a button appeared, prompting the participants to push it when they were ready to read the respective target sentence. The sentence was presented in a self-paced reading format, i.e., participants had to press the space key to read the next word. At the end of the target sentence, three question marks appeared for 700 ms, indicating that the comprehension question turned up. The comprehension question asked for the agent or the patient of the sentence and had to be answered by pressing "e" for yes or "i" for no. After they answered the question, a new trial started. Since participants could take a break between the visual presentation and the beginning of the self-paced reading, the stimuli list was not split into blocks with fixed breaks.

Statistical analyses. The pre-processing of the raw data as well as the statistical analyses and the plotting were conducted in *R* (R Core Team, 2019). In the pre-processing script, data for each subject were inserted and combined into one list. Trials with a reaction time (to the comprehension question) of more than 3000 ms or below 100 ms were excluded from the reaction time data; leading to the exclusion of 297 trials of the 1248 trials in total for reaction time to choice, eight out of 1248 for reaction time to the first NP, three for the verb and 44 for reaction time to the second NP.

Based on the data, means and standard deviations were calculated for each independent variable (accuracy, reaction time to choice and reaction time per word of the sentence) per subject and condition. The mean reaction times per word from the self-paced reading task were plotted in a point plot (with connected lines to highlight differences between the conditions). Each of the independent variables was entered into linear mixed effects model using the *lmer()* function from the *R* packages *"lme4"* (D. Bates et al., 2015).

Each model included the fixed factor CUE and ORDER (i.e., pre-verbal DOI), random effects for subject and item as well as random slopes for ORDER to account for different general rating scalings per subject. Additional group-level linear mixed effects models for the interaction of CUE and ORDER were calculated for each type of grammatical gender. For the word positions with significant interactions, additional raincloud plots were plotted to visualize the effect.

Results. The means and standard deviations for each dependent variable are summarized in table 37. Reaction times per word are additionally plotted in figure 40.

Accuracy of choice is generally better for sentences with SVO order (irrespective of gender or cue), ranging between 93.59 to 96.79 % than for sentences with OVS/ pre-verbal

DOI (range: 87.82 to 92.92 %). With feminine referents, the presence of an object cue decreases the accuracy, both for SVO (from 96.79 % to 94.87 %) and OVS (from 92.95 % to 90.38 %). The opposite is true for masculine referents. Here, the presence of an object cue improves accuracy for OVS (from 87.82 % to 89.10 %) as well as for SVO (from 93.59 % to 94.87 %). With respect to reaction time to choice for feminine referents, reaction time was the fastest for OVS after object cues (M = 1564, SD = 654), followed by SVO after an object cue (M = 1614,SD = 628) and slower after a subject cue (with OVS after a subject cue being the slowest condition in terms of reaction time to choice). For masculine referents, the choice was quicker with subject cues (SVO: M = 1585, SD = 587; OVS: M = 1584,SD = 650) than for object cues (SVO: M = 1600, SD = 643; OVS: M = 1634,SD = 654). Interestingly, however, after a subject cue, OVS was quicker and after an object cue, response to SVO was quicker.

Table 37

SPR experiment: Means and standard deviations

condition		Accuracy in %		Reaction time in ms NP1		OI		AUX		V		NP2		to choice	
		M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
feminine referents															
subject cue	SVO	96.79	18	571	292			403	172	442	291	600	496	1652	605
	OVS	92.95	26	675	376	458	176	410	176	544	359	701	482	1703	683
object cue	SVO	94.87	22	610	353			434	261	485	350	611	453	1614	628
	OVS	90.38	30	586	298	457	249	400	252	475	274	649	465	1564	654
masculine referents															
subject cue	SVO	93.59	25	608	360			439	209	441	262	640	478	1585	587
	OVS	87.82	33	635	419	507	402	408	211	516	321	767	576	1548	650
object cue	SVO	94.87	22	639	371			461	251	461	309	673	539	1600	643
	OVS	89.10	31	680	426	476	289	411	181	497	308	696	516	1634	654

For the single reaction times per word a more consistent picture emerges for both genders (as visible in figure 40). For SVO sentences, the presence of an object cue slows down reaction time for each word (to different degrees). This difference is slightly more pronounced for feminine referents. In contrast, in OVS the object cue speeds up reaction time for almost every word (except for the NP1 position with masculine referents that additionally carries flagging).

In the first analyses, the interaction of all dimensions (CUE, ORDER and GENDER) was tested. In table 38, only the models that reached significance are provided. In general, there is a main effect of order on accuracy and the reaction times for the auxiliary, the verb and the second nominal phrase. There is a significant effect for the interaction of cue and order at the verbal position ($\chi^2(1) = 4.08$, $p = .043$). At the position of the first NP, the interaction of all three independent dimensions was significant. At the position of the object index (OI), there was no significant main effect or interaction effect. Note that this is not indicative of no interaction of the visual cue and the object index, since interaction effects on self-paced reading may occur slightly shifted in time (i.e., the button presses are potentially slowed down or speeded up on the following words).

Figure 40

SPR experiment: Reaction times per word (button press)

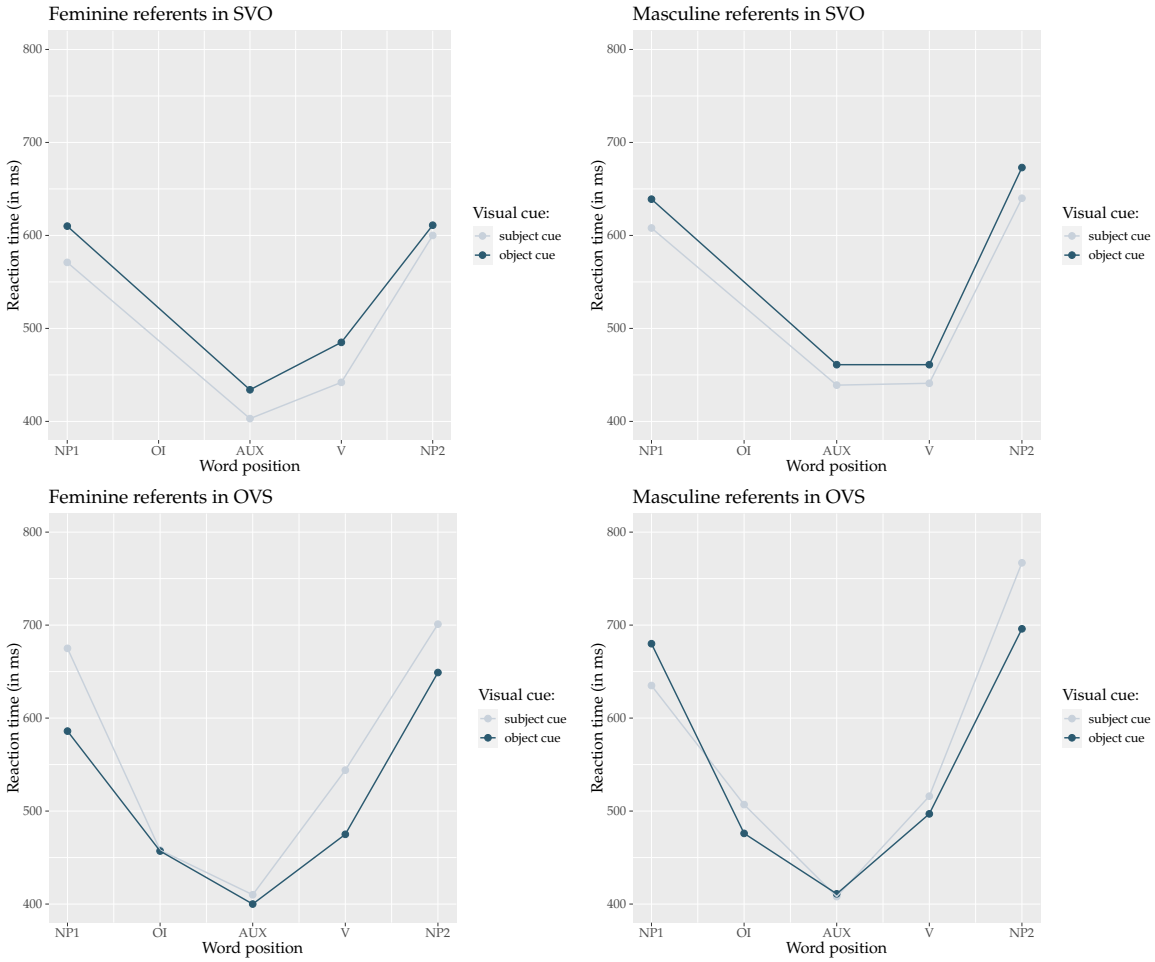


Table 38

SPR experiment: Main and interaction effects for cue, gender, and order

		reaction time					
	accuracy	NP1	OI	AUX	V	NP2	choice
cue							
gender							
order	$\chi^2(1) = 4.86$, $p = 0.028$*			$\chi^2(1) = 5.65$, $p = .017$*	$\chi^2(1) = 14.16$, $p < .001$***	$\chi^2(1) = 6.38$, $p = .012$*	
cue*gender							
cue*order					$\chi^2(1) = 4.08$, $p = .043$*		
gender*order							
cue*gender*order		$\chi^2(1) = 4$, $p = .046$*					

In order to investigate these effects further and with respect to the fact that the gender difference also reflects a difference in additional flagging, group-level comparisons were conducted for masculine and feminine referents separately. The significant results of these models are highlighted in table 39. For masculine referents, only a few order effects were significant, but no effect of cue or the interaction reached significance. In contrast, for feminine referents there was a highly significant interaction of cue and order at the position of NP1 ($\chi^2(1) = 7.48$, $p = .006$) and a significant interaction at the verb ($\chi^2(1) = 4.23$, $p = .040$).

Table 39

SPR experiment: Main and interaction effects for cue and order per group

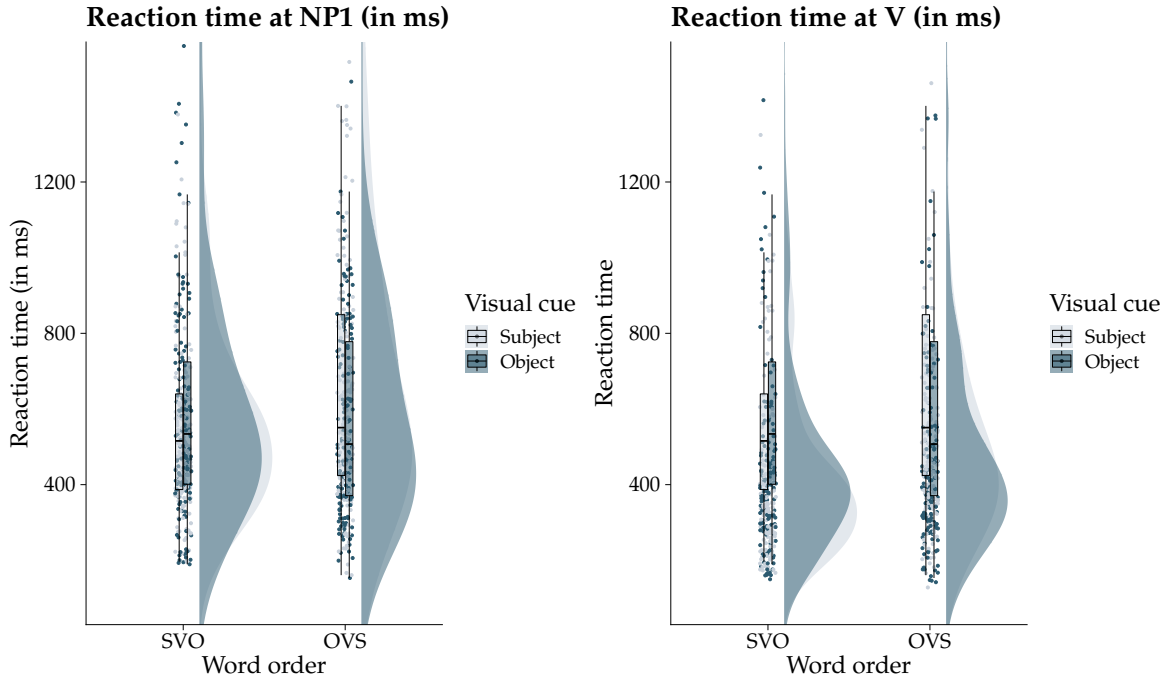
		reaction time					
	accuracy	NP1	OI	AUX	V	NP2	choice
feminine referents							
cue							
order					$\chi^2(1) = 3.98$, $p = .046$*		
cue*order		$\chi^2(1) = 7.48$, $p = .006$**			$\chi^2(1) = 4.23$, $p = .040$*		
masculine referents							
cue							
order	$\chi^2(1) = 5.07$, $p = .024$*			$\chi^2(1) = 6.29$, $p = .012$*	$\chi^2(1) = 8.98$, $p = .003$ **	$\chi^2(1) = 4.08$, $p = .043$*	
cue*order							

The effects for feminine referents are additionally plotted in figure 41. For SVO, the type of the cue did not play a huge role, but object cues slightly increased (i.e., slowed down) button press reaction time at both positions. For sentences with pre-verbal DOI (OVS) however, the object cue speeded up reaction time for NP1 (before the object index was examined) and for the verb (after the object index was presented). The interaction

effect can be nicely illustrated at the verb. Here, order of the sentence affected the reaction time for the verb ($\chi^2(1) = 3.98$, $p = .046$), with OVS increasing reaction time by 85 ms (±30 standard errors). However, the significant interaction of an object cue and OVS ($\chi^2(1) = 4.23$, $p = .040$) decreased reaction time by 83 ms (±40 standard errors).

Figure 41

SPR experiment: Raincloud plots for significant interactions



Discussion. This exploratory experiment yielded a couple of different effects with respect to the dimensions that were measured. The presence of a visual object cue reduced the accuracy (as response to the comprehension question) slightly for sentences with feminine referents in comparison to visual subject cues (irrespective of the sentence structure). The opposite effect was found with regard to masculine referents, where cueing the (future) object of the event slightly improved accuracy for SVO as well as OVS sentences.

For reaction time to answering the comprehension question, no strong differences occurred. For the self-paced reading reaction times, a more consistent picture emerged for feminine and masculine referents. SVO was processed faster after subject cues (reflected in the button presses per word), whereas OVS was processed faster after object cues. Divergent cue and order combinations (i.e., OVS after subject cues or SVO after object cues) slowed down the SPR reaction times.

For feminine referents, the reaction time at the object index was comparable irrespective of the visual cue. For masculine referents, the reaction time was lower (faster) after a visual object cue. For feminine referents, object cues (significantly) decreased reaction times for NP1 and the verb. In sum, there are three main results identifiable in this pattern with

respect to the effect that visually cueing the patient or object exercises on sentences with pre-verbal DOI. Object cueing causes the following effects:

1. OVS is read faster with feminine referents (but slightly less accurate) and with masculine referents (but more accurate)

2. Object indexes are read faster with masculine referents but not with feminine referents

3. (Before encountering the object index: Reading the first NP and the verb is significantly faster with feminine referents)

The first main result suggests that cueing the object facilitates the processing of sentences with pre-verbal DOI and object-initial order, at least in terms of reaction time. The differences in accuracy for feminine referents are not fully supportive of this picture, but are comparably small to draw conclusions. The positive effect of "context" is in line with the well-known finding that supporting context improves the processing of (dispreferred) object-initial orders (see the short discussion in chapter 6 and for example Kaiser & Trueswell, 2004, as one of the classical studies on this issue).

Also, this finding complements the visual cueing production studies discussed in the introduction to this experiment that showed that visual object cueing increases the likelihood of the speaker to select a patient-prominent or object-initial order (e.g., passives in English, object-initial sentences in Russian, etc.). My study provides some initial evidence that visual cueing can also influence the processing of such sentences in language comprehension, as is visible in different behavioural responses (accuracy of choice and reaction times).

Differences between feminine and masculine referents and the other two main results can possibly be explained by examining the role that the visual cue, the masculine flag and the object index play on the the time-course of interpretation. Arguably, there are two slightly different processes reflected in this pattern – most likely due to the additional flagging of the masculine referents. The potential course of interpretation is sketched in table 40 for the interaction of the object cue and OVS sentences. For the purpose of this sketch, let us assume that the visual cue, the flag and the object index are comparably serving as attentional cues for the role and relational interpretation.

At the beginning, the visual cue serves as a first attentional cue that *(pre-)selects* one out of two referents that play a role in the subsequent trial. At the NP1, this initial selection is *confirmed*, yet differently for the two genders. Feminine referents are only matched in terms of identity. The visual cue increased attention to this referent and the NP lexically confirms that something is going on with this referent. In contrast, the masculine referent is matched by identity and by relation (i.e. the overt case morphology). Since the object cue slightly suggested to pay attention to the object of the depicted event, now this role association is matched by the flag that confirms the probative association.

In the following, the object index also contributes differently to the interpretations developed so far. For the masculine referents, the object index only *(re-)affirms* an interpretation that was already established unambiguously by the visual cue and the flag before. The singling out of the respective object took place before; therefore, the object index is processed much quicker here, because it only weakly contributes to an interpretation that

Table 40

SPR experiment: Potential course of interpretation with object cues and object indexes

Gender	Visual cue	NP1	OI	Remaining sentence
feminine	single out →	match identity (lexeme) →	elevate	
cue for interpretation & attention	Cue 1		Cue 2	
reading behaviour		faster	slower	faster
masculine	single out →	match identity (lexeme) → + specify relation	elevate	
cue for interpretation & attention	Cue 1	Cue 2	Cue 3	
reading behaviour		slower	faster	equal

was already fixed (and the rest of the sentence is processed in a comparable time as for subject cues). Interestingly, the "redundant" use of the object index in this case is not causing additional processing costs as potentially reflected in a slower reaction time.

In contrast, for feminine referents only attention was cued to one referent and the attention to this referent was confirmed, but without a strong support for a particular role and relation assignment. Now, DOI serves as the first cue in the sentence that strongly affirms the role of the object. Therefore, processing of the object index is slowed down, but subsequent processing of the sentence is speeded up because the interpretation is clear now, since both attentional cues support the object initial interpretation and the role of this referent. In other words, the visual cue engenders some attentional selection (or singling out) of one of two referents (without any indication of the relational structure).

Subjects pay attention to this referent throughout the sentence and match the attentional assignment with the sentence structure. For masculine referents in OVS, the first nominal phrase with flagging directly affirms the attention on this referent and also specifies the relational structure. Here, the object index does not contribute much as an additional attentional cue, because both the attentional and the relational assignment are already made clear before (i.e., the selected referent is prominent and the object of the sentence).

For feminine referents, attention to this referent is held up, but it is not clear until the object index in which relation the referent in attention serves. Therefore, the object index as an additional attentional cue supports this. Arguably, this could also explain the lower accuracy for feminine referents. Here, only two (attentional) cues operate on the referent, whereas three cues contribute to the status of the masculine referents. This interpretation is an attempt to explain the pattern found in the results. To some extent, the results of this experiment suggest that visual cueing (that directly affects attention) interacts with

DOI in that it singles out and operates linguistically on a particular entity. The pattern is different when other cues (flagging and overt OVS order) interact with this interpretation. This study only provided a basic exploratory way to investigate these mechanisms. The evidence shows that visual cueing and DOI interact, but the effects clearly require more elaborate investigations.

In addition, this experiment had a number of limitations that need to be addressed in subsequent research. This design probably captured the connection of discourse prominence and DOI that I proposed in this book only to a minor extent. As was stated throughout this book, I assume that DOI primarily targets referents at a medium level of prominence and this typically requires some competition with referents of different prominence levels. However, in this study, I only used a very basic contrast of agent and patient. Either the future agent or the future patient of the event depicted in the image and presented in the target sentence was cued visually. It is not clear if this is sufficient to uncover associations of visual attention cueing and DOI. More fine-grained manipulations of more referents are required to address this issue. Due to the inclusion of three factors, the number of trials per actual condition was comparably low. Also, I only used 12 different event descriptions as targets (and their mirror counterpart).

In total, the number of trials was comparably low as well. This was unavoidable, given that web-based experiments typically have a higher drop-out rate to ensure motivation to participate (nevertheless, the high exclusion rate suggests that this task was comparably complex and strenuous for many participants). Also, in this study, no pre-set breaks or a split of the trials into several blocks was included. Breaks were only possible between seeing the pictures and reading the text. This was definitely not an ideal scenario. On the one hand, this could lead to some participants not using breaks at all (with negative effects on the response quality) or – even worse – could confound potential cueing effects of the visual cue on the text when participants did take a break at this position. On the other hand, the high accuracy for each condition still shows that participants diligently conducted this experiment. Nevertheless, future research should improve these limitations to make the experiment more user-friendly and ensure a better data quality.

All in all, this experiment clearly identified some (significant) interactions of visual cueing on the interpretation of different sentence structures. In particular, some indication was found for an interaction of the visual cueing and the differential object index – both arguably being related to the attentional system due to the association with salience and prominence, respectively. Both are indicative of their comparable drawing on cognitive mechanisms associated with attention.

7.5 Chapter conclusion

The purpose of the last two experiments was to shed light on some processing aspects related to differential object indexing. The first experiment investigated the time-course and neurophysiological patterns associated with processing indexing, whereas the second experiment provided a first attempt to scrutinize the interplay of visually manipulated salience and DOI as a marker of discourse prominence.

The ERP study found a modulation of discourse linking and discourse updating after an object index was encountered in sentences with pre-verbal DOI – reflected in a reduced N400 and a reduced late positivity, in comparison to reference mismatches and agreement

violations that do not lead to successful discourse linking and updating. This modulation can be attributed to the acclaimed function of DOI as a prominence-lending cue for object referents in discourse. The combined visual cueing and self-paced reading study found some evidence that DOI reacts sensitively to modulations of attention induced by cueing visual salience. This effect was stronger for sentences with feminine referents, in which DOI was the only cue in (re-)affirming the objecthood and discourse prominence of a sentence-initial object. The presence of an object index facilitated the speed of processing such sentences in interaction with the visual cue, suggesting a joint interaction of visual salience and linguistic prominence and highlighting their role as attentioncal cues.

Both experiments were not directly concerned with the exact status of the discourse representations that triggers or determines differential object indexing, but illuminated processes or mechanisms that can be argued to be related to the shaping and processing of discourse representations. The first experiment illustrated the use of DOI for singling out and activating one out of two almost equally ranking referents in an object-prominent structure. It was shown that DOI operates on and can override predictions that are constructed at the level of discourse representations and subsequently engenders discourse updating toward a refined discourse structure.

The second experiment showed that DOI can take up and affirm the prominence of a referent that was visually brought to a more central position in attention. Thereby, the presence of the object index was more expected when previous cues suggested a more prominent status of the object (as for masculine referents, for which the visual cue and the flagging led to a faster reading time of the object index) or clarified the prominence assignment to the sentence-initial object (reflected in a faster reading time of the rest of the sentence). Crucially, even a simple cueing of a referent already interacted with the prominence assignment.

In chapter 4, I argued that differential object indexing in Bulgarian is primarily used to (re-)establish the (discourse) prominence status of a P referent whose status is uncertain or less predictable or to elevate the (discourse) prominence status of one out of several almost equally ranking referents. The ERP study clearly relates to these functions by singling out one out of two referents and even establishing the prominence status of a patient by overriding an assignment based on the agent-first principle. Also, there is some indication that the SPR experiment is in line with the first function, considering that it seems that the visual cueing alone was not sufficient in establishing the prominence status, but rather the interaction with DOI strengthened this assignment that had only already suggested ("cued") by the visual marking.

To some extent, the studies presented in this chapter are exploratory. Up to date, only few ERP studies addressed object indexing and specifically object cross-indexing. Also, DOI was not previously investigated with respect to visual cueing and cross-modal salience. Therefore, both studies provide a point of departure for future research that addresses some of the issues raised by these experiments.

Clearly, future research needs to extend these investigations by paying attention to the contextual affects modulating the use of DOI, both in pre-verbal and post-verbal object position. Also, research of this kind should also disentangle the function of the sentence-initial object as a topic marker and DOI as a prominence marker with respect to differences in the processing patterns and their sensitivity to salience.

Finally, more cross-linguistic empirical research on the processing and representation of differential object indexing is needed. Particularly the structural representations and associated processing patterns of form-function-pairs that are sensitive to prominence and predictability require further analysis in light of this particular perspective. For this purpose, there is a clear need for a robust conceptualization of predictability in language that can be applied to the analysis in the same way as prominence provides a framework for broad-scale investigations. The experiments presented in this chapter are a first step toward this endeavour with particular emphasis on object indexing.

8 Discussion and outlook

In this final chapter, I conclude my analysis and point out some additional observations that I made during the course of my investigation. I summarize the key aspects of my analysis and the main findings from my empirical investigation in section 8.1. In section 8.2, I present some thoughts on the role of predictability in language from a more general perspective and discuss some additional observations on dislocation based on my investigation to provide some input for future research on these two topics. I conclude this chapter by discussing some of the major limitations of my own investigation and point out directions for future research in section 8.3.

8.1 General summary

The general goal of this study was to account for a particular encoding strategy in Bulgarian that was previously described as object reduplication or clitic doubling. To account for this structure, I did not follow the traditional perspective of treating it as a structure *sui generis*. Instead, I focussed on the sub-components giving rise to this type of object marking and its interaction with word order as another means of marking an aspect of arguments.

For this purpose, I focussed on two specific components. I argued in line with the concept of indexing by Haspelmath (2013, 2019) that object reduplication is an instance of differential object indexing (Iemmolo, 2011; Schikowski & Iemmolo, 2015). Therefore, object reduplication is clearly a means of what is traditionally called *person agreement* or more generally *person marking*. This aspect was implicitly acknowledged in previous accounts, but not considered much with respect to the functional contribution of these person forms. There are other forms of (differentially) marking objects, yet object marking with indexes should bear at least some association with the primary function of person marking. It was shown that person indexing in general is associated with speech roles or highly accessible third person referents (Haspelmath, 2013) and person marking (or person agreement) is "primarily a means of keeping track of referents in the discourse via their index of features" (Siewierska & Bakker, 2012, p. 293). Explicitly taking object reduplication as a form of person marking was the point of departure for my analysis of Bulgarian DOI.

In addition, I elaborated on the differential aspect of DOI. The idea that object reduplication or DOI is an instance of differential object marking only received little attention in previous accounts and object reduplication was typically considered to be a marker of a particular category (most commonly, topicality). These accounts did not emphasize the aspect that DOI basically selects among a group of elements and targets a particular subgroup of objects – a notion that is more strongly emphasized by the concept of differential object marking.

I pointed out that differential object marking entails some evaluation of perceived deviance from a more proto-typically expected pattern, reflected in a lower predictability of the element that is marked by DOM. This evaluation can take place at different levels and with respect to different features. However, in the case of differential object indexing, it seemed logical to assume a differentiation with respect to discourse referents and discourse structure, since indexing as a person marker is directly related to this level.

Both perspectives conjoined point in the direction that DOI is used to select among

elements based on an evaluation of their status in discourse. Previous accounts typically assumed that Bulgarian DOI is associated with the topichood of an object. However, as I outlined in some detail, many of the accounts on Bulgarian express some intuition that goes beyond a classical information structuring account of topicality and rather points towards an association with salience and discourse status (with the backdrop that these accounts still stick to the concept of topicality, occasionally in a refined version of topic) (Leafgren, 1997, 2002; Ovcharova, 2018). Interestingly, the same idea is present in recent accounts on DOI in Spanish (Belloro, 2007, 2015; García-Miguel, 2015; Melis, 2018).

I pointed out that the idea to associate DOI with the salience and discourse structure of the respective referents and the fact that it concerns the selection or singling out of particular referents (in comparison to other referents) can be captured more adequately in a recent framework of discourse prominence (von Heusinger & Schumacher, 2019). For the purpose of my analysis, I adopted this framework and argued that the function and usage of DOI in Bulgarian can be described with this discourse-oriented prominence concept. In particular, I argue that discourse prominence is better suited to capture the function of DOI than the concept of topicality or adaptions of topic-related concepts.

In sum, I analysed differential object indexing in Bulgarian with respect to discourse prominence and predictability, assuming that these two principles directly reflect indexing (as a means of reference tracking) and differential marking (as a special encoding strategy). Based on this theoretical discussion and with reference to corpus evidence, I developed a definition of DOI in Bulgarian that is directly concerned with the sub-components and their acclaimed functional associations. In this dissertation, I argued that

> differential object indexing is a type of differential marking of a P referent by means of a person index in cases when there is a certain level of unpredictability with respect to the (re)establishment or elevation of the discourse prominence status of this referent.

In my analysis of corpus data and my empirical investigation of Bulgarian DOI, this primary function is reflected in two particular sub-functions. My evidence indicates that Bulgarian DOI is typically used to

- (re)establish the discourse prominence status of a P referent whose status is uncertain or less predictable, or
- elevate the discourse prominence status of one out of several almost equally ranking referents

In order to investigate the representation, function and processing of differential object indexing in Bulgarian further, I conducted ten experiments that I presented in the three chapters of the empirical section of this study.

In chapter 5, I regarded DOI as a linguistic cue in role interpretation and investigated the interaction of DOI with other cues, namely a semantic feature (animacy) and a syntactic means that can also be employed for argument marking (word order). I presented the results from three acceptability judgment studies and one web-based cue validity study that focussed on the interaction and correlation with these features. The studies in that chapter indicate that DOI is a comparably strong cue in Bulgarian that can be used unambiguously

to determine the patient role in a sentence. Importantly, there was no indication that semantic properties of the referent (animacy) play a strong role in interaction with DOI. Inanimate or animate referents can equally be selected with DOI and there is no preference for one or the other. Also, in interaction, DOI can easily override preferences built up via animacy. With respect to word order, the previously acclaimed general preference for object-initial orders with DOI was confirmed and it was shown that the interaction of both cues is relatively strong with respect to role interpretation. The experiments suggest that DOI can target all sorts of referents (as long as they are definite or specific), that the function of DOI must be comparably restricted in application and that it is clearly preferred in interaction with an encoding strategy that is well-known to mark topicality (order).

The experiments presented in chapter 6 were directly concerned with topicality and discourse prominence. The three acceptability judgment studies and the combined reaction time – acceptability judgment study provide evidence in favour of my theoretical analysis of DOI. Three studies challenged the topic marker perspective (acceptability judgment studies 4, 5, and 6) and the combined experiment provided evidence in favour of the discourse prominence perspective. In particular, the first three studies suggested that DOI cannot be (directly) related to the sentence topic (in the sense of aboutness) or to givenness (and indirectly topic). The final experiment indicated that DOI is not associated with the most prominent (and discourse-topical) referent, but with a second referent that had a medium-level prominence status lower than the discourse topic. The evidence presented in this chapter supports the perspective that DOI is more directly concerned with reference tracking in discourse and particularly the discourse prominence status of mid-level referents.

In chapter 7, I looked at processing aspects related to differential object indexing. The ERP study found a modulation of discourse linking and discourse updating after an object index was encountered in sentences with pre-verbal DOI – reflected in a reduced N400 and a reduced late positivity, in comparison to reference mismatches and agreement violations that do not lead to successful discourse linking and updating. This modulation can be attributed to the acclaimed function of DOI as a prominence-lending cue for object referents in discourse and relates to the function of DOI outlined in this study, by singling out one out of two referents and even establishing the prominence status of a patient by overriding an assignment based on the agent-first principle. The combined visual cueing and self-paced reading study found some evidence that DOI reacts sensitively to modulations of attention induced by cueing visual salience. This effect occurred more intensely for sentences with feminine referents, in which DOI was the only cue in (re)affirming the objecthood and discourse prominence of a sentence-initial object. The presence of an object index facilitated the speed of processing in interaction with the visual cue, suggesting a joint interaction of visual salience and linguistic prominence and highlighting their role as attentioncal cues. Both studies indicate the involvement of prominence-related as well as predictive mechanisms in the processing of differential object indexing.

The experiments investigated differential object indexing in Bulgarian from different angles and highlighted different aspects of this encoding strategy. The studies contribute to the idea that DOI is associated with discourse representations and that the singling out of particular referents in special contexts can be accounted for by discourse prominence. Particularly, there is support for the idea that DOI operates and interacts with referents

whose discourse representation entails a lower prominence status (in comparison to another more prominent referent) and whose prominence status needs to be elevated. A motivating factor to use this special encoding is most likely reflected in some evaluation of predictability of referents in a particular status. The special encoding with respect to discourse status deviances can be achieved by using the person index for objects, due to its close association with discourse roles. Person indexes are thereby comparably strong cues – as much as their subject-related counterpart verbal inflection.

My investigation supports the view that discourse prominence and some notion of predictability are involved in differential object indexing in Bulgarian. Nonetheless, my analysis leaves open one central issue with respect to these two principles. It is not clear if DOI should be perceived as a marker of discourse prominence (in the sense of being a marker of a particular prominence level) or rather if it serves as an attentional cue that marks the relative unpredictability of a less prominent referent with respect to the most prominent referent in discourse (i.e., highlighting a particular deviance in discourse prominence). To date, there is no systematic theory or concept of predictability in language. However, such an account is necessary to elaborate further on the cognitive representation of special encoding. This issue is even more intriguing when taking into account the idea that prominence and predictability bear some direct association with underlying cognitive mechanisms in terms of attention and prediction. In the following, I shortly summarize some of the general thoughts in this regard as they turned up in my investigation, in order to stimulate subsequent research in this direction.

8.2 Discourse prominence and predictability revisited

In this dissertation, I was mainly concerned with the functional representation and associated processing patterns of differential object indexing in Bulgarian. In order to account for this, I adopted the concept of discourse prominence (von Heusinger & Schumacher, 2019) and drew on the intuition that special encoding is conditioned by the predictability of an element in a particular surrounding (Haspelmath, 2021a).

The concept of linguistic prominence is directly grounded in general theories of attention and salience (Himmelmann & Primus, 2015) and I discussed this association at several points of my study. Attention is among the most central domains of cognition and its reflection in language is attributed for by the concept of prominence. In contrast, predictability is not captured in a consistent framework, although it is central to recent cognitive theories. Let me shortly point out why such a paradigm could contribute to the understanding of language.

Recent accounts in cognitive science as well as philosophy of mind assign predictive mechanisms a central role in cognition. These accounts are directly related to recent insights from the neuroscience that emphasize the particular role of top-down predictive mechanisms in the nervous system and attempt to provide a generalized perspective (Friston, 2010; Rao & Ballard, 1999) and conceptualize predictive processing as "a general computational principle which can be applied to describe perception, action, cognition, and their relationships in a single, conceptually unified manner" (Wiese & Metzinger, 2017, p. 2). The basic assumption in prediction-related accounts is that our "mind is shaped by how we manage these predictive efforts" (Hohwy, 2013, p. 258). Perception and information processing is presumed to be processed with a constant matching of the input to pre-

generated models of how the input will most likely look like. This general idea received a lot of attention for different cognitive domains, but was only sufficiently investigated for only a few cognitive domains (esp. visual perception). Investigating predictive processes at higher cognitive levels is a task for future research and the previous prediction-based research in the language sciences can provide a point of departure for this endeavour.

Interestingly, the idea that predictions underlie the way in which we perceive and make sense of the world also matches intuitions in different areas of linguistic research. I already discussed the role of predictability with respect to special encoding, but the participation of predictions in language goes probably far beyond this morphosyntactic process. The anticipation of features, words and structures in language does not hinge only on a cognitive mechanism but is also reflected in and by linguistic structure. When anticipating an upcoming word, people draw on rules of their language system, world knowledge, processing demands and context alike. If language were not guided by clear preferences and structural rules (that are equally anticipated), language would not be such an efficient means of communication. Therefore, prediction is not a phenomenon of processing alone, but rather reflected in the structures and principles of a language system itself. This intuition can be found independently of each other in different domains of language research. I want to illustrate this briefly with reference to two areas, namely neurolinguistics and typology.

In the field of psycho- and neurolinguistics, it is widely acknowledged that "language users predict upcoming language input" (Huettig, 2015). The current debate of prediction in language processing largely revolves around the question as to what extent this mechanism is used to predict upcoming material - ranging from the anticipation of specific elements in highly restricted contexts to the constant generation of predictions in the course of processing. With respect to my EEG study (presented in chapter 7), I already discussed the idea that particular neurophysiological correlates may be indicative of neurobiological predictive processing. This research area directly addresses the link between language and predictive processing as a cognitive mechanism associated with neural constraints.

However, the notion of predictability is not restricted to language processing, as I have shown in my dissertation. To the contrary, notions of prediction, anticipation, expectations and related concepts can be found throughout all areas of language research, independent of the cognitively inspired accounts. It is widely assumed in typology (not only with reference to special encoding) that language users build up certain preferences based on the frequency of using particular structures (Comrie, 1989; Haspelmath, 2021a). This view is in line with the idea of efficient coding (Hawkins, 2011), ultimately rooted in economy.

In addition, there are certain generalized principles that may derive from cognitive demands or other non-linguistic constraints (e.g., the previously discussed agent principle, see Bickel et al., 2015). Language systems (and processing) are ideally in line with these preferences. Deviations from these preferred patterns are pronounced as 'unexpected'. When the level of unexpectedness (or uncertainty) reaches a certain threshold, special forms of encoding are used.

In my analysis, I pointed out that differential marking is clearly determined by such processes. I related DOI to predictive processes in terms of structure and processing. In order to do so, it is necessary to combine insights from typology regarding underlying motivations and cognitive accounts postulating generalized mechanisms. Just like for

attention and prominence, it is fruitful to relate the principles derived from linguistic research to cognitive mechanisms identified by psycho- and neurolinguistic and general cognitive research. As should be clear by now, predictability is a notion in which both directions clearly converge and thus opens the way for a more interdisciplinary research.

In this dissertation, I showed how such a cognitive-typological investigation can determine the function of differential object indexing in a more plausible way. To give another example, similar insights can be achieved by comparing the general DOM perspective outlined in this study and neurolinguistic research on particular DOM markers. As was mentioned before, the Spanish *a*-marker indicates or highlights that the upcoming animate referent is the patient argument of the sentence. In line with the account by Schikowski and Iemmolo (2015), the marker itself is arguably not motivated by the thematic role or animacy alone, but instead motivated by the relative unexpectedness underlying the occurrence of an animate referent as P argument according to this particular perspective.

Interestingly, an electrophysiological study by Nieuwland et al. (2013) showed that the occurrence of an *a*-marker in front of an inanimate referent elicits a P600 (i.e., late positivity) component, whereas the omission of the same marker before an animate referent only elicits a N400 effect. This indicates that the presence of the marker builds up a strong expectation in form of a particular structure (that is violated when an inanimate referent occurs), whereas the presentation of an animate referent as the P argument without the marker engenders overall prediction errors that would have reduced by using the marker.

This example illustrates how a particular morphosyntactic encoding strategy is used to flag the deviance from a preference pattern present in the system and how this association is also reflected in the underlying processing pattern. Similar to my analysis, this example shows how theories derived from the observation of linguistic patterns may converge with our recent understanding of the organization of the brain and cognition.

Despite the centrality of predictive processes in recent cognitive models and the long-standing intuition in linguistics that such mechanisms play a role, the cognitive foundation of linguistic predictability is not developed extensively in current linguistic research (although, clearly, predictability as a mechanisms is acknowledged in psycholinguistics and proposals in this direction are made, e.g., Bornkessel & Schlesewsky, 2006, Bornkessel-Schlesewsky & Schlesewsky, 2019, Pickering & Gambi, 2018, Pickering & Garrod, 2013).

I cannot provide a unitary concept of prediction in language at this point, but I wanted to emphasize some of the commonalities between the idea of predictability in linguistic typology and neurolinguistics and would like to stress that both bear a clear resemblance with the general idea of prediction in cognition. Prediction in language is a highly relevant research endeavour for the future, because it provides a chance to bridge language patterns, cognitive mechanisms and ultimately neural correlates and has many connecting points with non-linguistic research in the cognitive sciences.

In my investigation, I attempted to account for the role of predictability alongside prominence as a structure-building principles associated with cognitive mechanisms that affect the usage of differential object indexing as a special encoding strategy in Bulgarian.

8.3 Directions for future research

Besides the need for additional research concerning the role of predictability in processing and structuring language, there is clearly a need for additional research on differ-

ential object indexing in Bulgarian and other languages. Finally, there are some directions for future research that turned up throughout my investigation. In the following, I shortly summarize some of the general issues of my analysis and state ideas and directions for future research.

Differential object indexing is a phenomenon with variability on different levels. In this dissertation, I restricted my analysis to the investigation of DOI with direct object or patient referents in mono-transitive sentences. Therefore, I cannot make claims about the object indexing of indirect objects or with other thematic roles, such as experiencers or recipients. Also, I did not investigate the occurrence of DOI in di-transitive sentences. Future research must show to what extent my discourse-based account of P indexing can be applied to R object indexing. It might be the case that the underlying motivations and the associated functions differ depending on the thematic role. Similarly, I only focussed on object indexing of noun phrases and did not investigate cross-indexing of long-form pronouns. Clearly, my analysis cannot be translated directly to this type of indexing, since the long-form pronouns are also person forms and marked for case. Therefore, the explanation for this structure must be different to some extent. In addition, the relation of direct and indirect object pronouns requires additional research and particularly the interaction of DOI with the indirect object marker *na* needs to be investigated in more detail.

In my account, I restricted myself to the comparison of DOI in canonical SVO and non-canonical OVS word order. However, as I stated in my analysis, there are other order alternations in Bulgarian that may appear with differential object indexing (especially verb-initial orders). Therefore, future research should address the issue as to what extent DOI interacts with structures that neither put the subject nor the object into the acclaimed topic-marking position. In addition, more complex order alternations in relative sentences and other sentence types (e.g., imperatives and questions) should be addressed. Ultimately, I excluded features of the verbal domain completely. It is in no way clear if differential object indexing interacts with tense, aspect or modality. This is of particular relevance in Bulgarian, because this language preserved a comparably complex tense and aspect system and – in addition – exhibits particular structures related to evidentiality and mirativity.

At the super-sentential level, I restricted the discussion to comparably small contexts with a limited number of referents. Clearly, in order to provide additional support for my analysis and to capture discourse prominence shifting at a closer look, analyses of larger pieces of discourse are needed. In particular, attention should be paid to the referential expression used for the object before and after DOI was used to alternate the prominence status. Similarly, since there was a frequent correlation with order alternations and topicality the interaction with other topic marking structures (e.g., prosody) should be investigated and other information structural categories taken into consideration. I restricted myself to a discussion of morphosyntax. I did not consider phonetic and prosodic aspects related to differential object indexing. At the phonetic level, the boundedness of the index to its verbal host requires more detailed analyses. With respect to function, prosodic marking in interaction with differential object index is a caveat for future research.

Throughout this investigation, I discussed dislocation as a related phenomenon. At the current stage, I assume that "classical" dislocation in the sense of H-type dislocation exists in Bulgarian. In contrast, I do not see a clear difference between clitic dislocation and

pre-verbal DOI, unless a clear prosodic boundary is expressed. There are two potential directions for future research in this regard. Either the two are indeed distinct categories with distinguishable functions or the two are basically the same and pre-verbal DOI/ clitic dislocation comes into being by the joint interaction of DOI and word order, as outlined in my analysis. Traditionally, dislocation is distinguished from DOI, but I have an intuition that the discourse-based cross-indexing perspective on DOI could also account for (at least some forms of) dislocation. However, to determine this question, additional research is necessary. On the one hand, prosodic analyses are needed to determine the extent to which intonational breaks are used and how closely the co-nominal is attached to the clause. On the other hand, more systematic research on the role and nature of the resumptive pronoun is needed, also taking more into account the syntactic diagnostics outlined in generative research. At this point, I cannot give a decisive answer on dislocation, but would like to emphasize that my analysis fits at least some observations with respect to dislocation.

At the extra-linguistic level, one important aspect which I only addressed superficially is the normatively marked character of DOI. I indicated that DOI is typically dispreferred in the standard language, although this traditional view is challenged by the more frequent occurrence in digital communication. Nevertheless, more systematic corpus analyses of modern standard language and web corpora are needed to make substantial claims about the usage and distribution of Bulgarian DOI in different genres, registers and text types. In particular, the intuition that DOI becomes more frequent in digital texts requires proof.

Although I derived my analysis from recent typological accounts, I restricted my own investigation to DOI in Bulgarian. I mentioned frequently that the situation in Bulgarian differs quite drastically from the situation found in the closest related language, Macedonian (at least at the level of standard languages). Comparative research on the two languages is needed, from a synchronic as well as a diachronic perspective. The idea typically stated in Balkan linguistics research that Macedonian is further grammaticalized towards an acclaimed end-point needs to be revised with respect to the observation brought forward by Haig (2018), namely that object indexing typically plateaus at the stage of differential object indexing. Additional comparisons with other Balkan and South Slavic languages – especially at the dialectal level – could inform this discussion.

It is of particular interest whether the analysis stated for Bulgarian can also account for DOI in other languages – particularly since I argued for the contribution of using indexing and differential marking, two aspects that clearly are present in all forms of DOI. Furthermore, I classified object reduplication within the much more widely found pattern of object indexing. Areal-independent research on object indexing is needed, considering that it received less attention in previous research than (the more frequently investigated) agent indexing.

There are a number of methodological issues in my investigation that need to be addressed by future research. I already mentioned specific ones with respect to the experiments and will not repeat them here. I only want to state some general methodological aspects that occurred in most or all experiments presented in this dissertation and that are relevant to consider in future investigations. I only used sentences in the written mode in all of my studies. This is clearly a problem with respect to the normatively induced avoidance of DOI in standard language and in the written modality. This did not inhibit the discovery of clear effects, but future research should apply the auditory domain to

make the experiments more natural. This could arguably license stronger effects or help detecting more fine-grained differences in the function and usage of DOI. The earlier studies of this project did not use context. This was acceptable for determining some of the formal interactions of DOI, yet later studies clearly increased in quality when adequate context sentences were used. Future research must ideally use even more complex context manipulations.

Due to an unfortunate situation at the time of the project, I had to restrict myself mainly to web-based research for this project. Web-based research is still novel to some extent and potentially caused some confounds that cannot be systematically accounted for. On the one hand, reaction time and response measures might be distorted due to different transfer rates, hardware and operating systems. Nonetheless, most studies clearly identified plausible patterns suggesting that web-based studies can adequately capture differences between conditions in experimental designs.

On the other hand, recruiting participants online causes less control of their behaviour during the experiment. I tried out different ways to ensure data quality and control for the attention of the participants. In the respective experiments, I outlined my experience. Additional, lab-based research should elaborate on some of the issues raised. Despite this limitation, this dissertation contributed to the general development of web-based designs in linguistics and clearly supports the idea that web-based research can (complementarily) be used, also for smaller languages and in investigations of rare structures such as DOI. Naturally, some studies were exploratory in a sense because the paradigms or designs were not attested before in web-situations.

In addition, DOI and special encoding in general clearly can and should be investigated further with profound neurolinguistic tools. Based on my theoretical analysis and mainly supported by web-based experiments, I explicated the involvement of discourse prominence-related and predictability-associated processes in DOI. I argued that both processes are related to cognitive mechanisms. Since already less web-based research identified these associations, future lab-based research could inform this even further. This is particularly relevant with respect to the role of predictability in language. As I stated before, linguistic prominence is a vibrant field of research and investigated from many different perspectives and with different methodological tools.

In contrast, predictability is more of a shared intuition in general linguistics as well as psycho- and neurolinguistic research. Both research areas suggest that predictive processes are involved in shaping language structure and determining language processing. This intuition should be the basis for a future research programme on the role of prediction in language. More mechanisms-oriented typological research, computational modelling and empirical research is needed to jointly tackle this issue. The joint application of tools on one particular linguistic pattern helped to shed light on these underlying mechanisms, as shown in my investigation.

To conclude, my investigation and the line of research described above contribute to the goal of establishing "crosslinguistic generalizations in the neurocognition of language" in the sense of a neurotypolgical research programme (Bornkessel-Schlesewsky & Schlesewsky, 2013, p. 241). Linguistic principles and cognitive mechanisms such as prominence, salience and predictability are the link between the vast variety of language patterns and the comparably uniform structure of the mind and brain.

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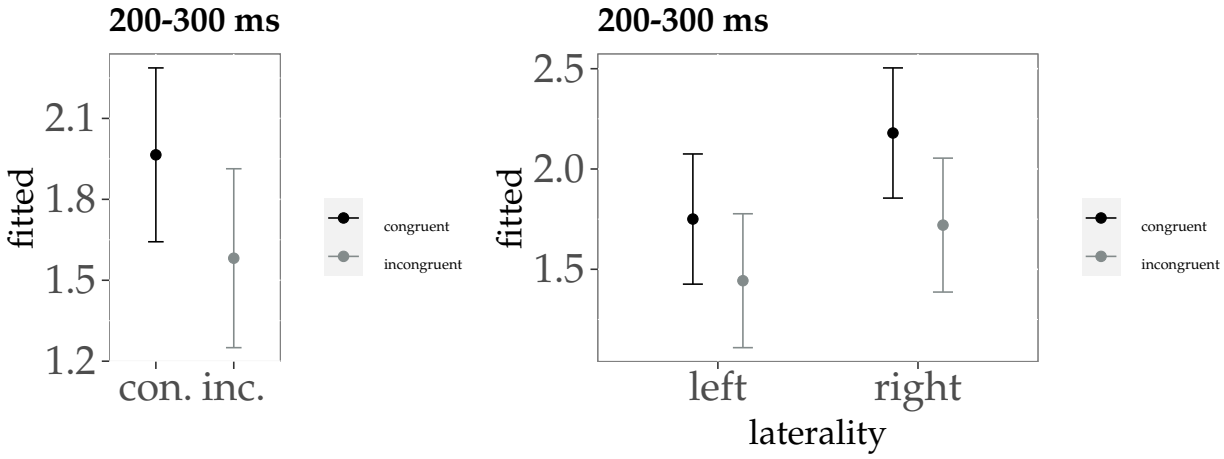
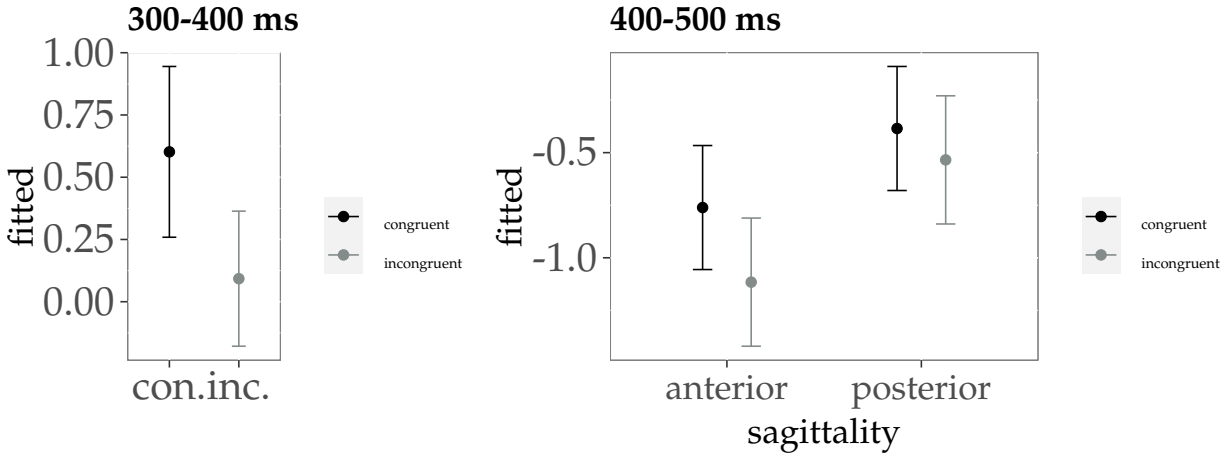
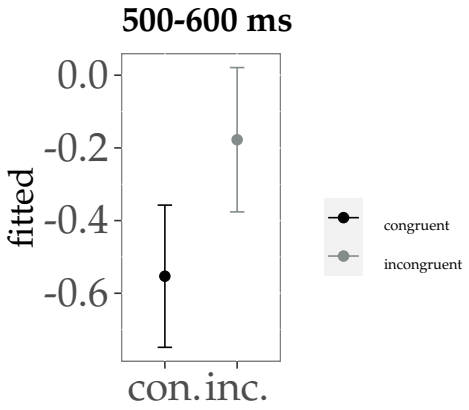
Appendices

Appendix A EEG experiment: Effects plots of significant main effects and interactions at position 1 (object index)



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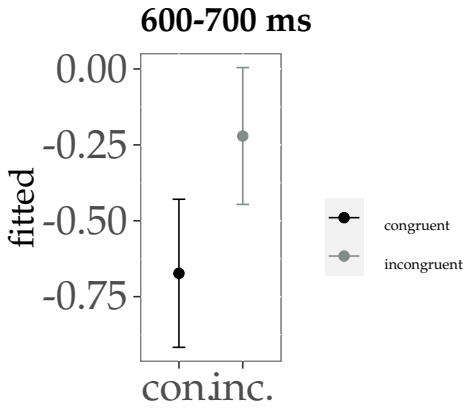
600-700 ms
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-0.25
-0.50
-0.75
fitted
con.
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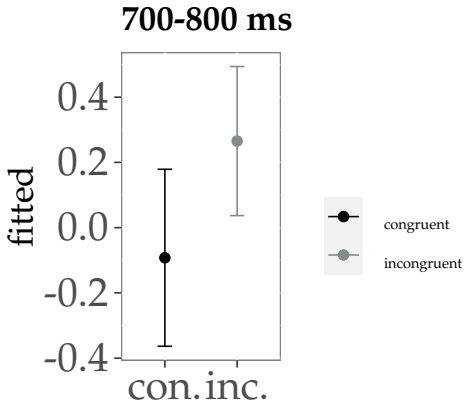
congruent
incongruent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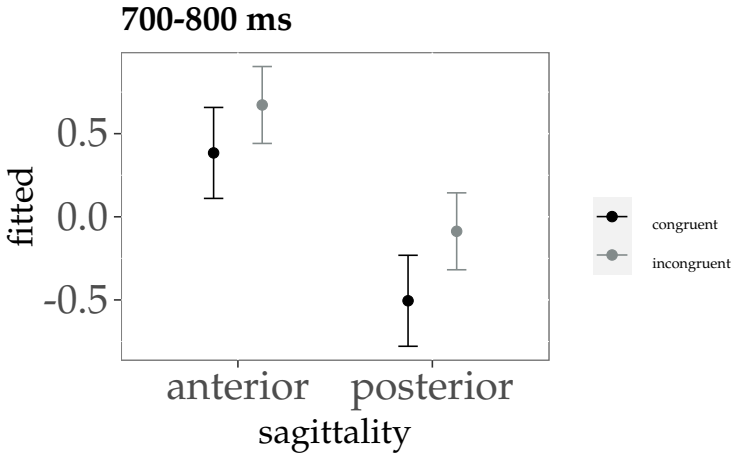
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0.5
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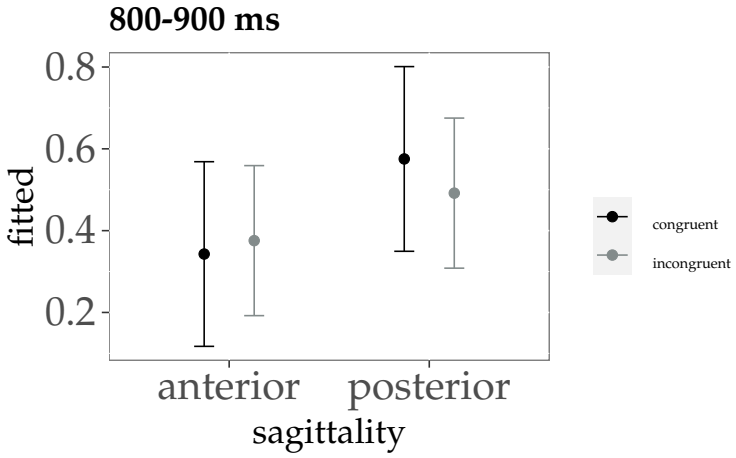
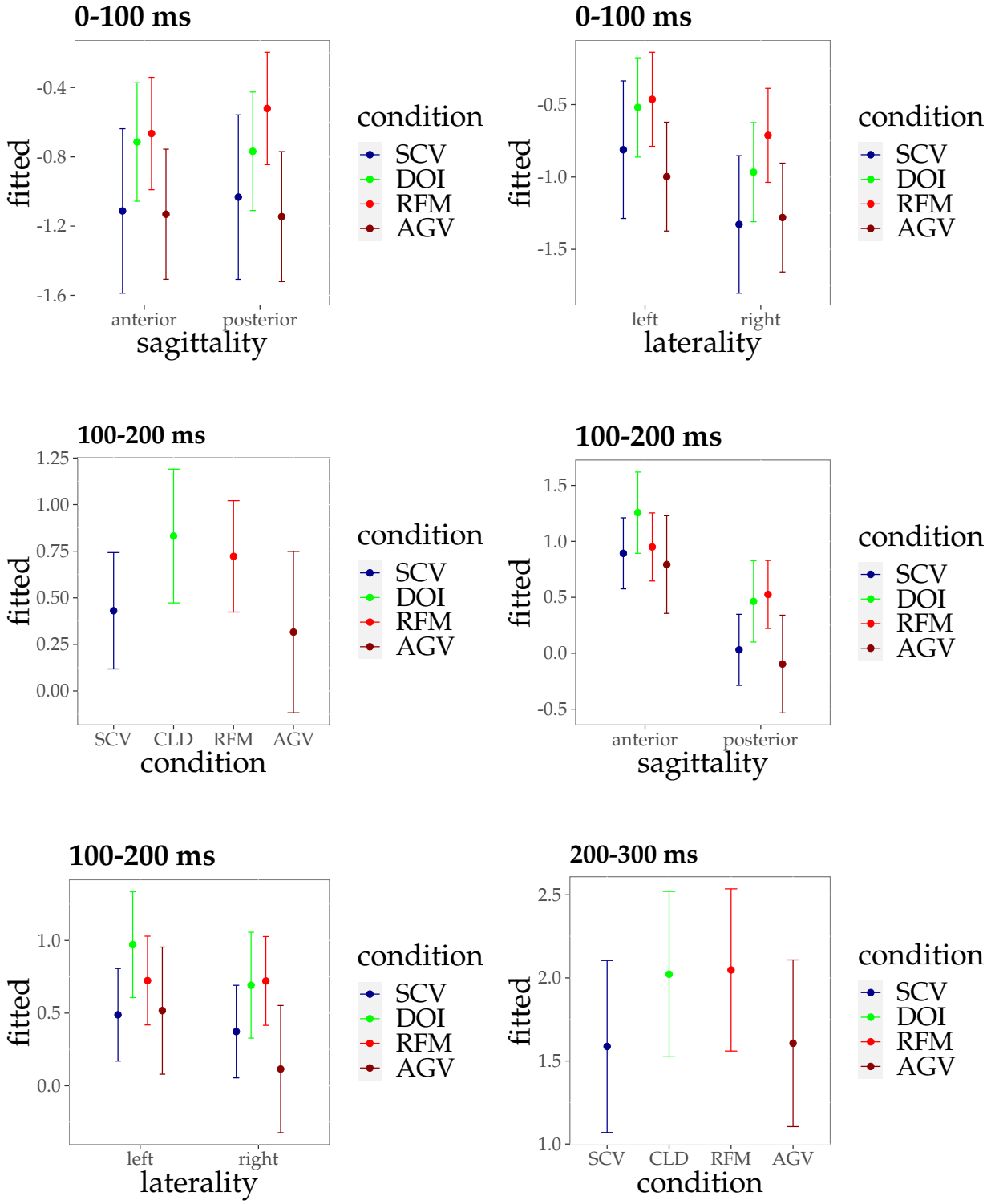
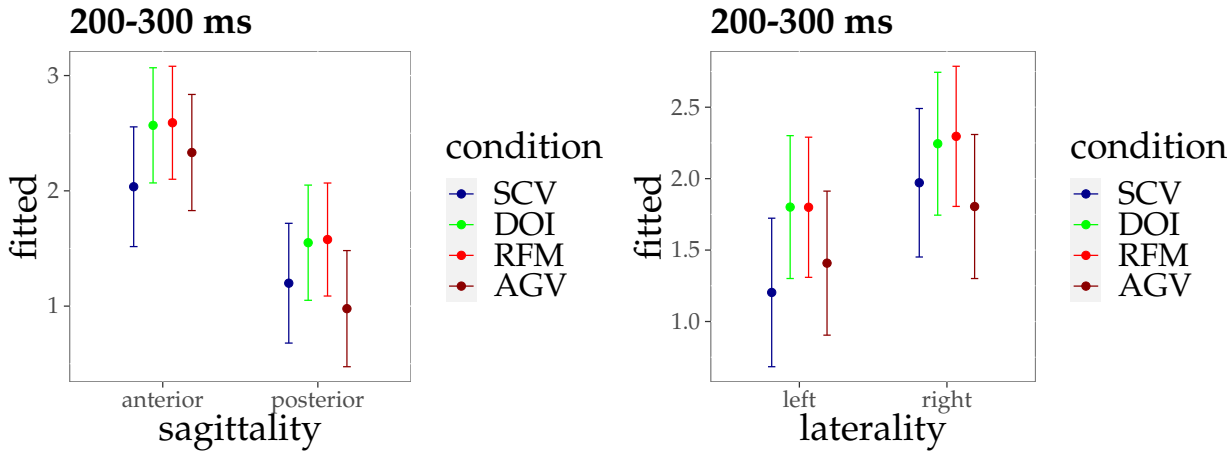
fitted
anterior
posterior
sagittality
congruent
incongruent


800-900 ms
0.8
0.6
0.4
0.2
fitted
anterior
posterior
sagittality
congruent
incongruent

Appendix B EEG experiment: Effects plots of significant main effects and interactions at position 2 (verb)




200-300 ms
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200-300 ms
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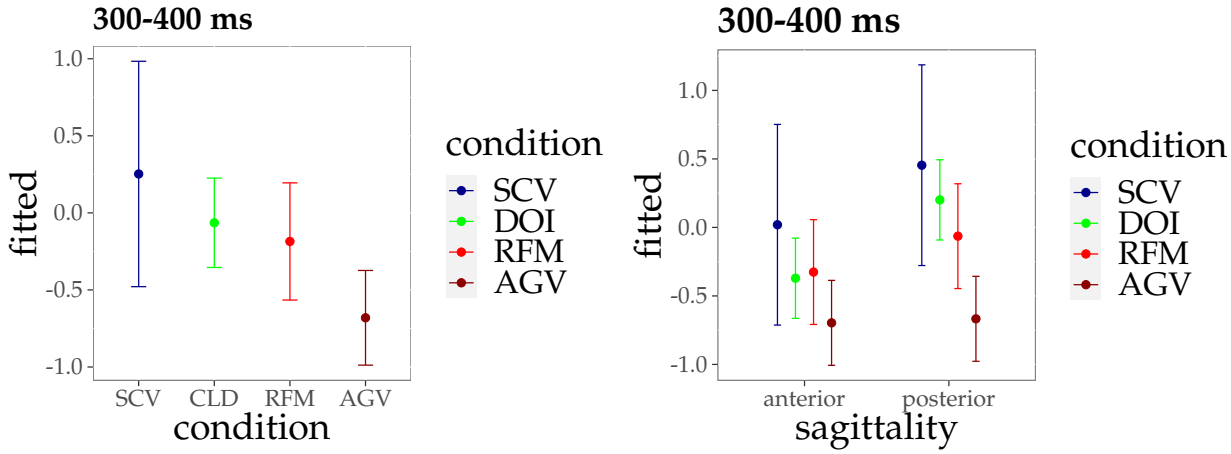
2.5
2.0
1.5
1.0
left
right
laterality
condition
SCV
DOI
RFM
AGV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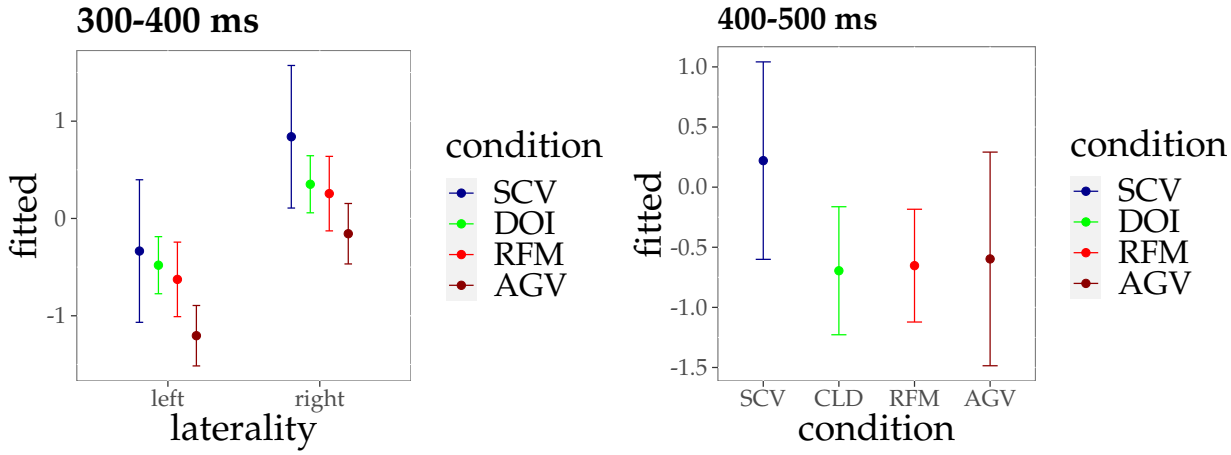
condition
condition
SCV
DOI
RFM
AGV
300-400 ms
fitted
1.0
0.5
0.0
-0.5
-1.0
anterior
posterior
sagittality
condition
SCV
DOI
RFM
AGV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SCV
CLD
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condition
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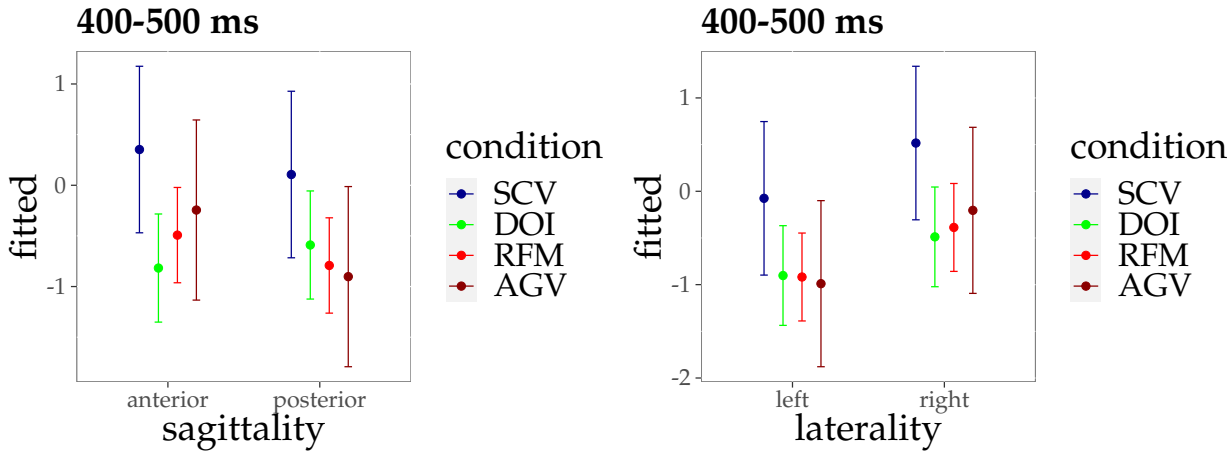
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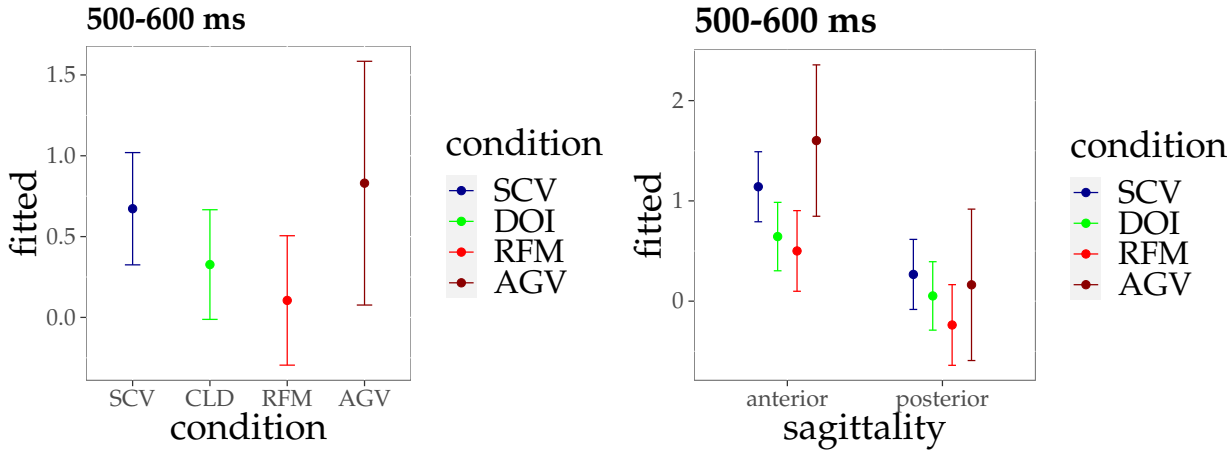
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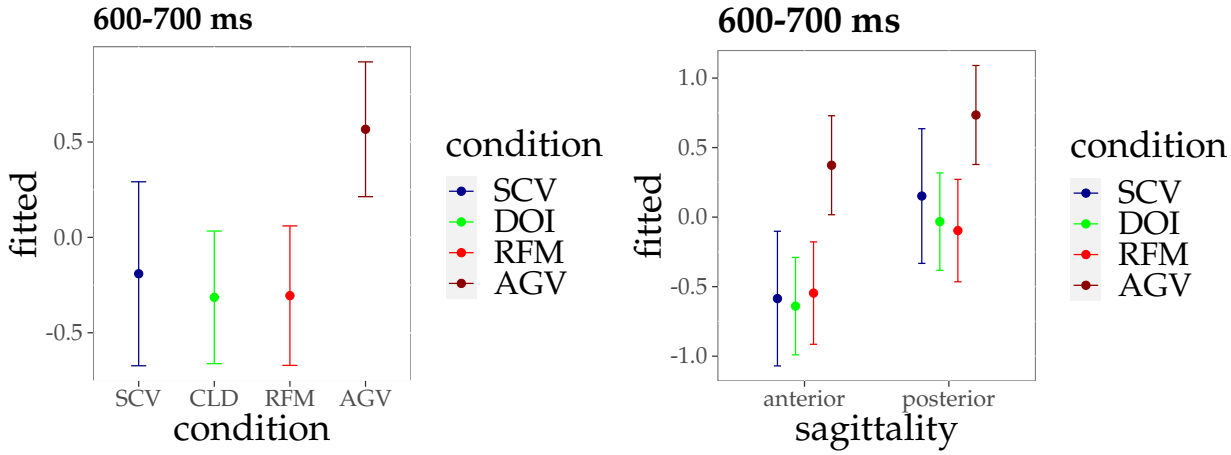
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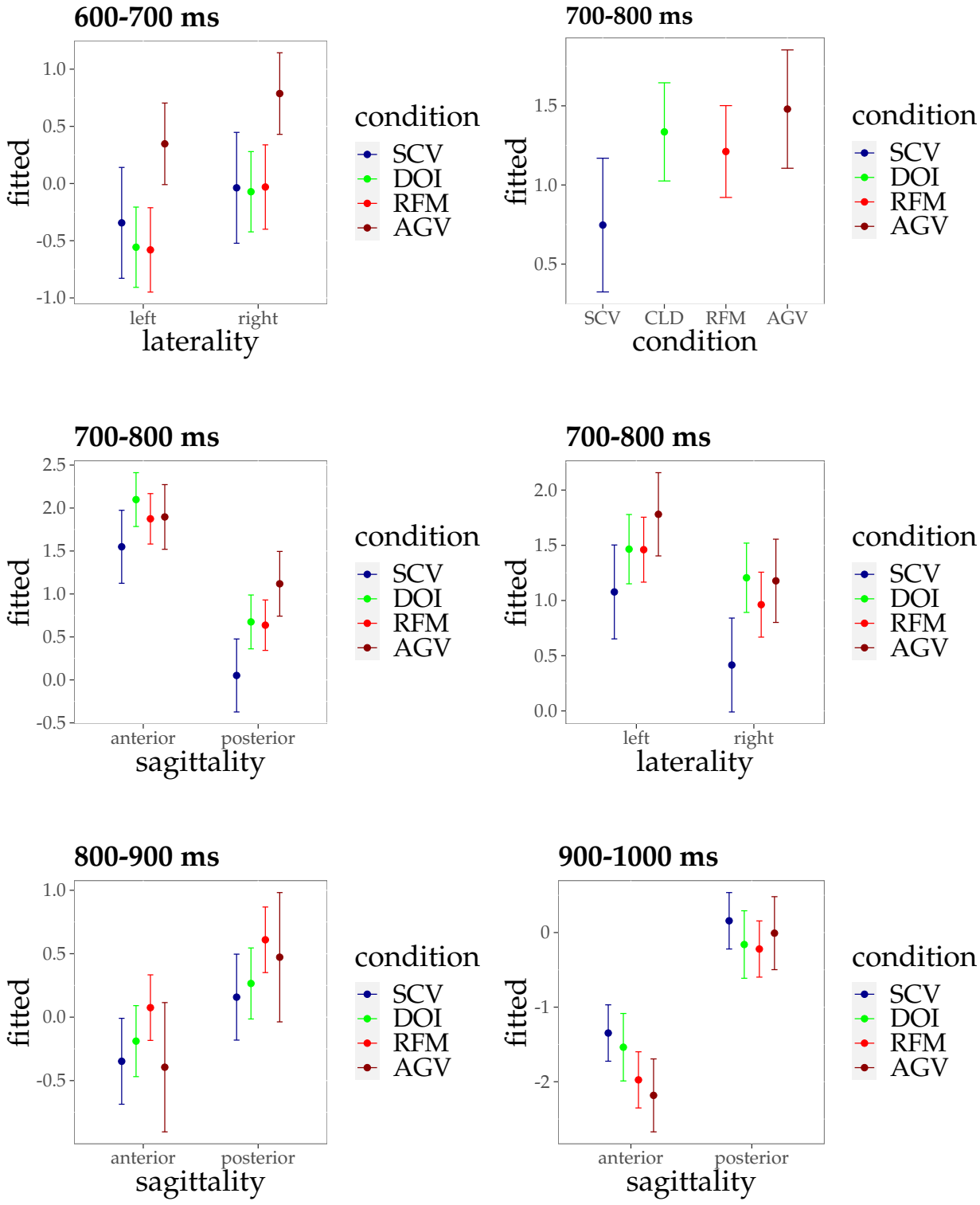
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