

**D-pronouns in narrative texts:
Examining referential behavior and neural processing**

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Contents

1	Introduction	1
I	Theoretical Background	9
2	Reference	11
2.1	Introduction	11
2.2	Mental models	13
2.3	Approaches to reference	14
2.3.1	Accessibility	14
2.3.2	Topic account / Question Under Discussion	16
2.3.3	Centering Theory	18
2.3.4	Prominence framework	20
2.3.5	Bayesian approach	23
2.4	Interim summary	25
3	Demonstrative pronouns	29
3.1	Introduction	29
3.2	Functions of German d-pronouns	30
3.2.1	Attention (re)orientation function	31
3.2.2	Contrast function	36
3.2.3	Disambiguation	38
3.2.4	Expressive function	39
3.2.5	Interim summary	41
3.3	Prominence-lending cues	42
3.3.1	Order of mention	44
3.3.2	Grammatical role	44
3.3.3	Topic	48
3.3.4	Focus	49
3.3.5	Thematic role	50
3.3.6	Discourse relations	54
3.3.7	Prosodic prominence	55

Contents

3.3.8	Perspective	56
3.3.9	Interim summary	60
3.4	Differences between d- and diese-pronouns	63
3.4.1	Previous mention features	64
3.4.2	Referential-shift-potential	69
3.4.3	Register	69
3.4.4	Modality	70
3.4.5	Interim summary	71
4	Naturalistic stimuli & narrative processing	73
4.1	Introduction	73
4.2	Naturalistic stimuli	74
4.3	Particular features of narrative texts	77
4.3.1	Interpretation of narratives	77
4.3.2	Layers of discourse organization	81
4.3.3	Role of narrator	82
4.3.4	Perspective	84
4.3.5	Representing speech	86
4.3.6	Engagement	89
4.4	Interim discussion	91
II	Corpus investigation	93
5	The Tschick corpus	97
5.1	Introduction	97
5.2	Research questions & hypotheses	98
5.3	Annotation method	103
5.4	Characteristics of the Tschick Corpus	106
5.4.1	The novel excerpt	106
5.4.2	Distribution of referring expressions	108
5.4.3	Distribution of all personal & d-pronouns	111
5.4.4	Functions of d-pronouns	116
5.4.5	Interim summary	120
5.5	Addressing the research questions	121
5.5.1	RQ (i): Features of critical pronouns' previous mention	121
5.5.2	RQ (ii): Referential distance	130
5.5.3	RQ (iii): Intervening referring expressions	135
5.5.4	RQ (iv): Referential persistence	138

5.6	Additional investigation: Perspective	141
5.7	Discussion	143
5.7.1	Information foreground function	144
5.7.2	Backward-looking function	148
5.7.3	Perspective	149
5.7.4	Reference development	151
5.7.5	Implications for prominence	153
6	The AdT Corpus	155
6.1	Introduction	155
6.2	Research question	155
6.3	Annotation method	156
6.4	Characteristics of the AdT corpus	156
6.4.1	The novel excerpt	156
6.4.2	Distribution of referring expressions	158
6.4.3	Distribution of all personal & d-pronouns	161
6.4.4	Functions of pronouns	164
6.4.5	Interim summary	168
6.5	Addressing the research questions	168
6.5.1	RQ (i): Features of critical pronouns' previous mention	168
6.5.2	RQ (ii): Referential distance	177
6.5.3	RQ (iii): Intervening characters	183
6.5.4	RQ (iv): Referential persistence	185
6.6	Additional investigation: Perspective	188
6.7	Discussion	189
6.7.1	Information foreground function	190
6.7.2	Backward-looking function	192
6.7.3	Perspective	193
6.7.4	Reference development	195
6.7.5	Implications for prominence	196
7	General discussion of corpus investigation	197
7.1	Functions of pronouns & features of previous mention	197
7.2	Perspective	199
7.3	Ambiguity	202
7.4	Summary	202

III ERP investigation	205
8 Experiment 1 – Tschick	209
8.1 Introduction	209
8.2 The ERP method	209
8.3 ERP research review	211
8.3.1 ERP components	211
8.3.2 Studies on reference	216
8.3.3 Naturalistic stimuli	221
8.3.4 Perspective shift, self-relevance & emotion	223
8.3.5 Interim discussion	226
8.4 Research Question and Hypotheses	227
8.5 Method	229
8.5.1 Participants	229
8.5.2 Material	229
8.5.3 Procedure	232
8.5.4 EEG recording and analysis	233
8.6 Data analysis	234
8.7 Results	235
8.8 Discussion	237
8.8.1 Discussion of overall results	237
8.8.2 Post-hoc analysis of perspective-holders	239
9 Experiment 2 – Auferstehung der Toten	245
9.1 Introduction	245
9.2 Research Question and Hypotheses	245
9.3 Method	246
9.3.1 Participants	246
9.3.2 Material	247
9.3.3 Procedure	249
9.3.4 EEG recording and analysis	250
9.4 Data analysis	250
9.5 Results	250
9.6 Discussion	253
10 General discussion of ERP investigation	255
10.1 Predictive processing: N400 effect	256
10.2 Discourse updating: Late Positivity effect	258
10.3 Perspective: Frontal positivity	260

10.4	Self-relevance: Early positivity	262
10.5	Influence of evaluation	264
10.6	Extension of discourse representation model	266
10.7	Summary	268
11	Conclusion	271
	Appendix A: Annotation Scheme	279
A.1	Intra-sentential segmentation	279
A.2	Referring expressions that refer to animate referents	281
A.3	Referring expressions and their features	284
A.4	Referential chains	286
	Appendix B: Functions of d-pronouns	287
B.1	Auferstehung der Toten excerpt	287
B.2	Tschick excerpt	295
	Appendix C: Full statistical results of ERP experiments	299
C.1	Tschick Experiment	299
C.2	Post-hoc perspective analysis	302
C.3	AdT Experiment	302
	Appendix D: Post-hoc ERP analysis of evaluation	305
	References	307

List of Figures

3.1	Interchangeability of d-pronouns	35
5.1	Features of referring expressions	105
5.2	Grammatical role of all referring expressions (Tschick)	110
5.3	Thematic role of all referring expressions (Tschick)	110
5.4	Grammatical & thematic role of personal & d-pronouns (Tschick)	114
5.5	Combining grammatical & thematic role of personal & d-pronouns (Tschick)	115
5.6	Functions of d-pronouns (Tschick)	118
5.7	Referential form of previous mention (Tschick)	123
5.8	Grammatical & thematic role of previous mention (Tschick)	126
5.9	Combining grammatical & thematic roles of previous mention (Tschick)	128
5.10	Segment distance of critical pronouns (Tschick)	131
5.11	Intervening characters of critical pronouns (Tschick)	136
5.12	Recurring characters (Tschick)	139
5.13	Perspective-holders of critical pronouns (Tschick)	142
6.1	Grammatical role of all referring expressions (AdT)	160
6.2	Thematic role of all referring expressions (AdT)	160
6.3	Grammatical & thematic role of personal & d-pronouns (AdT)	163
6.4	Combining grammatical & thematic role of personal & d-pronouns (AdT)	164
6.5	Functions of d-pronouns (AdT)	167
6.6	Referential form of previous mention (AdT)	170
6.7	Grammatical & thematic role of previous mentions (AdT)	173
6.8	Combining grammatical & thematic role of previous mention (AdT)	175
6.9	Segment distance of critical pronoun (AdT)	177
6.10	Intervening characters of critical pronouns (AdT)	183
6.11	Recurring characters (AdT)	187
8.1	Distribution of prosodic features (Tschick)	231
8.2	Experiment presentation scheme (Tschick)	233

List of Figures

8.3	Grand-average ERPs (Tschick)	235
8.4	Grand-average ERPs of perspective analysis	241
9.1	Distribution of prosodic features (AdT)	248
9.2	Experiment presentation scheme (AdT)	249
9.3	Grand-average ERPs (AdT)	251
A.1	Coreference relations in WebAnno	286
D.1	ERPs of evaluation analysis (Tschick)	305
D.2	ERPs of evaluation analysis (AdT)	306

List of Tables

5.1	Overview of the Tschick Corpus' length	106
5.2	Distribution of all referring expressions (Tschick)	108
5.3	Shortened overview of referring expressions (Tschick)	109
5.4	Person and number of personal and d-pronouns (Tschick)	112
5.5	Grammatical gender of personal and d-pronouns (Tschick)	112
5.6	Mean, SD & range of segment distance (Tschick)	131
5.7	Segment distance of d-pronoun (Tschick)	133
5.8	Segment distance of personal pronouns (Tschick)	133
5.9	Mean, SD & range of intervening characters (Tschick)	136
5.10	Intervening characters for d-pronouns (Tschick)	137
5.11	Intervening characters for personal pronouns (Tschick)	137
6.1	Overview of the AdT Corpus' length	156
6.2	Distribution of all referring expressions (AdT)	158
6.3	Shortened overview of referring expressions (AdT)	159
6.4	Person and number of personal and d-pronouns (AdT)	162
6.5	Grammatical gender of personal and d-pronouns (AdT)	162
6.6	Mean, SD & range of segment distance (AdT)	177
6.7	Segment distance of d-pronoun (AdT)	179
6.8	Segment distance of personal pronouns (AdT)	179
6.9	Mean, SD & range of intervening characters (AdT)	183
6.10	Intervening characters for d-pronouns (AdT)	184
6.11	Intervening characters for personal pronouns (AdT)	184
8.1	Summary of overall significant interactions (Tschick)	236
8.2	Overview of significant interactions with the factor perspective	240
9.1	Summary of overall significant interactions (AdT)	252
C.1	Full summary of overall significant interactions (Tschick)	301
C.2	Full summary of overall significant interactions (Tschick post-hoc analysis)	302
C.3	Full summary of overall significant interactions (Tschick)	304

Abbreviations

ACC	accusative
AdT	Auferstehung der Toten
DAT	dative
DemPro	diese-pronoun
DP	determiner phrase
DPro	d-pronoun
DRT	Discourse Representation Theory
EEG	electroencephalogram
EOG	electrooculogram
ERP	event-related potential
FID	Free Indirect Discourse
IC	Implicit Causality
ICA	independent component analysis
MAUS	Munich Automatic Segmentation
NOM	nominative
NRef	referential negativity
OVS	object-verb-subject
POSS	possessive
QUD	Question Under Discussion
RE(s)	referring expression(s)
ROI	region-of-interest
RQ	research question
RSVP	rapid serial visual presentation
SD	standard deviation
SNR	signal-to-noise ratio
SVO	subject-verb-object
T	Tschick

1 Introduction

“Er denkt es geht um Worte. Ein Idiot!”

Tschick, *Herrndorf* (2010: 227)

As I delved into writing this dissertation, I couldn't shake off a quote from *Tschick* that is uttered by the vicious father of the novel's main protagonist: “He thinks it's about words. An idiot!” This dissertation revolves around the exploration of two seemingly simple yet profoundly impactful German monosyllabic (groups of) words: demonstrative and personal pronouns. However, are they truly ‘just’ words? The mere existence of an entire dissertation dedicated to them suggests otherwise. But what is so interesting about them? Since my early years as a student, I've been captivated by the intricacies of language and how we use linguistic expressions to refer to elements in the world around us. Speakers can use a variety of linguistic forms to refer to entities in their surroundings, while listeners must recognize these referents through the expressions used by the speaker. Pronouns, in particular, stand out as the pinnacle of this reference process, as they contain no substantive information while only carrying morpho-syntactic details such as gender and number. How do interlocutors manage to grasp each other's intended meanings with so little information? This question has intrigued linguists for decades, and research shows that the selection of a specific form depends on multiple factors, and that listeners, when interpreting these expressions, must consider various factors in order to determine the intended referent. Expanding this investigation to encompass natural linguistic contexts, particularly narrative texts, adds an extra layer of fascination. The allure lies in unraveling the complexities of natural language, departing from constructed and manipulated examples to explore real-world textual environments. The study of narrative texts thus represents a significant step toward this understanding. Personally, this interdisciplinary approach mirrors my early passion for language and literature, which drove me to pursue studies in German and linguistics at the University of Cologne.

So, for anyone assuming at the outset of this dissertation that it's all about words, don't worry you're not an idiot; you are partly correct. Indeed, the focus

1 Introduction

is on demonstrative and personal pronouns (which are words). Yet, this dissertation also explores the multitude of factors concealed within a text, exerting influence on these words. It explores both local factors and those that come into play specifically when engaging with longer narratives, such as the presence of protagonists or narrative perspective.

Why demonstrative pronouns?

An extensively researched area in psycholinguistics centers on the study of singular, third-person personal pronouns. Pronouns are characterized by their minimal descriptive content and depend on the context's prominence ranking of discourse referents to identify a specific referent (Jasinskaja et al. 2015, Patterson & Schumacher 2021, von Heusinger & Schumacher 2019). Given the substantial research on personal pronouns, it becomes crucial to enhance our understanding by exploring other referential forms. That is why it is worth expanding the scope of research to investigate demonstratives while keeping personal pronouns as a comparison point. The referential behavior of German personal and demonstrative pronouns has already been extensively examined in the literature, encompassing experimental and corpus studies. However, prior empirical studies have mainly focused on examining highly controlled two-sentence items with two potential antecedents. Yet, the complexity of natural language use cannot be fully captured by such controlled designs (Alday, Schlesewsky & Bornkessel-Schlesewsky 2017). Therefore, it remains an open question how pronouns, especially of the *der/die/das*-paradigm, are processed in larger, naturalistic discourse contexts. In the current dissertation, I aim to investigate the referential behavior of personal pronouns and demonstrative pronouns, as well as their neural processing in naturalistic discourse contexts. To achieve this, I will analyze larger excerpts from narrative texts, specifically novels.

Exploring demonstrative pronouns will shed light on the nuances of referential identification and prominence in German discourse. Demonstrative pronouns provide a clearer picture of prominence relations because they show more rigid interpretive biases than personal pronouns do. When looking at data from ditransitives in a controlled experimental setup, it becomes evident that personal pronouns make no distinction whether they refer to an agent, patient, or recipient in the antecedent clause (Patterson & Schumacher 2021). This implies that personal pronouns do not offer substantial insights into the prominence-related characteristics and hierarchies of referents. On the contrary, demonstrative pronouns are more restricted in their referential choice, allowing for a better understanding of prominence-lending cues and referential relations.

Many studies use the repertoire of referential forms found in languages worldwide to enhance our understanding of referential resolution processes. By broadening the investigation to encompass various languages, researchers can enhance the generalizability of existing hypotheses about pronoun resolution and explore different types of pronouns (Patterson & Schumacher 2021). An important observation is that different languages employ different types of pronouns. For instance, there is a distinction between long and short forms of personal pronouns, commonly known as weak and strong variants, as observed in languages like Dutch and Estonian (Kaiser & Trueswell 2004b,a, Kaiser 2011c). In addition to overt pronouns, many languages, such as Greek, Italian, Spanish, or Turkish, also employ zero pronouns, sometimes referred to as null pronouns (Torregrossa, Andreou & Bongartz 2020, Alonso-Ovalle, Fernández-Solera, Frazier & Clifton 2002, Dimitriadis 1995, Filiaci 2010, Filiaci, Sorace & Carreiras 2014, Turan 1995). Researchers have noted a clear division of labor between these two opposing forms of pronouns. This suggests that speakers or writers make choices between expressing a prominent or less-prominent pronoun, such as a strong or weak variant, or an explicit (overt) or unexpressed (zero) variant, based on various linguistic and contextual factors. Similar assumptions have been put forth regarding the differentiation between German personal and demonstrative pronouns. In addition, demonstratives present an intriguing research focus, given their apparent role as a universal referential form with reorienting and/or deictic function. Diessel (1999: 1) asserts that “all languages have demonstratives, but their form, meaning, and use vary tremendously.” Therefore, expanding the investigation of pronouns from English to other languages and different pronoun types highlights the complex nature of pronoun usage and resolution preferences across various languages. Gaining insights into how different pronouns operate within specific linguistic contexts enriches our understanding of language processing and communication mechanisms.

Compared to other languages, for instance English, German has a rather rich pronoun system. Usually, German requires overt pronouns but in rare colloquial speech cases also the use of zero pronouns can be observed (Schäfer 2021, Androutopoulos & Schmidt 2002). Beside the personal pronouns (*er/sie/es* and their inflections) there are three types of demonstrative pronouns: the *dieser/diese/dieses-*, *der/die/das-*, and *jener/jene/jenes-* paradigms. All of these demonstrative pronouns can felicitously refer to both animate and inanimate entities. In this regard, they differ from the English demonstrative pronouns *this* and *that*, which can only refer to inanimate entities¹. Pronominal demonstratives are considered to be the more marked form compared to (unstressed)

¹Except in presentational contexts, such as ‘*This is my son*’.

1 Introduction

personal pronouns, where the latter represent the least marked version of overt German pronouns (e.g., [Bethke 1990](#), [Weinrich 1986](#), [Wiemer 1996](#)). This dissertation focuses on the investigation of demonstrative pronouns of the *der/die/das*-paradigm (henceforth d-pronouns) in comparison to personal pronouns.

Aim of this dissertation

The primary objective of this dissertation is to explore the referential behavior of d-pronouns (*der/die/das*), as well as their neural processing, within the context of naturalistic discourse. This investigation involves the analysis of larger excerpts from narrative texts. I will examine personal pronouns as a comparative condition as they represent the default German pronoun type. Two general overarching questions guide this dissertation:

Overarching question 1: How are d-pronouns used in larger narrative texts?

Overarching question 2: How are d-pronouns processed in these contexts?

Notably, these questions have not been systematically addressed in prior research, as most studies have employed short controlled items to examine the referential and neural behavior of d-pronouns.

Concerning the first overarching question of this dissertation, previous research has demonstrated that d-pronouns exhibit distinct interpretative preferences and specific discourse functions compared to personal pronouns. The resolution preferences have been generally explored concerning the concept of prominence (e.g., [Grosz, Weinstein & Joshi 1995](#), [Schumacher, Backhaus & Dangl 2015](#), [von Heusinger & Schumacher 2019](#)), an approach to reference that will be discussed in Subsection 2.3.4. It has been suggested that the resolution process of a pronoun is, to some extent, influenced by the prominence of its antecedent. In this context, prior studies indicate that d-pronouns in German prefer reference to a less prominent candidate, where prominence has been associated with subjecthood ([Bosch, Rozario & Zhao 2003, 2007](#)), proto-agentivity ([Schumacher, Dangl & Uzun 2016](#)), sentence topicality ([Bosch & Umbach 2007](#)), order of mention ([Bosch et al. 2003](#)), and perspectival centers ([Hinterwimmer & Bosch 2016](#), [Hinterwimmer 2019](#)). Thus, for referentially ambiguous transitive context sentences it has been argued that personal pronouns, although less constrained in their referential behavior, usually show a preference for the subject/agent/first-mentioned/sentence-topic. D-pronouns, on the other hand, have shown to prefer

the object/patient/last-mentioned/non-sentence-topic. It has been further argued that the biases of d-pronouns are more rigid (reflected in strong referential preferences), while the personal pronoun behaves more flexibly (Kaiser 2011c, Schumacher et al. 2015, 2016, Schumacher, Roberts & Järvikivi 2017, Bader & Portele 2019). However, in previous research, the referential behavior of d-pronouns has mostly been investigated in short, self-written items (i.e., items written by the experimenters). Only few studies have employed naturalistic stimuli. For instance, Bosch et al. (2003) investigated a newspaper article corpus. However, newspaper articles might not represent the best source for the investigation of d-pronouns because d-pronouns are described to mainly occur in spoken and less formal language (Weinert 2011, Patil, Bosch & Hinterwimmer 2020). Therefore, the results from newspaper corpora might not fully describe the referential behavior that d-pronouns can exhibit in real-world language use. Hence, the current dissertation uses narrative texts with a conversation-like narrative style, resembling spoken language, as a base for a corpus investigation. By analyzing previously annotated fine-grained features of referential expressions in the corpora, I aim to contribute to a better understanding of the referential behavior of d-pronouns in more naturalistic language use. In doing so, I will focus on addressing the following specific subquestions derived from the overarching research question 1:

Question 1a: What is the referential behavior of d-pronouns in longer narrative texts in comparison to personal pronouns?

Question 1b: Does the referential behavior of d-pronouns in longer narrative texts differ from previously observed behavior in controlled experiments?

Concerning the second overarching question of this dissertation, which involves investigating the real-time processing of German pronouns, Schumacher et al. (2015) observed a biphasic N400-Late Positivity effect for d-pronouns relative to personal pronouns following contexts with two morpho-syntactically accessible entities. This effect is considered evidence of more demanding processing costs for the d-pronoun compared to the personal pronoun. The authors propose that these two effects reflect expectation-based and forward-looking processes, respectively. First, the observed N400 for the d-pronoun indicates processing demands arising from the relative unexpectedness of the d-pronoun and possibly the exclusion of the most prominent referential candidate. Second, the d-pronoun functions as a trigger for attentional reorienting, and the Late Positivity reflects the anticipation of changes in the subsequent referential structure and the corresponding discourse updating costs. However, the processing

1 Introduction

of d-pronouns in naturalistic discourse settings has been largely neglected in the literature. Hence, the current dissertation aims to close this research gap by addressing the following subquestions of the general research aim formulated in question 2:

Question 2a: How are personal and d-pronouns processed in larger naturalistic discourse contexts?

Question 2b: Can the results from previous highly controlled studies be confirmed in more naturalistic contexts?

Structure of the dissertation

The dissertation is divided into three parts. **Part I** offers a comprehensive literature review. In **Chapter 2**, I present various theories of reference use and referential selection, connecting referential form selection to elements like cognitive accessibility, text coherence, and the dynamicity and relational properties of referents. The chapter also introduces the concept of the mental model, which forms the basis of various approaches to reference. In **Chapter 3**, I describe this dissertation's research object, which are German d-pronouns. I explore the various functions that d-pronouns can serve and present the factors influencing their referential behavior. The chapter concludes with a section on demonstrative pronouns of the *dieser/diese/dieses*-paradigm and their distinctions from d-pronouns. **Chapter 4** is an interdisciplinary chapter, given that this dissertation lies at the intersection of neuro- and psycholinguistics, literature science, and psychology. The chapter aims to approach the use of longer, more naturalistic narrative discourses as stimuli from various theoretical perspectives. I begin by defining naturalistic stimuli and then delve into the implications of narrative texts. This includes exploring the need for a more complex mental model, narrative theories, the representation of speech and perspective, and reader/listener engagement.

Part II is dedicated to the first overarching question: *How are d-pronouns used in larger narrative texts?* The question is examined by means of a corpus investigation. Two corpora were created using excerpts from the novels *Tschick* (Herndorf 2010) and *Auferstehung der Toten* (Haas 1996). **Chapter 5** offers a comprehensive analysis of the Tschick Corpus, starting with a brief explanation of the annotation scheme as well as an introduction to the research questions and hypotheses, the chapter proceeds to outline the general characteristics of the corpus. It provides a detailed investigation of properties such as previous mention, referential distance, intervening referring expressions, referential persistence, and

perspective. The concluding section of the chapter examines the corpus study findings in the context of the diverse functions of d-pronouns and their relationship to the prominence framework. **Chapter 6** mirrors the structure of the previous chapter and presents the corpus analysis of the *Auferstehung der Toten* Corpus, covering the same procedures and analyses as performed for the *Tschick* Corpus. In **Chapter 7**, a general discussion of the findings in the *Tschick* and *Auferstehung der Toten* Corpora is provided, and the results of the two corpus investigations are compared. Conclusions are drawn from the exploration of more naturalistic discourse contexts regarding the use conditions of d-pronouns and comparison to personal pronouns.

Part III is dedicated to address the second overarching question: *How are d-pronouns processed in larger narrative texts?* This part employs an event-related potential (ERP) investigation, featuring two experiments that utilize audiobook versions of the novel excerpts previously examined in the corpus investigation. The primary aim is to shed light on the neural processing of d-pronouns in naturalistic contexts. In **Chapter 8**, I begin with a brief introduction to the ERP method, followed by a review of relevant ERP research literature. Subsequently, I present the ERP experiment centered on the *Tschick* novel excerpt, where I present the research method, and briefly discuss the results. Additionally, I conduct a post-hoc analysis regarding perspectival features in the novel excerpt. **Chapter 9** outlines the ERP experiment involving the *Auferstehung der Toten* novel excerpt. This chapter follows a similar structure to the previous one, with the exception that no additional investigation into perspectival features is warranted based on the nature of the narrative structure. **Chapter 10** presents a thorough discussion of the results obtained from the ERP investigation. Additionally, it includes a comparative analysis and interpretation of the outcomes from the two experiments. In this chapter, I provide a detailed examination of the observed effects in the two experiments, relating them to various features that emerge due to the naturalistic nature of the stimuli, given their narrative text format. To forecast, features such as perspective and engagement are identified as crucial ingredients during discourse processing, which is also reflected by dedicated effects in the ERP response. Furthermore, I introduce a model for pronoun processing that integrates the insights gained from this research.

The conclusive **Chapter 11** not only provides a summary of the findings from both the corpus and ERP investigations but also outlines potential avenues for future research. It synthesizes the results while also addressing limitations of the research.

Part I

Theoretical Background

2 Reference

2.1 Introduction

Reference is a fundamental aspect of language use. In order to communicate successfully, speakers or writers depend on their audience's ability to grasp the intended references when mentioning and discussing individuals, places, objects, and ideas. Linguistic expressions that are used to establish a relationship to entities in the world are called *referring expressions*. These expressions point to abstract discourse referents, which in turn correspond to real-world individuals, objects, or situations, but also to imaginative entities (e.g., *the unicorn*). A discourse referent is considered to be a proxy in the mental representation, it is merely a conceptual entity representing a person or a thing in the described world. Because of this indirect relationship, there is no one-to-one relation between referring expressions and the entities in the world. Numerous referential expressions could potentially refer to one specific entity (Ariel 1988, Gundel, Hedberg & Zacharski 1993). Nevertheless, in real-life situations, often not all of these potential expressions are suitable or accurate. The task of processing language, therefore, requires that an addressee (i.e., a reader or listener) identifies the referents used in discourse (Grosz et al. 1995). Consider a scenario in which two interlocutors are discussing the American musician Taylor Swift. They may employ different referring expressions for the extra-linguistic referent based on their knowledge and the communicative situation. If both participants are unfamiliar with the artist, the speaker might choose (1a). If the speaker knows Taylor Swift but believes the listener is unfamiliar with the artist, the speaker might opt for (1b). If both the speaker and the addressee are familiar, or are friends with Taylor Swift, (1c) could be uttered. If the speaker and the addressee are discussing the musician, and she is the topic of their conversation, sentence (1d) can be used. However, uttering (1a) in a scenario where the musician is familiar to the speakers and the topic of the conversation would be inappropriate.

- (1) a. An American musician is playing at the RheinEnergie stadium tonight.

2 Reference

- b. Taylor Swift, an American musician is playing at the RheinEnergie stadium tonight.
- c. Taylor is playing at the RheinEnergie stadium tonight.
- d. She is playing at the RheinEnergie stadium tonight.

To unravel the factors influencing the appropriateness of using different referring expressions, various approaches have been introduced. Numerous studies have developed a range of concepts that are partly interconnected and share similarities. These concepts include, for instance, *prominence*, *salience*, *accessibility*, *activation*, *givenness*, *topicality* (von Heusinger & Schumacher 2019, Ariel 1988, Gundel et al. 1993, Givón 1983). All of these theories aim to categorize referents in terms of how much attention is directed at them and how easily they can be retrieved, with different concepts coming into play.

Based on the observation that the mere concatenation of statements does not suffice to create a meaningful discourse, coherence is considered a fundamental prerequisite for a discourse. In general, coherence embodies the idea that every part of a sequence of sentences must be connected in content to form an intuitively coherent text, regardless of its length, spoken or written nature. Coherence operates on various levels. This dissertation is mainly concerned with referential coherence which deals with the frequent referencing of people, things, situations, or times across multiple sentences, forming a network of referential relationships. Additionally, there is relational coherence which underscores the connection of individual sentences and larger text segments through coherence relations. Indicating referential coherence can also be related to a *backward-looking function* of referring expressions. This function pertains to the attributes of the previously mentioned referring expression in relation to a given referring expression. Conversely, referring expressions can also signal changes or maintenance of the upcoming discourse structure; this is referred to as the *forward-looking function*. This function points to subsequent referential expressions as well as the broader structural developments within the discourse.

In this dissertation, my primary focus is on the prominence framework, as it offers a comprehensive account that effectively integrates insights from previous approaches. The discourse prominence account (von Heusinger & Schumacher 2019) deals with prominence relations between entities of equal type (such as discourse referents) and aims to provide a comprehensive understanding of the cognitive status of discourse referents. This concept of discourse referent prominence is rooted in the broader idea that prominence is a fundamental organizing principle at all levels of language structure, as proposed by Himmelmann & Primus (2015). The prominence framework is based on a three-part definition,

which I will elaborate on in Subsection 2.3.4. The concept of prominence in language is somewhat associated with the notions of salience, accessibility, and activation in cognition. In linguistic research, these terms are occasionally used interchangeably, but in this dissertation, the term *prominence* is favored. This choice is made because the prominence account offers a comprehensive and dynamic approach that allows for a more nuanced understanding of referential prominence. I will elaborate further on the reasons for this choice in Subsection 2.3.4. However, in this chapter, when discussing the work of various scholars, I will use the terminology employed in the relevant texts.

In this chapter, I will initially elaborate the concept of mental models (Section 2.2), as theories related to reference are often linked to a mental representation of the discourse referent. Following that in Section 2.3, I will provide an introduction into different approaches to reference, where I first explain the cognitively oriented theories of accessibility and givenness (Subsection 2.3.1) and then explore the topicality (Subsection 2.3.2), centering (Subsection 2.3.3) theories, before introducing another cognitive theory, the prominence framework, which I will base further analyses on (Subsection 2.3.4). Finally, I will introduce the more nuanced Bayesian approach (Subsection 2.3.5).

2.2 Mental models

In any form of linguistic interaction – whether involving production or processing, written, spoken, signed, read, or heard language – information regarding the ongoing discourse is stored in a mental representation. This mental representation is defined as a “cognitive representation of the events, actions, persons, and, in general, the situation a text is about” (van Dijk & Kintsch 1983: 11). The works of Johnson-Laird (1983) and van Dijk & Kintsch (1983), which are pioneers of the mental model approach, define language as a “set of processing instructions” (Zwaan & Radvansky 1998: 162) that are used to form mental representations of situations. As discourse progresses, changes arise that must be integrated into the mental representation. According to van Dijk & Kintsch (1983), discourse comprehension is a dynamic process where “understanding takes place online with the processing of input data, gradually, and not post hoc” (van Dijk & Kintsch 1983: 5). Thus, the mental discourse representation serves as a means to create a representation of the unfolding state of affairs and is constructed incrementally. For instance, new referents may be introduced, or a previously less prominent referent may be elevated to a more central discourse status. Johnson-Laird (1983) coined this representation as the *mental model*, whereas van Dijk & Kintsch (1983) re-

2 Reference

ferred to it as *situation models*. The term mental model is often used flexibly and encompasses any systematic representation of knowledge (Johnson-Laird 2013).

The concept that discourse is represented in mental models of described situations is widely accepted and is also found in linguistic theory (e.g., Garnham 2001, Burkhardt 2005, 2006). However, the construction and nature of mental models have intrigued numerous scholars, resulting in a diverse range of perspectives and various accounts. Concerning reference, the primary challenge for the system constructing such models lies in determining the appropriate referent for each expression. Speakers or writers refer back to discourse referents previously introduced in the discourse, employing various noun phrases, demonstratives, or pronouns to do so. The interpretative system relies on multiple cues for coreference, such as world knowledge or so-called *prominence-lending cues* (which I will present in detail in Section 3.3). In the following section, I will introduce various approaches to reference, each grounded in the idea that a mental discourse representation is formed during language processing. However, in these approaches, the description of the mental model representation is only marginally described because in this dissertation, I follow the prominence-based framework and its perspective on a mental discourse representation. Therefore, when elucidating the prominence framework in Subsection 2.3.4, I will also provide insights into the mental model approach within this framework. In short, the prominence framework suggests that the mental discourse representation has a dual role. It not only encodes the present state of discourse but also serves as the foundation for predicting future discourse units. The crucial role of prominence in maintaining and constructing this representation involves a continuously updated structure of ranked discourse units. This dynamic organization is influenced by incoming information and acts as the groundwork for forward-directed processes, including expectation-based processing, which generates expectations for upcoming content. Following this approach any changes in the discourse representation structure during discourse updating are linked to computational demands (von Heusinger & Schumacher 2019).

2.3 Approaches to reference

2.3.1 Accessibility

A commonly employed approach involves relating the selection of referential forms to the cognitive status of the relevant referent. The underlying idea is that speakers or writers opt for particular forms of referring expressions (e.g., definite or indefinite determiner phrase (DP), demonstrative pronoun, personal

pronoun) based on the status of the referent within the ongoing discourse. The crucial observation underlying these approaches is that there is an inverse relation between the explicitness, or informativity, of a referring expression, and the activation status of its associated referent within the discourse context (Givón 1983, Ariel 1990, Gundel et al. 1993). In practical terms, this indicates that less explicit forms (such as pronouns or zero pronouns) are generally used for discourse referents that are highly activated and, therefore, assumed to be highly accessible. Conversely, less activated and accessible referents are denoted by longer and more explicit forms (such as full DPs). Theories like *Accessibility Hierarchy* (Ariel 1990, 2001) and the *Givenness Hierarchy* (Gundel et al. 1993), propose that the cognitive status of a referent influences the choice of referential form, establishing scales of cognitive statuses corresponding to distinct referential forms.

Following the Givenness Hierarchy by Gundel et al. (1993), there are six levels in the hierarchy (in focus > activated > familiar > uniquely identifiable > referential > type identifiable), corresponding to different cognitive statuses that explain the use of different referential forms. One end of this scale signifies the lowest level of givenness (*type identifiable*), where a recipient is merely able to retrieve a representation of the type of object specified by the expression, while the opposite end signifies that recipients possess a high awareness of the nature of the described referent (*in focus*). Following Gundel et al. (1993), a personal pronoun would represent a referring expression that is *in focus*, whereas an indefinite DP would represent a *type identifiable* referring expression. Importantly, each status includes all lower statuses, indicating that a referent with a particular cognitive status on the hierarchy inherently fulfills all lower status requirements simultaneously. Hence, a referent assigned the cognitive status of for example *uniquely identifiable* inherently encompasses the statuses of *referential* and *type identifiable*. This hierarchy can explain the use of many different referential forms, but not all. For example, modified DPs are not accounted for.

A similar yet richer hierarchy with respect to referential forms, was developed by Ariel (1990) and focuses on the accessibility of a referent. According to the Accessibility Hierarchy, the referential form reflects the type of mental accessibility of the referent in question. Similar to the Givenness Hierarchy, the Accessibility Hierarchy is a cognitive framework that seeks to explain the choice of referring expressions based on the cognitive status or accessibility of the referents. According to this hierarchy, certain types of referents are considered more accessible (i.e., salient) in the mental representations of discourse participants (i.e., speakers or writers and listeners or readers), and this accessibility influences the selection of referring expressions. The underlying idea is that referring expressions act

2 Reference

as directives for the listener, instructing them to recall a specific piece of information from their memory. These expressions indicate the accessibility of that information to the listener at the present moment in the conversation (Ariel 2001: 29). The Accessibility Hierarchy is one of the most comprehensive accounts with respect to the choice of referential forms in relation to the cognitive status of the referent. In addition to formulating a scale of different cognitive statuses, Ariel (1990) suggests that the accessibility of a referent is determined by the three partially overlapping criteria: (i) *informativity* (the quantity of lexical information), (ii) *rigidity* (the capacity to select a singular referent based on the form), and (iii) *attenuation* (phonological size). According to Ariel (1990), expressions that are more informative, rigid, and unattenuated tend to convey lower degrees of accessibility, whereas expressions that are less informative, less rigid, and more attenuated tend to convey higher degrees of accessibility.

2.3.2 Topic account / Question Under Discussion

Another popular theory of reference is based on the observation that discourse participants tend to organize their communication output (i.e., speaking and writing) around a particular theme or subject and focus on that for a while before moving on to a new one (Givón 1983, Van Kuppevelt 1995, Roberts 2012). This observation has given rise to the concept of *topic*. The selection of referential expressions is, therefore, influenced by individuals' natural tendency to maintain referential coherence (aka referential persistence) in their discourse. This often involves focusing on particular referents and actions that are significant within the discourse. It has been shown that topicality influences the form of the referring expression (Givón 1983, Chiriacescu & von Heusinger 2010, von Heusinger & Chiriacescu 2013). One key property associated with topics is that subsequent references to the topic are more likely to involve pronouns (e.g., Ariel 1990, Arnold 1998). However, the influence of topics on referring expressions varies with the domain of interest – whether two adjacent sentences or a larger text is being assessed. Before delving into the influence of topics on reference and referring expressions, I will provide a brief overview of different approaches to the concept of topic and the different scopes it encompasses.

The term topic refers to what a sentence or discourse is about, and it is distinguished between *sentence topic* (*what is the sentence about?*; Reinhart 1981) and *discourse topic* (*what is the discourse (the entire text) about?*; van Dijk 1977, Van Kuppevelt 1995, Roberts 2012) based on the scope of the discussion. According to Reinhart (1981), the sentence topic plays a critical role for the local organization and storage of information. In German main clauses, the topic usually occurs

sentence initial, except when there are locative or temporal adverbials, which relegate the sentence topic to the top position in the middle field (Büring 1999, Frey 2000, Jacobs 2001, Speyer 2008). Reinhart (1981) highlights the difference between topics and subjects, noting that although they are distinct, there is a common tendency to place the topic in the subject position. The discourse topic, conversely, plays a vital role in information storage and global organization of discourse, establishing relationships between propositions. Within the framework of the *Question Under Discussion* (QUD; e.g., Van Kuppevelt 1995, Roberts 2012), a discourse topic is defined by its connection to the explicit or implicit questions that a series of sentences aims to address. From a cognitive perspective, both types of topics play a crucial role in organizing the internal representation of discourse and serve as anchors for its elements (Schumacher, Patterson & Repp 2024: 2). Sentence topics mainly contribute to coherence between neighboring sentences, while discourse topics structurally organize discourse by identifying its central theme on a broader scale, ensuring coherence and structure in spoken or written discourse (van Dijk 1977, 2014). Therefore, sentence topics and discourse topics are interconnected, as the topic of a sentence influences which discourse referent is interpreted as the discourse topic (Arnold 1998).

Especially interesting for the current dissertation is the work of Givón (1983) concerning the notion of topic in larger texts. He outlines the concept of *topic continuity*, where the same topic spans across multiple clauses, in terms of the behavior of discourse referents as discourse unfolds. Givón (1983) suggests a topicality scale, emphasizing that all referents in the discourse are topical to some extent. On this topicality scale zero anaphors point to the most topical referents, which are repeatedly mentioned by multiple anaphoric expressions in the discourse. Conversely, indefinite DPs are positioned at the opposite end of the scale, considered the least topical. This implies that the referent is typically a newly-introduced, newly-changed, or newly-returned topic, representing a “discontinuous topic in terms of the preceding discourse” (Givón 1983: 9). Givón (1983) also presents three factors affecting the form of referring expressions: (i) *referential distance* (how recently the discourse referent has been mentioned), (ii) *potential interference* (how many other potential antecedents of the referential form there are), and (iii) *persistence* (how long the discourse referent will remain in the discourse). Referential distance measures the gap between a referent’s prior mention and its current appearance within a clause. It quantifies this gap in terms of the number of clauses to the left, with a minimum value of one clause. Potential interference assesses how other referents in the immediately preceding five clauses may affect the identification of a topic. This measure also considers semantic compatibility with the predicate of the clause, taking into account

2 Reference

attributes like animacy, humanness, agentivity, or semantic plausibility. Persistence is forward-directed and reflects a topic's significance in the unfolding discourse, offering insight into the speaker's or writer's intended emphasis. According to Givón (1983: 15), topics that hold greater importance tend to appear more frequently in the discourse, indicating a higher likelihood of persisting for an extended duration after a specific measuring point. He quantifies this persistence by looking at the number of clauses to the right in which the subject or participant is continuously present as the semantic argument of the sentence, regardless of its role or the grammatical markers used. The lowest possible value that can be assigned is zero, indicating an argument that quickly decays, resulting in the lowest level of persistence. Conversely, there is no defined maximum value. Givón's (1983) notion of topicality is different from other approaches to referential form because it focuses on the referring expression itself rather than the cognitive status of the referent. Unlike scholars like Ariel (1990, 2001) who consider the topicality of the referent, Givón's (1983) measurements specifically indicate the topicality of the referring expression. Nevertheless, Givón (1983: 12) posits a connection between text properties and the cognitive status of referents, suggesting that ongoing elements are more predictable and easier to understand. Therefore, Givón's (1983) three topicality measures can also be viewed as indicators of the cognitive status of the referent, aligning with approaches that evaluate degrees of topicality based on the referent rather than the referring expression. Furthermore, von Heusinger and Chiriacescu (Chiriacescu & von Heusinger 2010, von Heusinger & Chiriacescu 2013, Chiriacescu 2011) have extended Givón's (1983) topic continuity framework by using the three measurable parameters to assess how a referent shapes discourse structure (*discourse structuring potential*).

2.3.3 Centering Theory

Another theory that addresses both discourse coherence and salience is *Centering Theory*. This theory introduces a framework for assessing the coherence of adjacent utterances in paragraphs by considering discourse referent mentions and the choice of referring expressions (Grosz et al. 1995). It aims to provide a model of discourse coherence based on the discourse trajectory of referential entities, i.e., their introduction into, persistence in and disappearance from the discourse. Simultaneously, Centering Theory seeks to predict referent salience and identify the most salient referents within a given discourse context. The core assumption of Centering Theory is similar to that of Givón (1983) by stating that "certain entities mentioned in an utterance [are] more central than others" (Grosz et al. 1995: 203). The theory suggests that discourse segments featuring

successive utterances that consistently refer to the same discourse referent exhibit higher local coherence compared to segments where different entities are mentioned. This claim, initially proposed by Chafe (1976), finds support in empirical evidence from studies like those by Kintsch & van Dijk (1978) and Givón (1983).

The computational-linguistically oriented Centering Theory analyzes text as a sequence of utterances, focusing on salient discourse referents called *centers*. The theory ranks these so-called *forward-looking centers* ($Cf(U_i)$) according to their salience to predict their likelihood of mention in the next utterance. Initially, grammatical function determined rankings, with subjects ranking higher (Grosz et al. 1995: 214). Later revisions included factors like topicality and empathy (Walker, Joshi & Prince 1998). The theory also assigns each statement a *backward-looking center* ($Cb(U_i)$), which is the highest-ranked element in Cf of the preceding sentence. This concept is closely related to the idea of a topic. Additionally, Centering Theory includes a *preferred center* ($Cp(U_i)$), predicting the next statement's Cb . This distinction between looking back with Cb and projecting forward with Cp is a fundamental aspect of Centering Theory. Centering Theory offers interesting predictions about referential chains and reference relations, making it a valuable tool due to its ability to extend beyond mere form-function correspondences to encompass a wider range of sentence structures. For instance, Centering Theory predicts that the most accessible discourse referent from the preceding utterance is typically expressed as a pronoun in the current one, known as the pronoun rule. Furthermore, Centering Theory categorizes inter-sentential referential relations by differentiating between various transition types between sentences.

In summary, Centering Theory predicts the referential form based on coherence and transitions, however, in doing this, it simplifies it to pronominal and non-pronominal forms. Moreover, Centering Theory does not account for modeling other forms like null pronouns or demonstratives and only explains choices within local contexts, neglecting the impact of coherence on overall discourse. Abraham (2002: 467) appears to be the sole researcher discussing German d-pronouns within the framework of Centering Theory. He suggests that d-pronouns shift topics and exclusively refer to rhematic referents. In Centering Theory terminology, he notes that d-pronouns, similar to personal pronouns, refer to an antecedent (Cf) but not the preferred antecedent (Cp) from the preceding text. Abraham (2002) sees the difference to personal pronouns in his observation that d-pronouns do not refer to a linear secondary Cf , i.e., a Cf after another Cf or Cp . This implies that the d-pronoun presupposes the setting of an antecedent and the non-topic property in the antecedent.

2.3.4 Prominence framework

The prominence framework offers a broad perspective on language, seeing prominence as a fundamental principle present at all levels of language and thus extending well beyond reference (Himmelmann & Primus 2015). The term *prominence* is commonly used informally to indicate that a specific discourse referent stands out in a given context (von Heusinger & Schumacher 2019). However, the discourse prominence framework presents a formal account that encompasses core notions of the theories of reference and referential expressions presented above. Additionally, it offers a number of advantages compared to the previously mentioned theories: unlike the Accessibility and Givenness Hierarchies, the prominence framework considers not only the relational, functional and structural aspects of referents but also their contextual significance. And in contrast to Centering Theory, the prominence framework not only focuses on the immediate context but also establishes connections on a broader, more global scope (cf. von Heusinger & Schumacher 2019).

The prominence framework is based on the account by Himmelmann & Primus (2015) who propose that prominence serves as a fundamental organizational principle in language, operating across various linguistic levels. In their account, prominence is defined via three key attributes: its relational nature, contextual dynamicity, and structural attraction. In line with this conceptualization, the prominence framework also describes referents and other entities in discourse via these three characteristics, as highlighted by Jasinskaja et al. (2015) and von Heusinger & Schumacher (2019). The basic units for modeling prominence in discourse in the framework are discourse referents (e.g., individuals, events, or objects) and time points. Within the framework, prominence is seen as a “structure-building principle” (von Heusinger & Schumacher 2019: 119), shaping how distinct referents are represented in discourse based on specific criteria. The prominence framework rests upon three fundamental definitions:

Criterion 1 SINGLING-OUT: Prominence is a relational property that makes one element stand out from a set of peer elements (e.g., the discourse referents in the current discourse).

Criterion 2 DYNAMICITY: Prominence status shifts over time, i.e., the prominence status of a referent can change as a discourse unfolds, for instance, a referent may have a low prominence status at one point but be promoted to the most prominent referent subsequently.

Criterion 3 **STRUCTURAL ATTRACTION:** Prominent referents are structural attractors, e.g., they can more easily be used as perspectival anchors than less prominent referents or allow for more referential variation.

The first criterion considers referential selection as a relational process, where the prominence of a referent is determined by comparing it to other similar elements within the discourse. This means that the prominence of a referent is determined by comparing it to other similar elements in the discourse, and descriptively underspecified referential expressions such as anaphoric pronouns select their referents based on their prominence status. In contrast to the Givenness and Accessibility Hierarchy, referents are not evaluated in isolation; instead, their prominence is established in relation to other competing referents.

The second criterion addresses the dynamic nature of referents. As the discourse unfolds, the prominence of referents undergoes changes over time. This implies that the most prominent referent can lose its prominence and regain it later in the discourse. Crucially, in this regard the prominence framework considers a much broader scope compared to Centering Theory. While Centering Theory primarily focuses on the type of referring expression in the next sentence, the prominence framework also addresses how the ranking of discourse items has broader structural effects. These effects are not limited to local relations (e.g., within a clause) but extend to the global impact on discourse (e.g., within a paragraph or entire text). This is important because while there is a general tendency to maintain the prominence status of referents, discourse participants may often wish to break a referential chain linked to the most prominent referent, even when it has been established across a longer sequence of time points. For instance, German demonstrative pronouns are often claimed to signal a shift in prominence structure. These expressions are said to possess forward-looking potential, meaning they are ascribed an influential role in how the prominence status of a referent develops in the future, either initiating referential shifts, or reinforcing the persistence of a referent in subsequent discourse.

The third criterion highlights that when a referent is prominent, it licenses other operations, e.g., more variation can be observed. For instance, various referential expressions can be employed to refer to a more prominent referent, leading to a wider range of available forms, while less prominent referents can only be described using a limited inventory of referential forms which are usually richer forms (e.g., full DPs). This variation in the use of referential expressions aligns with the Givenness Hierarchy.

Following the prominence framework, the process of reference resolution relies on specific principles that govern the relevant level of representation. The

2 Reference

process of reference resolution is modeled based on the idea that referents of the same type are ranked within the discourse representation. This ranking is not fixed but rather gets updated as discourse unfolds. Linguistic cues and markers (e.g., grammatical and thematic role) interact to establish prominence, thereby determining the position of their associated referent relative to that of others in this ranking. These markers, known as *prominence-lending cues*, will be further elaborated in Section 3.3 with specific relevance to pronoun resolution. The ranking of discourse referents plays a crucial role for how linguistic cues aid in constructing reference. The idea is that the cues do not create reference themselves, but indicate positions in the prominence ranking. Thus, speakers and writers select different linguistic means or cues depending on what position in the ranking the referent has they want to talk about. Listeners and readers also use (their individual version of) the ranking to resolve the reference of the expressions, given the cues they encounter. The ranking guides their use of diverse linguistic means by indicating the level of prominence (Jasinskaja et al. 2015, von Heusinger & Schumacher 2019). While various studies have explored factors contributing to prominence, a complete understanding of how prominence-lending cues interact is still pending. In my dissertation, I aim to contribute to answering this question by examining the influence of prominence-lending cues on the referential behavior of personal and d-pronouns in longer narrative texts. In accordance with the prominence framework proposed by Himmelmann & Primus (2015), it is worth noting that any level of linguistic description involves prominence-lending cues. Determining the most prominent referent based on prominence-lending cues holds implications for discourse interpretation. Concerning reference, a referent is considered more prominent than others when it is more likely to be mentioned by a referring expression or when it becomes the focus of implicit discourse-structural connections, such as coherence relations (relational coherence) (Jasinskaja et al. 2015).

von Heusinger & Schumacher (2019) propose within the prominence framework that the discourse representation, which speakers and hearers dynamically and incrementally construct as information is built up while the discourse unfolds, serves a dual purpose. It both encodes the current state of discourse and serves as the foundation for predictions about future discourse units. The authors argue that prominence plays a crucial role in maintaining and constructing the discourse representation, involving a dynamically updated structure of ranked discourse units. This organization undergoes continuous updates based on incoming information. Additionally, it forms the basis for forward-directed processes, as expectation-based processing relies on this prominence hierarchy of discourse referents, generating expectations for upcoming content. Regarding

discourse updating, von Heusinger & Schumacher (2019) stress that changes in the discourse representation structure during discourse updating are computationally demanding.

Overall, the prominence framework combines elements from previous theories of reference, including Givenness, Accessibility, Topic, and Centering Theory, by integrating the relational aspects of reference. This integration enhances its efficacy in comparison to the Accessibility and Givenness Hierarchies. Through its consideration of referent prominence in relation to other elements, the prominence framework offers a more comprehensive approach. The dynamicity principle within the prominence framework accommodates shifts that transpire within discourse. It explains how the prominence status of referents evolves over time. In contrast to Centering Theory, the prominence framework encompasses a broader contextual scope, rendering it more suitable for analyzing natural language and discourse phenomena. The prominence framework does not enforce a fixed inventory of referential forms nor does it restrict its applicability to specific types of referential expressions. Instead, it introduces three principles as foundational elements for constructing discourse structure. This adaptability empowers the prominence framework to be employed in diverse scenarios, accommodating an extensive array of referential expressions and discourse contexts.

2.3.5 Bayesian approach

The previous subsections have all dealt with the concept of *discourse referent prominence*, building on the assumption that listeners or readers develop interpreting strategies, i.e., preferences for referential expressions, based on previous experience of what types of cues are used by speakers or writers to denote various types of referents. Discourse referents in a conversation that receive more attention are more likely to be mentioned again, and are often referred to using short expressions like pronouns by speakers or writers. This is because listeners or readers are presumed to understand the inverse relationship between the attention given to a referent and the length of its corresponding referential expression. For this mechanism to operate effectively, it is crucial to assume that discourse participants share the same cues for determining referent prominence. Consequently, the prominence of a discourse referent dictates when speakers or writers opt for pronoun usage, simultaneously aiding addressees in correctly comprehending the reference. Approaches that suggest that biases on the listener's or reader's side mirror those that shape a speaker's or writer's selection on the production side have been termed *mirror models*. However, an extensive

2 Reference

body of research provides a more nuanced perspective, suggesting that pronoun production and comprehension are each influenced by distinct contextual factors (Stevenson, Crawley & Kleinman 1994, Kehler, Kertz, Rohde & Elman 2008, Rohde 2008, Miltsakaki 2007). This raises questions about the connection between biases in production and interpretation, hinting at a potential disconnect and casting uncertainty to what degree the same prominence principles apply to both processes. Andrew Kehler, Hannah Rohde, and their colleagues (Kehler et al. 2008, Kehler & Rohde 2013, Rohde & Kehler 2014, Kehler & Rohde 2019) pick up on this dissociation between production biases and interpretation biases and provide an extension of previous approaches by modeling the relationship between the two biases in terms of Bayes' Rule (cf. E1).

$$P(\textit{referent}|\textit{pronoun}) = \frac{P(\textit{pronoun}|\textit{referent})P(\textit{referent})}{P(\textit{pronoun})} \quad (\text{E1})$$

(Kehler et al. 2008)

The term $P(\textit{referent} | \textit{pronoun})$ on the left of the equation signifies the *interpretation bias*: it represents the interpretative probability on the listener's or reader's side that a pronoun, once it has occurred, is being employed by the speaker or writer to refer to a particular referent. On the other hand, the term $P(\textit{pronoun} | \textit{referent})$ in the numerator on the right side stands for the *production bias*, indicating the likelihood of a speaker or writer using a pronoun to refer to a specific discourse referent that they have in mind. According to Bayes' Rule, these biases are not exact mirror images of each other but are connected by the prior probability $P(\textit{referent})$, which represents the *next-mention bias*. The next-mention bias signifies the probability of a specific referent being mentioned next, regardless of the referring expression used. The term $P(\textit{pronoun})$ in the denominator of the equation represents a constant factor over all possible referents in the context. According to this model, comprehenders thus infer the speaker's or writer's intended references by integrating their understanding of the speaker's or writer's production biases with their prior expectations regarding the likelihood of specific referents being mentioned next. In other words, they make inferences about the speaker's or writer's referential intentions by considering both how the speaker or writer typically produces references and their own predictions about what will be mentioned in the discourse. Accordingly, overall pronoun interpretation preferences arise when the listener combines their top-down predictions about the upcoming message content (specifically, who will be mentioned next) with the bottom-up linguistic evidence (specifically, what they have learned so far about the speaker's or writer's choice to use a pronoun).

Kehler & Rohde (2019) propose two variations of their Bayesian Model. The first version, referred to as the weak form, suggests that the relationship between pronoun interpretation and production follows Bayesian principles without specifying the contextual factors influencing each term in the equation; this is illustrated in equation (E1). In other words, it predicts that if independent estimates of prior, likelihood, and posterior probabilities were available, the equation would hold approximately. However, Kehler & Rohde (2019) also propose a stronger form of the Bayesian Model, suggesting that the two terms in the equation's numerator are conditioned by different types of contextual factors. They argue on the basis of experimental studies that the factors influencing the next-mention bias primarily involve semantics and pragmatics, such as verb type and coherence relations. On the other hand, the factors influencing the production bias of pronouns are related to grammar and information structure, including grammatical role or topichood, which favor sentential subjects.

The strengths of the Bayesian approach lie in the fact that it can be implemented and thus make precise numerical predictions for pronoun resolution probabilities based on both production and perception data. It is also very compatible with the prominence framework. However, due to methodological issues, a full Bayesian implementation cannot be pursued in the current work (cf. interim summary below).

2.4 Interim summary

The previous section has presented several theories, most of them suggest a connection between discourse referent prominence and the choice of referring expressions used to represent them. For example, Givón (1983) establishes a link between a speaker's or writer's choice of referential form and the topic's significance within the context. Similarly, Ariel (1990) and Gundel et al. (1993) have developed hierarchies that connect the cognitive status of discourse referents to referential expressions. These hierarchies associate specific expressions with predetermined cognitive levels. Speakers or writers choose expressions based on their assumptions about the addressee's mental model, which aids the listener or reader in identifying the relevant discourse referent. On the other hand, Centering Theory (Grosz et al. 1995) posits that referential expressions in a text are organized into a ranked list of discourse items. This ranking is determined by contextual features associated with the expressions that introduce these items. In essence, the order or ranking of discourse items is a consequence of the specific characteristics of those items. As an account aimed at unifying the previ-

2 Reference

ous proposals, I introduced the prominence framework (von Heusinger & Schumacher 2019, Himmelmann & Primus 2015), which proposes three definitional criteria (singling-out, dynamicity, structural attraction) as essential components of prominence in discourse pragmatics. In the further course of this dissertation, I will mainly work with the prominence account due to its strengths in integrating relational and dynamic aspects of discourse referents. I also introduced a mathematical approach to reference: the Bayesian approach (Kehler et al. 2008, Kehler & Rohde 2013) which is a very promising and nuanced method that goes beyond equating the interpretation bias with the production bias. Instead, it also takes into account the influence of the next-mention bias. This expansion beyond capturing just the production bias is a crucial aspect when describing the referential process. While the prominence framework is grouping all prominence-lending cues (which I will in detail present in Section 3.3) together, it is important to note that the strong Bayesian model posits that these cues affect next mention bias and production bias differently. Therefore, prominence lending cues may have different ways of influencing the interpretation bias. However, while the Bayesian approach is very promising, I am unable to pursue it due to methodological requirements. Typically, studies evaluating the Bayesian model for pronoun resolution rely on story completion experiments. Such experiments provide data that directly allow for the extraction of relevant biases required for the model. In these experiments, participants are asked to complete sentences that either involve a pronoun or are free prompts without specific referential expressions. Analyzing the pronoun prompts yields information about pronoun interpretations, while studying the first referring expression in the free prompts reveals insights into the next-mention bias (i.e., which referent is being discussed) and the production bias (whether a pronoun is used to refer to a particular referent or not). However, since my dissertation deals with naturalistic stimuli, conducting a Bayesian analysis is beyond its scope.

In this dissertation, I therefore follow the prominence approach, which has many advantages over previously proposed approaches. Crucially, the aforementioned approaches touch upon specific aspects of the three definitional criteria of the prominence framework but never address all of them comprehensively. For instance, a key aspect of prominence is that it does not categorize referents in a binary manner. Instead, it can assign different prominence levels to multiple referents simultaneously because it deals with referents in a relational and dynamic sense. This contrasts with the topicality approach, which is limited to a specific set of referents. In a similar vein, the Accessibility and Givenness Hierarchies lack the dynamic and relational nature of the prominence account. In these hierarchies, the relationship between a lexical item and cognitive status re-

mains fixed and independent of other items. In contrast, the prominence framework (criterion 1) asserts that discourse operations, such as referent preference and form choice, depend on potential competitors. This process is also dynamic (criterion 2). Centering Theory also shows some limitations in comparison to the prominence framework, particularly in dealing with similarly activated elements within a static view. The prominence framework (criterion 1) underpins the core assumption of centering, emphasizing comparisons among elements of the same type. Criterion 2 introduces the dynamic aspect of ranking elements, as observed in Centering Theory, considering different transitional states. However, while Centering Theory primarily focuses on the type of referring expression in the next sentence, the prominence framework also addresses how the ranking of discourse items has broader structural effects. These effects are not limited to local relations but extend to the global impact on discourse (von Heusinger & Schumacher 2019), which especially in relation to the current research seems to be a crucial advantage of the prominence framework.

In sum, the prominence framework offers a comprehensive approach to reference. One of the key advantages is that this approach accounts for dynamicity which becomes very important when dealing with longer, more naturalistic texts.

3 Demonstrative pronouns

3.1 Introduction

Demonstratives have received much attention within the research literature. A multitude of reports and articles describe the definition, usage, and referential behavior of these linguistic elements. One crucial function of demonstratives, as highlighted by Diessel (2006: 463), is their role in establishing joint attention, considered “one of the most fundamental functions of human communication.” Another characteristic often associated with demonstratives lies in their deictic nature. Furthermore, it is noteworthy that demonstratives constitute some of the earliest words acquired by children (Levinson 2018, Clark 1978). This concept is tightly intertwined with the pointing gesture (Tomasello, Carpenter, Call, Behne & Moll 2005, Liszkowski, Brown, Callaghan, Takada & De Vos 2012), which precedes the linguistic acquisition of demonstratives and represents the beginning of “systematic intentional and referential communication” (Levinson 2018: 2). This close connection to pointing underscores that the core function of demonstratives is deixis – the act of directing joint attention to an object in the environment. The significance of demonstratives becomes even more evident considering that they rank among the most frequently employed words across many languages, such as English (Levinson 2018) and German (Ahrenholz 2007, Weinert 2011, Bethke 1990). Furthermore, demonstratives appear to be a universal linguistic feature, as stated by Diessel (1999: 1): “all languages have demonstratives, but their form, meaning, and use vary tremendously.” In fact, demonstratives can take on various syntactic forms, including adnominal (*diese Schauspielerin* ‘this actor’), adverbial (*hier* ‘here’, *dort* ‘over there’, *da* ‘over here’), or pronominal (*der/die/das* ‘this one’, *dieser/diese/dieses* ‘that one’). However, across many languages, especially when it comes to demonstrative pronouns, they can serve not only as deictic elements but also as anaphoric ones. They thus compete with third-person personal pronouns. Furthermore, demonstratives are used in a variety of different contexts. A distinction between different usage types of demonstratives has been part of cross-linguistic research for many years (Himmelmann 1996, Diessel 1999, Fillmore 1982, Halliday & Hasan 2013). In particular, accounts by Himmelmann (1996) and Diessel (1999) describe four different main types of

3 Demonstrative pronouns

demonstrative uses, which are claimed to apply to demonstratives from all languages: situational use² (introduces a new referent through deixis, pointing to something in the immediate context), anaphoric use³ (serves to track coreferent participants in the preceding discourse), discourse deictic use (indicates reference to propositions or events within the discourse), and recognitional use (characterizes demonstratives that are used to activate specific shared knowledge). Furthermore, studies have shown that pronoun resolution, in particular the processing of demonstratives, has real-time consequences (e.g., [Schumacher et al. 2015, 2017](#)).

This chapter offers a comprehensive overview of the characteristics and referential patterns of German demonstrative pronouns. Thereby, I will especially focus on the German demonstrative pronouns *der/die/das* (referred to as d-pronouns). In [Section 3.2](#), I will discuss the various functions of German d-pronouns, examining their roles in specific contexts. Following this, the chapter delves into an analysis of local prominence-lending cues ([Section 3.3](#)) to clarify how these cues contribute to the referential resolution of d-pronouns within a prominence-based framework. To ensure a comprehensive examination, the chapter also covers differences between d-pronouns and pronouns of the *dieser/diese/dieses*-paradigm (hereafter: diese-pronouns) in [Section 3.4](#), completing the introduction of German demonstratives. I will not discuss the *jener/jene/jenes*-paradigm in detail, since this form of the demonstrative pronoun is about to disappear from German and, if at all, can only be found in the written modality ([Himmelman 1996](#)).

3.2 Functions of German d-pronouns

In research on demonstrative pronouns, a central concern has always been to distinguish them from personal pronouns, thus achieving a clear delimitation of the two categories. Demonstrative pronouns have been ascribed a multitude of functions that span a wide spectrum. Within this spectrum, specifically d-pronouns have been attributed functions that encompass perspective, evaluation, contrast, attentional management, and disambiguation ([Patil, Hinterwimmer & Schumacher 2023](#), [Hinterwimmer & Bosch 2016](#), [Levinson 2018](#), [Kaiser 2011b](#), [Diessel 1999](#), [Ahrenholz 2007](#), [Bethke 1990](#)). Additionally, it has been debated whether d-pronouns essentially are marked personal pronouns, possibly

²The situational use is referred to as exophoric use by [Diessel \(1999\)](#), [Halliday & Hasan \(2013\)](#).

³The anaphoric use is referred to as tracking use by [Himmelman \(1996\)](#).

making them interchangeable with personal pronouns (Wiemer 1996). This section provides an exploration of the diverse functions inherent to d-pronouns. Functions presented in this section relate to the contrast between personal and d-pronouns. Nevertheless, some functions relate to both demonstrative pronoun types, i.e., d-pronouns and diese-pronouns. Consequently, the more encompassing term *demonstrative* will at times be employed to refer collectively to both paradigms of pronouns.

3.2.1 Attention (re)orientation function

As mentioned earlier, demonstratives in general have the inherent function of establishing joint attention. Thus, they can (re)orient the attention of the discourse participants. This interaction between attention and the demonstrative can result in different effects. On the one hand, it can lead to a change in the topic, while on the other hand, they can focus attention on a specific referent without altering the topic.

Topic shift By the use of a demonstrative (*der/die/das* or *dieser/diese/dieses*) the addressee's attention can be directed from one referent to another. Therefore, demonstratives are able to establish a new common focus of attention between the discourse participants. According to Diessel (2006, 2019), this is the primary function of demonstratives. He attributes this to the close connection between demonstratives and deictic gestures. It has also been claimed that demonstratives hold this function in spoken conversations as well as in written texts. This function is often named *topic-shift function* (Diessel 1999, 2006, 2019, Ahrenholz 2007, Bethke 1990, Abraham 2002) or *referential shift potential* (Fuchs & Schumacher 2020). It is an aspect of the functions of demonstratives that is *forward-looking* (e.g., Schumacher et al. 2015, Fuchs & Schumacher 2020). Specifically for German, Diessel (1999, 2006, 2019) states that demonstrative pronouns tend to not pick up topics and thus do not continue them, but instead signal a topic change by referring to the non-topic referent. This holds for both the pronominal (Diessel 2006: 477) and adnominal (Weinrich 1993: 441) use of demonstratives. In contrast, a personal pronoun acts as a topic *continuer* since it primarily refers to topical antecedents and consequently maintains the prominence status of established referents. Example (2) illustrates the topic shift function of d-pronouns. In this context, the corresponding d-pronouns in continuations (2a) and (2b) cannot refer to Peter. However, they can readily refer to the second animate DP, *einem alten Freund* ('an old friend'). Since the d-pronouns in the continuation sentence

3 Demonstrative pronouns

serve as the sentence topic (due to their sentential position), the previous non-topic referent to which they refer has been elevated in prominence.

- (2) Als Peter_i auf die Straße herauskam, begegnete er einem alten Freund_j.
When Peter_i came out into the street, he met an old friend_j.
- a. Der_{*i/j} grüßte ihn_{i/*j}.
*He-DPRO_{*i/j} greeted him_{i/*j}.*
- b. Den_{*i/j} grüßte er_{i/*j}.
*Him-DPRO_{*i/j} he_{i/*j} greeted.*

(Abraham 2002: 458)

Empirical evidence for the topic shift function comes from text continuation tasks, aimed at determining which referent is selected and how the form of a referring expression impacts subsequent discourse. [Gernsbacher & Shroyer \(1989\)](#) examined the English adnominal indefinite demonstrative *this* (e.g., *this egg*) in comparison to regular indefinites (*an egg*). The results show that participants mentioned the referent in question more often in their continuations when the indefinite demonstrative determiner *this* preceded the newly introduced referent. Therefore, the authors conclude that the demonstrative determiner increases or boosts the accessibility of the newly introduced referent. With respect to German d-pronouns, [Schumacher et al. \(2015\)](#) investigated the topic shift behavior of personal pronouns and d-pronouns in a story continuation task. Their context sentences encompassed active-accusative and dative-experiencer structures, where the referents are placed in canonical (subject-verb-object) or non-canonical (object-verb-subject) order. It has to be noted that usually the subject-verb-object (SVO) order is the unmarked word order of German (cf. [Lenerz 1977](#)). However, dative-experiencer verbs are an exception; in these contexts, the object-verb-subject (OVS) order is the canonical one ([Haider 1993](#)). The study assumed that placing the referent in sentence-initial position cues it as topic of the sentence. The results reveal that d-pronouns induce more topic shifts compared to personal pronouns. However, the linear positioning of referents in non-canonical constructions does impact the likelihood of referential shifts for personal pronouns. In non-canonical contexts, especially those involving active-accusative verbs, personal pronouns tend to result in more frequent topic shifts. Similar results were observed by [Fuchs & Schumacher \(2020\)](#). Thus, the empirical studies on the topic-shift potential are in line with previous theoretical assumptions by [Diessel \(1999, 2006\)](#), [Bethke \(1990\)](#) and [Abraham \(2002\)](#), that d-pronouns initiate a topic shift by continuing the text with referring to a less prominent referent (e.g., non-topic, proto-patiens).

Information foreground Another aspect of attention-orienting involves the contribution of *d*-pronouns to the so-called information profile (Bethke 1990), which refers to the differentiation between important information and less significant details based on the formal distinctions of the two pronoun types. This function differs from the previously discussed topic shift function in that it does not solely depend on the information content of the antecedent. Instead, it highlights the *d*-pronoun's ability to elevate the referent into the information foreground, regardless of whether the referent was the topic in the previous sentence (whether prominent or less prominent), while personal pronouns represent the information background. Therefore, *d*-pronouns create a so-called *relief profile* (ger. "Reliefbildung", Bethke 1990). Hence, *d*-pronouns are frequently considered the more marked form compared to personal pronouns (Bethke 1990, Ahrenholz 2007, Weinrich 1986). Bethke (1990: 57) argues that the distinction between personal pronouns and *d*-pronouns lies in the "auffälligkeit" (translated as *conspicuousness*) of *d*-pronouns, whereas personal pronouns are marked only by "unauffälligkeit" (*inconspicuousness*). Furthermore, the base morpheme *d-* (*der* vs. *er*) is discussed as a carrier of attention-orienting characteristics and serves to attract the listener's attention (Bethke 1990: 56, Weinrich 1986). In contrast, personal pronouns lack such an attention-orienting morpheme, providing only inconspicuous anaphoric reference. As a result, *d*-pronouns direct more attention than personal pronouns, guiding the listener's or reader's attention to specific referents. Thus, *d*-pronouns can highlight specific referents, for instance, a protagonist, by positioning them in the foreground (i.e., relief profile). This is evident in the dialogue presented in (3).

- (3) Anne: Guten Tag, hier ist Anne. Ist die Helga da?
 Iris: Nee, **die** is nich da, **die** is im Moment, ich glaub in Hilden oder so, bei ihrem Freund.
 Anne: Ah so...
 Iris: **Die** wird also in den nächsten 2, 3 Wochen kaum hier auftauchen.
 Anne: Ah so! Ehm, was is denn... hat denn der Freund bestanden?
 Iris: **Der** is ja noch nich fertig.
 Anne: **Der** is noch nich fertig?
 Iris: Nee, ich glaub, **der** hat die mündlichen Prüfungen noch vor sich!
 Anne: Ah so! Na, dann kann man ja noch nichts sagen.
 Weiß du, wie's **ihr** an der Schule gefällt?
 Iris: Ja, **die** hat wohl diese Woche angefangen, am Donnerstag.
 Anne: Hello, this is Anne. Is Helga there?
 Iris: No, she's-DPRO not here, she's-DPRO at the moment, I think in Hilden or some-

3 Demonstrative pronouns

thing, with her boyfriend.

Anne: Ah okay...

Iris: She-DPRO will hardly show up here in the next 2, 3 weeks.

Anne: Ah okay! Ehm, what is then... has then the friend passed?

Iris: He-DPRO isn't finished yet.

Anne: He-DPRO isn't finished yet?

Iris: No, I think he-DPRO still has the oral exams ahead of him!

Anne: Ah so! Well, then you can't say anything yet.

Do you know how she likes school?

Iris: Yes, it-DPRO probably started this week, on Thursday.

(Bethke 1990: 188)

The relief profile becomes apparent when d-pronouns emphasize specific referents, whereas personal pronouns do not possess the same effect. In this example, the use of d-pronouns serves to direct attention to distinct referents. However, in the example (with the exception of the last d-pronoun in Iris' final statement), they do not indicate a shift in reference. Instead, they maintain continuity with the topic introduced in the preceding sentence while intensifying attention. Zifonun et al. (1997: 560) refer to this as a constant state of (re)orientation, which can effectively highlight a referent in a particular manner. Notably, in (3), Iris' first statement introduces two referents (Helga and Helga's boyfriend). However, in Iris' second statement, which can be viewed as a continuation of the first, interrupted only by the backchannel *ah so*, she continues to focus on the previous sentence's topic (Helga) by employing a d-pronoun. This not only illustrates the d-pronoun's foregrounding function but also underscores that its use does not necessarily result in a change of reference. It is worth mentioning that the d-pronoun in Iris' second statement is unambiguous due to the presence of gender information. In a context where Helga is visiting her girlfriend, there could be substantial ambiguity with the d-pronoun, as it might also refer to the second referent.

Moreover, (3) illustrates that personal pronouns and d-pronouns can be used interchangeably (Wiemer 1996). In fact, substituting d-pronouns with personal pronouns in (3) would result in an acceptable dialogue (except in Iris' final statement). Wiemer (1996) classifies d-pronouns as *strong* personal pronouns, in contrast to personal pronouns, which he refers to as *weak* personal pronouns. Ahrenholz (2007: 235) terms this phenomenon as *focus preservation*, because d-pronouns maintain a more focused reference compared to personal pronoun. Especially in everyday language and dialects, it has been observed that d-pronouns often serve as substitutes for personal pronouns (Bellmann 1990, Wiemer 1996,

3.2 Functions of German d-pronouns

Regularitas verbi, ich hab/ imperfectum hoc modo
format:

Ich heb/	Wir heben/
Du hebst/	Ihr hebtet/
Der hebt.	Die hebeten.

Verum b litera propter euphoniā è medio tollitur.
Praeteritum perfectum.

Sing.		Plur.
Ich hab/	}	Wir haben/
Du hast/		Ihr habt/
Der hat		Die haben
		} gehabt.

Figure 3.1: Interchangeability of d-pronouns. Screenshot from [Albertus](#) (1573/1895: 101).^a

^aTranslation of Figure 3.1:

*Regularity of the verb, I have / forms the imperfect in this way:
I have, you have, he-DPRO has, we have, you have, they-DPRO have
But the letter b was removed from the middle for reasons of euphony. Past perfect.
I have had, you have had, he-DPRO has had, we have had, you have had, they-DPRO have had*

[Curme 1905: 188](#), [Patel-Grosz & Grosz 2017: 286](#)). The primary reason for this substitution is considered to be the structural *weakness* of the personal pronouns, specifically the absence of the base morpheme *d-* ([Bellmann 1990: 206](#)). However, [Wiemer \(1996\)](#) posits that interchangeability is not always possible. Cases in point are situations involving ambiguous referents (as seen in Iris’ final statement) or when dealing with pejorative expressions, both of which will be discussed in the following subsections. However, a historic comparison reveals that the interchangeability of d-pronouns has a history of over 500 years and is not a recent linguistic development ([Bellmann 1990: 207](#)). The practice of substituting d-pronouns for personal pronouns can be traced back to the earliest grammatical discussions of the German language. For instance, it can be observed in early grammar texts where *der/die* were used in place of *er/sie* as personal pronouns in verbal inflection paradigms. For example, in the Leipziger edited version of *Exercitium puerorum* from 1493, there are occurrences of *der ruft* instead of *er ruft* (he calls) (cf. [Bellmann 1990](#)). Similar examples can be found in the grammars of [Albertus](#) (1573/1895: 101) and [Clajus](#) (1578/1894: 67) from the 16th century, see [Figure 3.1](#) for a screenshot from [Albertus](#) (1573/1895). However, by the 18th century, the use of *der/die* as d-pronouns became more commonly associated with lower styles and dialects, while the “Bildungssprache” (educated language) predominantly supported the use of *er/sie* pronouns ([Bellmann 1990: 207](#)).

3.2.2 Contrast function

Another function closely related to the general function of attention orientation is the contrastive function served by demonstratives. This is accomplished by their capacity to redirect attention, highlighting an object in contrast to alternatives (Diessel 1999, Bosch & Hinterwimmer 2016: 208, Zifonun, Hoffmann, Strecker & Ballweg 1997: 559).

In linguistics, the concept of contrast is defined in various ways. One common definition characterizes contrast as involving an alternative element that, when substituted for the original, results in a false statement (e.g., Halliday 1967: 206, Chafe 1976: 34). Another definition posits that alternatives inherently contrast with each other due to their inherent differences, implying the presence of either new information or contrast (e.g., Katz & Selkirk 2011). This concept of contrast closely aligns with the notion of focus in Alternative Semantics (Rooth 1992). Other studies also associate contrast with the information structural concept of contrastive focus (Repp 2016, Umbach 2004). Additionally, contrast can be linked to the beliefs of conversation participants, where the speaker's or writer's choice of an alternative is considered unexpected or remarkable (Halliday 1967, Zimmermann 2008).

In the literature related to demonstratives, two different types of contrast are discussed: a local-deictic contrast and a delimitation to alternative sets. However, the often discussed form of expressing a contrast through the juxtaposition of a proximal and a distal referent (e.g., as seen in English for *this* and *that*) is not applicable to German⁴. Rather German demonstratives primarily serve to distinguish the intended referent from a set of possible alternatives, essentially creating a contrast between two alternative sets (Bisle-Müller 1991). As Pause (1991: 558) points out, the use of demonstratives inherently involves selecting from multiple options and placing either focus or contrastive emphasis on a referent. According to Bisle-Müller (1991: 80), adnominal demonstratives help to differentiate the intended referent from other possible referents within shared knowledge, ensuring clear distinction of the intended referent from the alternative forms. Therefore, the function of demonstratives is often considered to involve the information structural notion of a contrastive focus (Voigt 2022).

⁴German demonstratives (*der/die/das* and *dieser/diese/dieses*) do not inherently indicate distance. They can be used for both proximal and distal reference. To convey a contrast in distance, German demonstrative pronouns are often combined with demonstrative adverbs like *das da* (this there) and *das hier* (this here) for proximal reference and *das dort* (that) for distal reference. While some discussions suggest that *diese* and *jene* may express proximity and distance respectively (cf. Himmelmann 1997: 49-50, Bisle-Müller 1991: 69), a corpus study by Ahrenholz (2007: 207) could not confirm this claim, especially in spoken German.

However, it has been suggested that this contrastive use, serving as a means of delimiting identification, only applies to adnominal diese-pronouns and not to d-pronouns (Diessel 1999, Ahrenholz 2007, Bisle-Müller 1991). Ahrenholz (2007), attributes an identifying and delimiting function to diese-pronouns, while he associates d-pronouns primarily with an identifying function. However, he further suggests that d-pronouns could potentially be used contrastively, although achieving this effect typically requires additional linguistic devices, such as prosodic emphasis (Roberts 2012). This observation, indicating that achieving a contrastive effect with the d-pronoun often requires a certain degree of prosodic stress, is also supported by Bader, Portele & Schäfer (2022). A comparison with the generally unstressed relative pronoun illustrates that when stressed, the d-pronoun can indeed convey contrast (cf. (4)).

- (4) a. Er hat einen neuen Vorschlag gemacht, der (RELATIVE PRO) mir besser gefallen hat.
He made a new suggestion, which I liked better.
- b. Er hat einen neuen Vorschlag gemacht; der (D-PRO) hat mir besser gefallen.
He made a new suggestion; this one I liked better.

(Diessel 1999: 121)

Nonetheless, a contrastive function is also attributed to unstressed d-pronouns. In a study by Bosch & Hinterwimmer (2016: 208) where they actually explore the referential behavior of d-pronouns in relation to their tendency to refer to topics, they posit that topics may not be favorably taken up by any anaphoric expressions that reorients attention away from a topical referent, unless there is a pragmatic desire to do so, such as to express a form of contrast. In their discussion, they explicitly reference Schwarz (2015), who also suggests that d-pronouns can refer to topics when they are contrasted with other salient referents in the discourse. While Bosch & Hinterwimmer (2016) share a similar perspective, they are less certain that the other referents must necessarily be salient in the discourse for this to occur. However, they explicitly acknowledge that these considerations lack empirical confirmation and are solely based on their linguistic intuition. Voigt (2021) conducted a referent-selection study in written modality with the aim of investigating the contrastive function of d- and diese-pronouns. The study demonstrates that d-pronouns can also be employed in contrastive contexts. These findings align with the suggestions put forth by Bosch & Hinterwimmer (2016).

3 Demonstrative pronouns

However, if contrast is considered simply as the presence of alternatives, then all demonstratives automatically entail contrast by inherently drawing attention to something other than the expected referent or implying alternatives. Nevertheless, despite the challenges in precisely defining the term contrast, studies on d-pronouns demonstrate their role in contributing to contrast in different aspects. It has been demonstrated that d-pronouns, even when unstressed, can distinguish intended referents from possible alternatives, thereby creating a contrast. It is essential to emphasize that demonstratives are compatible with contrast even when they are unstressed, whereas personal pronouns only exhibit contrast when stressed. This distinction becomes evident in (5), where the d-pronoun in (5a) signals a dislike for the former nanny, whereas this interpretation is not apparent in (5b) for the unstressed personal pronoun. Example (5) also highlights the significance of word order in conveying contrast (e.g., Frey 2006). With unstressed personal pronouns, the contrastive reading remains odd, as personal pronouns typically require stress to effectively denote contrast. Notably, the sentence initial d-pronoun, whether stressed or not, consistently conveys a contrastive reading. Conversely, when the word order does not imply a contrastive reading, such as in SVO order (*'Ich mag sie/die.'*), the d-pronoun also lacks a contrastive function. Thus, it can be inferred that d-pronouns contribute to expressing contrast. This discrepancy between the contrastive contributions of personal and d-pronouns, exemplified by the fact that even an unstressed d-pronoun in (5a) can convey contrast, can be linked to the attentional (re)orienting function of the d-pronoun, a capability that personal pronouns lack. However, from a semantic standpoint, the contrast function is associated with the alternative set, and, therefore, extends beyond mere attention orientation. Nevertheless, compared to the personal pronoun, this function is facilitated by the attention-orienting feature.

- (5) a. Wir haben wieder eine neue Nanny. Die mag ich.
We have a new nanny. Her-DPRO I like. (literal translation)
- b. Wir haben wieder eine neue Nanny. Sie mag ich.
We have a new nanny. Her I like. (literal translation)

3.2.3 Disambiguation

Even though personal pronouns and d-pronouns can both serve referential continuation, they often do so in different ways. The preceding Subsection 3.2.1 demonstrated instances in which personal pronouns and d-pronouns can be used interchangeably. However, there are also situations where interchangeability is

not possible, as d-pronouns are in fact frequently used for disambiguation purposes (Zifonun et al. 1997, Ahrenholz 2007, Wiemer 1996). According to Wiemer (1996), d-pronouns can make an unambiguous choice between competing referents. This is because d-pronouns are often ascribed divergent resolution preferences from personal pronouns. Example (6) illustrates the disambiguation function of d-pronouns; here the illustrated context is ambiguous for the personal pronoun, i.e., it can felicitously refer to both referents. The d-pronoun, however, is more restricted than the personal pronoun and is more likely to be interpreted as referring to the tour manager (this tendency also indicates the topic shift function, which was discussed in Subsection 3.2.1).

- (6) Der Künstler₁ will den Tourmanager₂ treffen, weil das Konzert ansteht.
Aber er_{1/2} / der₂ ist viel zu aufgeregt.
The artist₁ wants to meet the tour manager₂ because the concert is coming up. But he_{1/2} / he-DPRO₂ is way too excited.

Empirical studies reveal that d-pronouns exhibit a preference for less prominent discourse referents. These preferences, as exemplified in (6), indicate that in transitive sentences, the less prominent referent (i.e., the second-mentioned referent) is favored in the majority of cases (77 % of cases in a study by Schumacher et al. 2016). Personal pronouns, on the other hand, show somewhat more flexible resolution preferences, revealed in less pronounced referential choices (e.g., first-mention preference in 62 % of cases in Schumacher et al. 2016). In naturalistic speech, an ambiguous sentence is rarely disambiguated solely by the pronoun; instead, the disambiguation relies on context, world knowledge, or information about the discourse referents.

3.2.4 Expressive function

D-pronouns are often intuitively associated with an expressive, emotional, or pejorative function. The use of d-pronouns in reference to people is at times considered impolite or marked with a negative valence (Weinrich 1986). However, the question of whether d-pronouns actually carry a pejorative function or whether the surrounding context is actually responsible for this attribution has been a matter of controversy for many years (Weinrich 1986, Bellmann 1990, Bethke 1990, Ahrenholz 2007).

Weinrich (1986) distinguishes between d- and personal pronouns based on their sensitivity to politeness or impoliteness. He labels d-pronouns as “konturenschärfend” (translated as *contour-sharpening*) and identifies directness or

3 Demonstrative pronouns

contour-sharpening as a potential marker of impoliteness. Consequently, he categorizes d-pronouns as impolite referring expressions. However, [Weinrich \(1986\)](#) limits this function to reference to people; using a d-pronoun to refer to an inanimate referent (or animals) is not necessarily perceived as impolite. [Bellmann \(1990\)](#) also observes that the use of d-pronouns can be considered inappropriate due to their potential to convey negative evaluations. Additionally, [Bellmann \(1990\)](#) identifies the use of d-pronouns as suitable when referring to inanimate entities but potentially problematic when addressing animate entities, especially people, as illustrated in (7). In contrast, [Bethke \(1990: 72\)](#) argues that the pejorative use of d-pronouns does not stem solely from the pronouns themselves; she states that d-pronouns are not “responsible” for evaluative connotation, rather they are influenced by other linguistic and situational factors within the context of utterance. Furthermore, she claims that d-pronouns can also serve in positively evaluative contexts, as indicated in (8). This is also corroborated by experimental work of [Patil et al. \(2023\)](#). Likewise, [Ahrenholz \(2007\)](#) disagrees with the categorization of the use of d-pronouns as invariably and inherently impolite. He claims that d-pronouns can indeed serve an additional function of conveying emotion or carrying a pejorative tone, but this aspect is not necessarily a central or obligatory function of d-pronouns.

- (7) a. Peter will einen Benz kaufen. Der hat wohl zu viel Geld.
Peter wants to buy a (Mercedes-)Benz. He-DPRO apparently has too much money.
- b. Peter will einen Benz kaufen. Der soll aber nicht so teuer sein.
Peter wants to buy a Benz. But it-DPRO should not be too expensive.
- (Patil et al. 2023: 2)

- (8) Berndt von Staden, der ausscheidende Staatssekretär des Bonner Außenamtes – ein Gentleman alter Schule, der Maßstäbe für die moderne Diplomatie setzte und über den der ehemalige Amtschef Willi Brandt heute mit Hochachtung sagt, “der ist einfach Sonderklasse.”
Berndt von Staden, the retiring state secretary of the Bonn Foreign Office – a gentleman of the old school who set standards for modern diplomacy and about whom former head of office Willi Brandt says today with respect, “he-DPRO is simply exceptional”.

(Bethke 1990: 2)

Regarding the notion that d-pronouns carry an emotional and/or pejorative connotation, it has also been proposed that d-pronouns serve an **evaluative func-**

tion. This perspective gains support from the observation that d-pronouns frequently appear in expressions where an evaluative statement is made from a perspectival center (Hinterwimmer & Bosch 2017, Hinterwimmer et al. 2020, Patil et al. 2023). This approach can also provide an explanation for (7a). In the second sentence, which features the d-pronoun, a negative evaluation is directed towards the discourse referent Peter. However, not only (7a), but also the whole controversial debate about the potentially pejorative connotation of d-pronouns can be clarified by means of the evaluative function. This is because it has been observed that d-pronouns can appear in contexts with both positive and negative connotations (Patil et al. 2023, Bethke 1990). Consequently, an analysis has been proposed that a function of d-pronouns is to express the individual perspective of the perspective-holder, thus linking them to evaluative statements. In an exploratory analysis by Patil et al. (2023), it has been shown that d-pronouns have a graded sensitivity to evaluation, e.g., the stronger the evaluation expressed in the sentence the more suitable is the use of a d-pronoun, whereas the polarity of the statement (negative vs. positive) does not matter. This latter observation suggests that it is not expressive or pejorative content that aligns with the use of d-pronouns but rather that evaluative expressions are anchored to the perspective-holder, which licenses the use of a d-pronoun (cf. Subsection 3.3.8 below for the contribution of perspectival anchors to prominence).

This dissertation follows the account proposed by Hinterwimmer (2019, 2020) and Patil et al. (2023) based on their empirical findings. According to them the d-pronoun can refer to people appropriately without being offensive or impolite. While it is undeniable that d-pronouns can indeed be employed to express negative emotions toward the referent, it is important to note that they are not inherently required to carry a negative connotation. Instead, it appears that an evaluative statement creates the possibility for a pejorative interpretation in the first place.

3.2.5 Interim summary

This section has outlined the various functions of d-pronouns, highlighting distinct differences from personal pronouns. The functions discussed herein are closely tied to the d-pronouns' capacity to (re)orient attention. This is mainly attributed to the marked nature of d-pronouns, which significantly influences the attention of conversation participants. Consequently, functions such as topic shift, information foregrounding, and contrast are intricately linked to the attention-orienting ability of d-pronouns. In the context of a topic shift function, the demonstrative pronoun in the topical position directs attention

3 *Demonstrative pronouns*

to a previously less prominent referent, effectively shifting the topical referent. This sets them apart from personal pronouns, usually employed to uphold the ongoing topic. Nevertheless, it is important to note that referential shift is not the only function of d-pronouns, as commonly suggested in previous literature. D-pronouns also serve the function of information foregrounding (Bethke 1990), effectively providing an *attentional boost* to a referent. This function is possibly associated with the base morpheme *d-*, which makes d-pronouns more conspicuous compared to personal pronouns. Information foregrounding can occur even with already topicalized referents, making d-pronouns behave like “strong personal pronouns” (Wiemer 1996: 75) in such cases. Furthermore, I have discussed how d-pronouns can convey a contrastive function, a role that personal pronouns by themselves also do not possess. However, with a contrastive stress personal pronouns can also convey a contrastive function. Another function that is less related to attention is the d-pronouns’ capacity to disambiguate certain contexts due to their strong interpretation preferences for the less prominent discourse referent (as elaborated in the following section). Another prominently discussed function of d-pronouns is their emotional and evaluative connotation. Contrary to the previous assumption that d-pronouns are consistently interpreted pejoratively, I have argued based on recent research that this is not actually the case. Instead, d-pronouns are frequently associated with evaluative statements, but the polarity of this evaluation can be negative or positive. This further distinguishes them from personal pronouns.

3.3 Prominence-lending cues

In the preceding section, various properties of d-pronouns were discussed. It was demonstrated that while the d-pronoun exhibits a preference for referring to the less prominent referent, it can also refer to prominent referents, for example, in order to highlight them. The current section will now elaborate the properties of the *previously mentioned referent*, which I also refer to as the *previous mention*, that is the coreferent discourse referent that immediately precedes the relevant pronoun. But what factors contribute to the selection or rejection of a potential previously mentioned referent? The understanding of the relational aspect of reference resolution is often rooted in the organization of referents as ordered sets within discourse representation (e.g., Grosz et al. 1995, von von Heusinger 2006). This ordering relies on cues from previous mentions of discourse referents, known as *prominence-lending cues*, which contribute to the prominence ranking of a given discourse referent. A substantial and growing body of literature has

investigated the referential behavior of pronouns. Many studies have pinpointed various factors influencing prominence rankings. However, a debate persists regarding whether a single factor or a combination of factors is accountable for pronoun resolution. Early studies aimed to isolate the specific elements that determine the prominence of certain antecedents (e.g., [Gernsbacher & Hargreaves 1988](#), [Bosch et al. 2003](#)). Subsequently, a more nuanced perspective has evolved, with recent research highlighting that prominence results from the interplay of multiple factors such as grammatical function, syntactic position, and thematic role (e.g., [Bader & Portele 2019](#), [Järvikivi, van Gompel, Hyönä & Bertram 2005](#), [Kaiser & Trueswell 2004a,b](#), [Schumacher et al. 2015, 2016](#)). Another perspective is the so-called form specific approach, which posits that various referring expressions are sensitive to different factors or exhibit varying sensitivities to specific factors (I will discuss this in more detail in Subsection 3.3.9).

Early studies examining the referential behavior of pronouns were conducted on English personal pronouns. Consequently, early studies of the referential behavior of German pronouns (and other languages) were also limited to personal pronouns. Therefore, the following subsections will also describe studies solely on German personal pronouns before moving on to research on demonstratives. Another notable issue that arises from the study of prominence-lending cues is that often various prominence-lending cues converge on a single discourse referent. In English, for example, the subject is most likely also the sentence topic and the first-mentioned referent. Consequently, disentangling these prominence-lending cues and discussing them separately is to some degree a methodological challenge, as many studies explore numerous prominence-lending cues taken together. In the subsections that follow, I will nevertheless discuss the different prominence-lending cues one by one, with the caveat that any empirical results about one cue might come from studies that did or could not always fully disentangle the effect of that cue from another. I will point this out where possible.

Nevertheless, it also has to be noted that prominence-lending cues (such as grammatical role, thematic role, or topichood) are not the main decisive factors for pronoun resolution. In fact, morpho-syntactic cues such as gender congruence is the most important factor for pronoun resolution outweighing other prominence-lending cues ([Lappin & Leass 1994](#), [Patterson & Schumacher 2021](#)). However, especially in ambiguous scenarios other prominence-lending cues substantially contribute to pronoun resolution

3.3.1 Order of mention

One of the earliest proposals regarding the referential behavior of pronouns is the *structure-building account*, also known as the *first-mention account*. This theory sees order of mention as a relevant prominence parameter, assigning special importance to the order of mention in the antecedent sentence. According to the structure-building framework, the first-mentioned referent functions as a basis on which other information are mapped when constructing a mental model (Gernsbacher 1989, Gernsbacher & Hargreaves 1988, Carreiras, Gernsbacher & Villa 1995). This account suggests that the importance of the initially mentioned referent is tied to general cognitive processes, which are not influenced by linguistic factors such as the grammatical role of the antecedent. From a linguistic perspective, the first-mentioned position is significant because it often aligns with other prominence-lending cues, such as topichood, subjecthood, and agentivity (as it is usually the case for English, and often for German). Generally, edge placement is assumed to enhance the significance of a prominent element and is thought to be processed more easily compared to those positioned in the middle (cf. Himmelmann & Primus 2015). Order of mention is interpreted as a reflection of information structuring, where the initial referent is taken to be the most relevant/important/prominent (topical) one. Notably, Carreiras et al. (1995) also observed the first mention advantage for Spanish, a language with a more flexible word order than English, even in OVS word order sentences, where the first-named noun phrase is not a grammatical subject. A study on German personal and d-pronouns, however, revealed that that order of mention cannot be the primary cue for pronoun resolution (Schumacher et al. 2016). The authors did not observe that specific pronoun types consistently refer to either the first-mentioned or the most recent referent. The issue whether linear order is a cue in itself or rather an epiphenomenon resulting from other prominence cues is, therefore, not fully resolved yet. The factor of recency and last mention has also been proposed to influence the referential behavior of demonstratives. However, this effect has primarily been observed for *diese*-pronouns, which is why I will discuss it only in Subsection 3.4.1.

3.3.2 Grammatical role

The structure-building framework just discussed is grounded in assumptions about general cognitive processes. However, in terms of linguistic preferences, one factor that has been prominently discussed as a decisive element for referent selection is the grammatical role of the antecedent. The factor of grammatical

role has also been generally discussed as an influential prominence-lending cue, for instance, placing subjects at the top of a case hierarchy (Keenan & Comrie 1977) or indicating that subjects are easier to process than objects, as studies on argument order manipulations suggest (Traxler, Morris & Seely 2002, Delgado, Raposo & Santos 2021). The factor of grammatical role continues to be a focal point in numerous studies to this day. Two different accounts postulate the importance of grammatical role: the *parallelism account* (Smyth 1994, Chambers & Smyth 1998, Streb, Rösler & Hennighausen 1999) and the *subject preference account* (Gordon, Grosz & Gilliom 1993, Frederiksen 1981).

Parallelism account The *parallelism account*, first proposed by Sheldon (1974), states that when confronted with an ambiguous pronoun, interpreters connect its reference to the antecedent that shares the same grammatical function in previous discourse; this account, therefore, combines the factors grammatical role and linear order (e.g., Chambers & Smyth 1998, Stevenson et al. 1994, Caramazza & Gupta 1979). According to this view, in (9a), the personal pronoun *she* would be coreferent with Alicia, whereas in (9b), *her* would be coreferent with Jana.

- (9) a. Alicia hugged Jana and then she said hello to Pia.
 b. Alicia hugged Jana and then Pia said hello to her.

Smyth (1994) and Stevenson et al. (1994) attempted to disentangle the effects of parallelism, grammatical function and word order. Stevenson et al. (1994) provided evidence countering a strict ‘position effect’ in the resolution of subject pronouns, while Smyth (1994) found that both parallelism of grammatical roles and structural parallelism had an impact on resolution preferences (see also Järvikivi et al. 2005). However, neither study explored structures in non-canonical word orders. The concept of structural parallelism also plays a significant role in sentence processing. This effect has been demonstrated in eye-tracking studies (e.g., Chambers & Smyth 1998, Knoeferle & Crocker 2009) as well as in ERP studies (Streb et al. 1999) that reported increased processing costs for anaphors in non-parallel structures compared to parallel structures.

However, these findings were challenged by Sauermann & Gagarina (2017), who investigated in a visual world eye-tracking study, the influence of word order and grammatical role parallelism on German pronoun interpretation. The results show that regardless of word order, subject pronouns are most often interpreted as referring to the subject of the antecedent sentence, and vice versa for object pronouns. Thus, even in cases where the subject in the first sentence is

3 Demonstrative pronouns

not the first-mentioned referent, as seen in OVS structures, a sentence-initial subject pronoun is often resolved in favor of the subject in the preceding sentence (Sauermann & Gagarina 2017). The authors conclude that it is the grammatical role of the anaphor that mainly influences its resolution, whereas the parallelism in syntactic structure of antecedent and anaphor sentence or the position of the antecedent play a lesser role.

Subject preference account The *subject preference account* is based on Frederiksen (1981) who claims that the grammatical subject is the preferred antecedent for an ambiguous (personal) pronoun. For English, for instance, Frederiksen (1981) and Gordon et al. (1993) showed in reading time measurements, that the subject of a sentence is more accessible than the object. This was evident as the reading times of a pronoun at the beginning of a sentence were shorter when it referred to the subject of the previous clause rather than the object. However, in both studies, due to the word order restrictions in English, the subject was also always the first-mentioned referent.

Studies on German, which has a more flexible word order, have also uncovered evidence supporting the significance of grammatical role in pronoun resolution. In a referent-selection task, Bouma & Hopp (2006) examined the impact of grammatical function and linear order in the German ‘Mittelfeld’ (*middle field*) on the resolution of German personal pronouns, using ambiguous contexts. The results indicate that grammatical function is a predictor for pronoun resolution. More specifically, the findings show that subjecthood has an influence on the interpretation of German personal pronouns. In approximately two-thirds of the time, subjects were chosen as antecedents. Bouma & Hopp (2006) further claim that linear order has no influence on pronoun resolution in relation to the German *Mittelfeld* (in contrast to claims by Rambow 1993). Even studies of other languages with free word order such as Finnish (Järvikivi et al. 2005, Kaiser & Trueswell 2004b) or Dutch (Kaiser & Trueswell 2004a) observe a subject preference for the interpretation of personal pronouns. In an eye movement study, Järvikivi et al. (2005) observed more fixations for subject and first-mentioned antecedents compared to object and second-mentioned antecedents. Both grammatical role and the order of mention exhibited clear effects in their study. Importantly, the authors found no interaction between the effects of grammatical role and the order of mention, suggesting that these factors independently influence the resolution of ambiguous pronouns. Listeners seem to use both order-of-mention and grammatical-role information to resolve ambiguous pronouns. Taken together, these cross-linguistic findings suggest that that word order alone is not the deci-

sive factor for pronoun resolution and thus challenge the first-mention account by [Gernsbacher & Hargreaves \(1988\)](#).

As research has expanded beyond English to languages with more diverse pronoun systems, many studies have explored the comparison between personal pronouns and demonstrative pronouns regarding the influence of grammatical role on these two anaphoric forms. For German, distinctions between personal and d-pronouns were first examined by [Bosch, Rozario & Zhao \(2003\)](#). In a newspaper-based corpus study they found that personal pronouns typically referred to subject antecedents, while d-pronouns typically referred to non-subject antecedents (no nominative case), suggesting complementary resolution preferences for these pronouns. In a subsequent study, [Bosch, Katz & Umbach \(2007\)](#) conducted a self-paced reading experiment combined with a completion task. They investigated how personal and d-pronouns relate to different syntactic positions of their antecedents in the preceding sentence. They hypothesized that personal pronouns prefer subjects as antecedents, while d-pronouns prefer objects. The study used short paragraphs, including a headline, and a completion sentence with a gap. Participants were asked to fill in a noun to paraphrase their interpretation of the target sentence. The experiment further manipulated word order, varying between the canonical SVO, and the non-canonical OVS word order. In addition to the manipulation of grammatical role preference, world knowledge was also manipulated. [Bosch et al. \(2007\)](#) designed items that exhibited a biased pronoun resolution towards either the subject or the object protagonist, alongside neutral items without a world knowledge bias. The results indicate that reading times are longer for d-pronouns when they refer to the biased subject, compared to personal pronouns when they refer to the biased subject. However, no significant results were observed when the biased referent was presented as an object. The study did not detect an influence of word order in any of the conditions. The completion task further supports the findings from the reading time study. Consequently, [Bosch et al. \(2007\)](#) draw a significant distinction between personal and d-pronouns, asserting that d-pronouns reject subjects as antecedents, whereas personal pronouns allow both objects and subjects to serve as antecedents, demonstrating greater flexibility. Thus, the distinctive feature of d-pronouns lies not only in their preference for a different referent (in cases of transitive context sentence) but also in their significantly lower flexibility.

Comparable results on the behavior of personal and demonstrative pronouns with respect to the grammatical role of the antecedent are found by cross-linguistic studies ([Kaiser & Trueswell 2004a](#) for Dutch, [Kaiser & Trueswell 2008](#) for Finnish). Both in Dutch and in Finnish personal pronouns prefer a more prominent referent, whereas demonstratives prefer a less prominent referent. In

3 Demonstrative pronouns

addition, the studies by Kaiser & Trueswell (2004a, 2008) are important because they propose an alternative analysis, the *form-specific account*, which I will discuss in more detail in Subsection 3.3.9.

3.3.3 Topic

In another study, Bosch & Umbach (2007) reconsidered their previously formulated hypothesis that it is subjects that demonstrative pronouns avoid (Bosch et al. 2003, 2007). The authors reinterpreted their earlier purely structural explanation and considered the influence of information-structural properties on pronoun resolution. To illustrate this, they presented contexts in which the d-pronoun either accepts the subject as an antecedent (10a), or rejects the subject as an antecedent (10b).

- (10) a. Woher ich das weiß? Peter_i hat es mir gesagt. Der_i / Er_i war gerade hier.
How do I know that? Peter_i told me. He-DPRO_i / He_i was just here.
- b. Woher Karl_i das weiß? Er_i hat es von Peter_k gehört. Der_k / Er_{i/k} war gerade hier.
How does Karl_i know that? He_i heard it from Peter_k. He-DPRO_k / He_{i/k} was just here.

(Bosch & Umbach 2008: 48)

In previous studies, it had been assumed that d-pronouns reject subject antecedents (cf. Bosch et al. 2003, 2007), but as shown in (10a), this assumption does not seem to hold. Therefore, Bosch & Umbach (2007) suggest that d-pronouns reject the discourse topic (i.e., Karl or the knowing person ‘I’) as an antecedent. The personal pronoun, on the other hand, preferentially refers to a candidate that has already been established as discourse topic. However, personal pronouns are also well suited to refer to referents that do not correspond to the discourse topic. D-pronouns, on the other hand, preferentially refer to non-topical discourse referents. Similar results have been observed for diese-pronouns vs. personal pronouns by Schumacher et al. (2024) who investigated the influence of sentence and discourse topicality (I will discuss this study in more detail in Subsection 3.4.1). Therefore, the study by Bosch & Umbach (2007) shows that German d-pronouns are more affected by topic than by grammatical role (cf. Wilson 2009, Hinterwimmer 2015). This approach is consistent with previous findings (cf. Bosch et al. 2003, 2007) in as far as the sentence topic in German is often realized as the

subject. In line with these findings on German pronouns, cross-linguistic studies reveal similar results (Kaiser & Trueswell 2008 for Finnish, Comrie 1997 for Dutch).

Note that subsequent studies on German by partially the same authors (Hinterwimmer & Bosch 2016, Hinterwimmer 2020, Patil et al. 2023) again update this account with the proposal that the d-pronouns are not sensitive to topichood but to perspectival anchors. Hinterwimmer & Bosch (2016) critically question the concept of topic avoidance, and they come to the conclusion that the topic avoidance account is not able to explain the full range of data. Although Hinterwimmer & Bosch (2016) ascribe an important role to topic avoidance for the interpretation of d-pronouns, they rather see the decisive influence for the referential behavior of d-pronouns in perspectival properties. In Subsection 3.3.8, I will in detail present the influence of perspective on d-pronouns.

3.3.4 Focus

The concept of focus falls (just like the notion of topic) within the domain of information structure (Chafe 1976, Krifka 2008, Patterson & Schumacher 2023). Linguistic focus can be indicated, for instance, by prosody (pitch accent), sentence structure (such as clefts or scrambling), or morphological markers (focus markers, specific focus constructions, or focus particles). Traditionally, focus was seen as conveying new or important information relative to the topic (Halliday 1967). Recent proposals have suggested to define focus as indicating that relevant alternatives are necessary for the interpretation of the linguistic expression that is in focus (Krifka 2008: 247). The concept of focus is discussed quite heterogeneously in linguistics. Some accounts define it as the answer to the QUD (Roberts 2012), while others deny that the concept of focus has any crosslinguistic reality at all (Matić & Wedgwood 2013).

In the context of pronoun resolution, focus has been suggested as a means for heightening the prominence and accessibility of a referent. Empirical evidence supports the notion that when an antecedent is in focus, it becomes notably more accessible for a pronoun (Arnold 1998, Cowles, Walenski & Klueder 2007, Foraker & McElree 2007, Ellert 2010). Numerous studies further have shown that both focus and topicality have similar effects on pronoun resolution, despite their distinct roles in information structure. They both contribute to the successful identification of a referent (Cowles et al. 2007, Kaiser 2011a, Foraker & McElree 2007). However, it has been suggested that focus alone is not what enhances pronoun resolution. Recent studies have found that the advantage of focused referents disappears or even reverses when the pronoun and the focused

3 *Demonstrative pronouns*

referent are in the same sentence (e.g., Colonna, Schimke & Hemforth 2012, 2015). Hence, Colonna et al. (2015) propose that focus acts as a signal for an upcoming shift of the topic. Accordingly, the topic status of the referent in the subsequent sentence actually leads to the focus advantage in pronoun resolution. This theory clarifies why previous studies have noted similar effects for both topicality and focus on pronoun resolution; the focus effect is essentially a manifestation of a shifted topicality effect.

However, most research on the interaction between focus and pronoun resolution has concentrated on personal pronouns. The relationship between demonstratives and focus is a subject of debate due to a couple of factors. Firstly, when an element is in focus, it gains prominence (Cowles et al. 2007, Kaiser 2011a), but demonstratives typically refer to less prominent referents (e.g., Bader & Portele 2019). Secondly, both demonstratives and focus indicate a topic shift (Abraham 2002, Schumacher et al. 2015, Colonna et al. 2015), potentially creating a conflict in their discourse functions. To the best of my knowledge, there are no studies that have examined the referential behavior of d-pronouns in relation to focus. However, a study by Patterson & Schumacher (2023) explored diese-pronouns in the context of focus. The results reveal a noticeable impact of focus on the interpretation of diese-pronouns. Surprisingly, diese-pronouns show a sensitivity to cleft focus that is similar to that of personal pronouns, which have been ascribed a tendency to refer to focused referents. Instead of conflicting, it seems that the comparable discourse functions of focus and demonstrative pronouns effectively complement each other. The focus in the initial sentence signals a forthcoming shift towards the focused referent. Consequently, the demonstrative in the subsequent sentence can be viewed as referring to that focused referent at the moment of the topic shift. The study by Patterson & Schumacher (2023) demonstrated the role of focus as a significant prominence-lending cue, at least for diese-pronouns. However, it has not been tested whether these findings generalize to d-pronouns.

3.3.5 **Thematic role**

In addition to structural considerations, semantic factors, particularly thematic roles, play a crucial role in influencing pronoun resolution. Studies have provided evidence that certain thematic roles are more likely to serve as antecedents than others (Stevenson et al. 1994). A prime example of how semantic bias can impact pronoun resolution is demonstrated by so-called *Implicit Causality* (IC) verbs introduced by Garvey & Caramazza (1974). These verbs evoke strong expectations regarding which referent causes the event described by the verb (e.g. Garvey & Caramazza 1974, Rudolph & Forsterling 1997, Bott & Solstad 2014). For example,

with psychological verbs (stimulus-experiencer and experiencer-stimulus verbs), it is widely assumed that the preferred antecedent for an (ambiguous) pronoun is the stimulus, see (11) (e.g., [Garvey et al. 1974](#), [Stevenson et al. 1994](#), [Kehler & Rohde 2013](#)). Moreover, studies suggest that these preferences stem from top-down processes, where preferred thematic roles play a salient role in the mental model, influencing pronoun interpretation ([Stevenson et al. 1994](#)). Empirical studies have further shown that IC verbs elicit effects in online comprehension experiments and that a pronoun interpretation inconsistent with an IC bias results in enhanced processing costs (e.g., [Caramazza et al. 1977](#), [Koornneef & Van Berkum 2006](#), [Van Berkum et al. 2007](#)). The sensitivity to certain thematic roles is additionally influenced by coherence relations and discourse connectives, leading to different resolution patterns ([Stevenson et al. 1994](#), [Koornneef & Van Berkum 2006](#), [Fukumura & van Gompel 2010](#)). I will discuss this influence in detail in the next subsection (3.3.6).

- (11) a. Ken admired Geoff because he ... [subject-experiencer verb]
 b. Ken impressed Geoff because he ... [object-experiencer verb]

(Stevenson et al. 1994: 523)

With respect to demonstratives, implicit causality becomes especially interesting, as studies observed that German d-pronouns exhibit a strong bias toward the less prominent referent, often associated with proto-patient, object, or non-topic status. However, empirical research also indicates that semantic preferences can attenuate these (structural) biases ([Portele & Bader 2020, 2023](#), for Finnish: [Järvikivi et al. 2017](#)). In the next subsection (3.3.6), I will elaborate the study by [Portele & Bader \(2020, 2023\)](#) who explored information structure and coherence relations in more detail. In this section, I will continue discussing studies that focus on investigating solely thematic roles.

A systematic investigation of the referential behavior of d-pronouns with respect to thematic roles has been performed by [Schumacher et al. \(2016, 2017\)](#). Schumacher and colleagues explored the impact of various factors that enhance prominence on the interpretation of personal and d-pronouns in German. In addition to the factors word order and grammatical function, they also examined the influence of the thematic roles of potential referents in the preceding clause ([Schumacher et al. 2016, 2017](#)). Regarding the characterization of thematic roles, [Schumacher et al. \(2016\)](#) refer to proto-roles according to [Dowty \(1991\)](#) and [Primus \(1999\)](#). Proto-roles bring together various thematic roles. The proto-agent category encompasses agents, experiencers, and possessors, among others. Proto-agents are distinguished by attributes such as volitionality, sentience

3 Demonstrative pronouns

and causation. The proto-patient category encompasses patients, causees, and is linked to undergoing a change of state and being impacted by the action of the predicate (Dowty 1991, Primus 2012, Schumacher et al. 2016).

To disentangle the influences of grammatical role and thematic role, since subjecthood and proto-agenthood usually converge on the same referent, Schumacher et al. (2016, 2017) employed dative-experiencer verbs alongside nominative-accusative verbs. To illustrate this, see (12). In addition to the factor verb type, Schumacher et al. (2016, 2017) also manipulated the factor word order, comparing canonical and non-canonical word orders. Note that the typical unmarked (canonical) word order in German is usually SVO (cf. Lenerz 1977). However, there is an exception with dative-experiencer verbs, where the canonical order becomes OVS instead (Haider 1993). In nominative-accusative scenarios, thematic role and grammatical function coincide, meaning the referent with the highest thematic role also carries the highest grammatical function. Furthermore, in canonical sentences (SVO), sentence-topic (assumed to be associated with the clause-initial prefield position) aligns with the thematic role and grammatical function hierarchy. In non-canonical conditions (OVS), on the other hand, the nominative-marked agent represents the non-initial non-topic referent. Contrary, in dative-experiencer scenarios, thematic role and grammatical function do not align, yielding an alignment of the highest thematic role with sentence-topic. However, in non-canonical dative-experiencer settings the subject and sentence-topic align but carry the less prominent thematic role. Accordingly, in dative-experiencer sentences the features grammatical role and thematic role can be examined separately.

- (12) a. Nominative-accusative verb, canonical order
Der Feuerwehrmann_{NOM} will den Jungen_{ACC} retten, weil das Haus brennt. Aber er/der ist zu aufgeregt.
The fire fighter_{NOM} wants to rescue the boy_{ACC}, because the house is on fire. But he/he-DPRO is too nervous.
- b. Nominative-accusative verb, non-canonical order
Den Jungen_{ACC} will Der Feuerwehrmann_{NOM} retten, weil das Haus brennt. Aber er/der ist zu aufgeregt.
The boy_{ACC} wants the fire fighter_{NOM} to rescue, because the house is on fire. But he/he-DPRO is too nervous.
- c. Dative-experiencer verb, canonical order
Dem Zuschauer_{DAT} ist der Terrorist_{NOM} aufgefallen, und zwar nahe der Absperrung. Aber er/der will eigentlich nur die Feier sehen.

The spectator_{DAT} has noticed the terrorist_{NOM}, in fact next to the barrier. But he/he-DPRO actually only wants to watch the ceremony.

d. Dative-experiencer verb, non-canonical order

Der Terrorist_{NOM} ist dem Zuschauer_{DAT} aufgefallen, und zwar nahe der Absperrung. Aber er/der will eigentlich nur die Feier sehen.

The terrorist_{NOM} is noticed by the spectator_{DAT}, in fact next to the barrier. But he/he-DPRO actually only wants to watch the ceremony.

(Schumacher et al. 2016: 218)

Schumacher et al. (2016) performed a referent-selection task and two sentence completion tasks. In the three experiments, Schumacher et al. (2016) were able to uncover an influence of thematic roles on pronoun interpretation. The personal pronoun shows a preference for proto-agents and d-pronouns prefer proto-patients as antecedents. The d-pronouns show a much stricter preference, however. The referent-selection task reveals, for instance, that the d-pronoun in the nominative-accusative contexts has a preference for the proto-patient (second-mentioned referent, object). Similarly, in the dative-experiencer cases, the d-pronoun shows a preference for the proto-patient (second-mentioned, subject). However, this phenomenon does not extend to items with a non-canonical word order, where participants exhibit no particular preferences. Schumacher et al. (2016: 223) explain these cases by the “limited alignment of prominence scales”, which attenuates interpretive preferences. This suggests that there is an interplay of various cues for computing prominence. Similar results are found in an eye-tracking study by Schumacher et al. (2017), using similar items as illustrated in (12).

Overall, Schumacher et al. (2016, 2017) suggest that agentivity serves as a more reliable predictor for pronoun resolution compared to subjecthood or sentence topic, as previously suggested. Furthermore, the studies show that the misalignment of thematic role and grammatical function weakens interpretive processes in pronoun resolution. Such misalignment, especially when it displaces the agent as sentence-topic, still provides cues for referential preference computation. Nevertheless, fronting of the proto-patient, especially in non-canonical word order context sentences (i.e., nominative-accusative OVS), complicates underlying resolution processes. This observation underscores the involvement of multiple cues in pronoun resolution. Moreover, the data suggest that the d-pronoun has more restrictive interpretive biases than the personal pronoun.

3.3.6 Discourse relations

Apart from the impact of verbs and their arguments, the choice of connectives and the semantic link between the clause containing the pronoun and the one containing the antecedent also plays a significant role in determining the referent of an ambiguous pronoun (Stevenson et al. 1994, Stevenson, Knott, Oberlander & McDonald 2000). For connectives other than *because*, such as *and*, *but*, *so*, and *as well as*, different anaphoric preferences of IC verbs have been observed. For instance, Fukumura & van Gompel (2010) found that the use of *because* following a stimulus-experiencer verb (Referent 1-biased) leads to Referent 1 continuations due to Implicit Causality. In contrast, when *so* is used with the same verb, it shifts the discourse relation toward a result interpretation, prompting Referent 2 reference. Essentially, some connectives can elicit the reverse pattern of Implicit Causality biases.

Portele & Bader (2020) examined experiencer-stimulus verbs together with the causal discourse marker *nämlich* ('cause'; stimulus biased) or the consequential discourse marker *deshalb* ('therefore'; experiencer biased). The results show that in both coherence relations, the personal pronoun refers in the majority of cases to the semantically favored referent, which was the experiencer subject for consequence relations and the stimulus object for causal relations. D-pronoun interpretation was also influenced by coherence relations, however, the interpretation preference was not switched, instead it consistently favored the structurally less prominent referent (i.e., the stimulus object). In summary, Portele & Bader's (2020) experiment reveals that the favored antecedent for the personal pronoun changed based on the coherence relation, whereas the d-pronoun consistently preferred the structurally less prominent referent, with only the strength of this preference varying depending on the coherence relation. These findings raise a significant question: why did the coherence manipulation not lead to a preference reversal for the d-pronoun? Portele & Bader (2023) propose that the experiencer being the subject in the materials of Portele & Bader (2020) might have resulted in a relatively weak semantic bias of the consequence relation towards the experiencer subject, which was insufficient to override the d-pronoun's structural bias towards the object referent. To address these concerns, Portele & Bader (2023) conducted a series of experiments using modified stimuli to those in Portele & Bader (2020). Notably, they employed object-experiencer (i.e., stimulus-experiencer) verbs in the final context sentence to weaken the structural preference for the object antecedent. They expected that the causal and consequential discourse markers would induce strong semantic biases of approximately equal strength. And indeed, their results indicate that both personal

and d-pronouns demonstrate similar semantic biases in causal relations, primarily referring to the stimulus argument. In consequence relations, both pronouns favored the experiencer argument. Other studies have further shown that the connective *aber* ('but') has also an influence on pronoun resolution (Schumacher et al. 2016) and that conversely, pronouns also guide expectations regarding coherence relations (Kaiser 2011a). Overall, these studies highlight the influence of coherence relations on d-pronouns, though the extent of this influence remains debated.

3.3.7 Prosodic prominence

Besides (morpho-)syntactic, semantic, and discourse-pragmatic influences, intonation is also considered an influential prominence-lending cue (Ladd 2008, Grice & Baumann 2007). Intonation serves multiple functions in spoken language, including indicating prosodic structure, which often aligns with sentence and information structure, as well as paralinguistic functions like conveying a speaker's emotions and attitudes (Grice & Baumann 2016). For example, in West Germanic languages accentuation (pitch accent vs. no accent) is a pivotal signal that directs attention and supports interpretation. Accent type and accent status play a crucial role, particularly in marking focus and information status (e.g., Röhr et al. 2022, Baumann & Grice 2006). The way a discourse referent's information status is marked prosodically is associated with variations in prosodic prominence. While new referents are typically marked by pitch accents rather than given referents, the distinction between nuclear and non-nuclear accents proves to be a more reliable indicator of information status. Studies on accent types suggest that prominent, high, and rising accents are favored for less accessible or new information, while less prominent, low, and falling accents are preferred for more accessible or given information (Baumann & Grice 2006, Röhr & Baumann 2010, Schumacher & Baumann 2010, Baumann 2006, Röhr et al. 2022).

Regarding pronoun resolution, previous studies on English have indicated that pronouns produced with more prosodic prominence are subject to different interpretations compared to those without such prominence. Accenting a personal pronoun leads to a referential shift toward the less prominent referent (Venditti, Stone, Nanda & Tepper 2001, Balogh 2003). For German personal and d-pronouns, this effect of intonation has been investigated in a referent-selection study (Özden 2022). The results reveal – in line with previous research – that the d-pronoun exhibits a preference for the less prominent (second-mentioned) referent over the first-mentioned one. With respect to intonation, accentuation of d-pronouns even enhances the proportion of choices for the less prominent

3 Demonstrative pronouns

referent. However, accenting a personal pronoun did not result in a shift towards the less prominent referent. Thus, the findings from English studies (Venditti et al. 2001, Balogh 2003) could not be replicated for the German d-pronoun. Rather than reversing the pronoun's preference, accentuation strengthens the inclinations of d-pronouns.

3.3.8 Perspective

Cross-linguistic studies have shown that perspective has a considerable influence on the referential behavior of pronouns (e.g., Sells 1987). Influential studies on German d-pronouns were conducted by Hinterwimmer and colleagues (Hinterwimmer & Bosch 2016, 2017, Hinterwimmer 2019, 2020, Patil et al. 2023), showing that d-pronouns do not consistently avoid selecting the locally maximal prominent referents as antecedents and that, therefore, the prominence avoidance theory cannot be maintained in its previously proposed form (e.g., Schumacher et al. 2016, Patterson & Schumacher 2021, Bosch & Umbach 2007). Instead, Hinterwimmer & Bosch (2016, 2017) have demonstrated that perspective-taking is an influential factor and that the d-pronoun avoids referring to a so-called *perspectival center*. They define the term *perspectival center* following Harris (2012) and Harris & Potts (2009) as stated in the following quote:

A referent α is the *perspectival center* with respect to a proposition p iff p is the content of a thought or perception of α .

Quote from Patil et al. (2023: 10)

To illustrate this claim, consider the contrast between (13a) and (13b), as well as (14a) and (14b). In all cases, the initial sentence introduces a referent that is highly prominent in terms of order of mention, grammatical function and thematic role. For instance, in (13), Peter appears at the beginning of the sentence, functions as the subject of the main clause, and is the experiencer of the main event. Similarly, in the opening sentence of (14), Paul is in the clause-initial position, serves as the subject of the clause, and is the experiencer of the state introduced by the verb *wollte* ('wanted'). Nevertheless, both examples show that these highly prominent referents can in fact be picked up by a d-pronoun in one version of the continuation but not in the other (i.e., these continuations are less acceptable) (cf. Patil et al. 2023: 9f.).

According to Hinterwimmer & Bosch (2016, 2017), the key factor that sets apart the continuations where the d-pronoun can more readily refer to the highly

prominent referent, from those where it cannot, is perspective. In both (13a) and (14a) the viewpoint of the highly prominent referent that the pronoun is coreferent with is conveyed, while the continuations in (13b) and (14b) can only be interpreted as reflecting the perspective of the speaker or narrator. Patil et al. (2023) form similar assumptions, however, they stress additionally the importance of evaluation. They state that a d-pronoun can pick up a locally prominent referent when the sentence expresses an evaluation of that referent in question (Patil et al. 2023: 13).

- (13) Als Peter abends nach Hause kam, war die Wohnung wieder in einem fürchterlichen Zustand.

When Peter came home in the evening, the flat was in a terrible state again.

- a. *Der / Er hatte doch gestern erst aufgeräumt.
**He-DPRO / He had only tidied up yesterday after all.*
- b. Der / Er kann sich einfach nicht gegen seine Mitbewohner durchsetzen.
He-DPRO / He is simply unable to stand his ground against his flatmates.

(Hinterwimmer & Bosch 2016: 205)

- (14) a. Paul_i wollte mit Peter_j laufen gehen. Aber er_{i,j} / der_j war leider erkältet.

Paul_i wanted to go running with Peter_j. But he_{i,j} / he-DPRO_j had a cold unfortunately.

- b. Paul_i wollte mit Peter_j laufen gehen. Er_{i,j} / Der_{i,j} sucht sich immer Leute als Trainingspartner aus, die nicht richtig fit sind.

Paul_i wanted to go running with Peter_j. He_{i,j} / He-DPRO_{i,j} always picks people as training partners who are not really fit.

(Hinterwimmer & Bosch 2016: 205)

The continuation in (13a) illustrates an instance of *Free Indirect Discourse* (FID), it can be understood as expressing Peter's own (conscious) thoughts about the dismal condition of his apartment. In line with the typical characteristics of FID (e.g., Eckardt 2015), all perspective-related linguistic elements, except pronouns and tenses, are construed from the viewpoint of the character whose thoughts are being conveyed. In particular, the exclamation *verdammt* ('damn') and the modal particles *doch* (loosely translated as *afterall*) and *erst* (loosely translated as *only*) are interpreted as reflecting Peter's negative emotions, not the narrator's, and the temporal adverb *gestern* ('yesterday') is interpreted in terms of the context in which Peter is situated.

3 *Demonstrative pronouns*

The second sentence in (14a) is best understood as conveying the viewpoint of the highly prominent character. In this interpretation, it suggests that *Paul* cannot go for a run due to having a cold. Importantly, this does not imply that the sentence represents Paul's conscious thoughts. Instead, it reflects Paul's overall attitude towards the situation being described. It is crucial to clarify that there is no indication that the events described are being perceived from the narrator's perspective.

Consequently, even in neutral narratives, d-pronouns tend to avoid referring to highly prominent individuals. [Hinterwimmer & Bosch \(2016\)](#) suggest that these prominent referents often function as aboutness topics. They argue that topics are considered as perspectival centers by default when no dominant narrator or protagonist is present ([Hinterwimmer & Bosch 2016: 214](#)). This was later reconsidered in subsequent research arguing that aboutness topics aren't automatically viewed as perspectival centers in neutral narratives ([Patil et al. 2023](#), [Hinterwimmer 2020](#)). Instead, there may be no perspectival center in such neutral narratives at all. The authors adopt the perspective, as proposed by [Altshuler & Maier \(2020, 2022\)](#), that while every text is assumed to be conveyed by an implicit narrator, only narrators whose perspective is emphasized are treated as discourse referents, similar to speakers in spoken conversations ([Patil et al. 2023: 13](#)). This viewpoint is supported by a literary analysis conducted by [Hinterwimmer \(2020\)](#) using novels by Wolf Haas.

Turning back to the examples (13) and (14), the continuations in (13b) and (14b) can only be interpreted as judgments or opinions expressed by the speaker or narrator. This interpretation is supported by the fact that this proposition represents the content of a mental state, specifically a thought, belonging to the narrator. Furthermore, the shift from past to present tense, which disrupts narrative continuity, also indicates that the narrator becomes the perspectival center in relation to the propositions specified in (13b) and (14b). Therefore, d-pronouns can refer to referents that are highly prominent in terms of their position in the sentence, as well as their grammatical and thematic roles if the sentence clearly conveys the perspective of a referent that is different from the antecedent. Hence, perspective-takers are assumed to be discourse referents. Building on this observation, [Hinterwimmer & Bosch \(2016, 2017\)](#) conclude that d-pronouns function as anti-logophoric pronouns, meaning they avoid referring to referents that act as perspectival centers as their antecedents. [Patil et al. \(2023\)](#) propose that abstract speakers or narrators with a prominent perspective, i.e., that evaluate a certain discourse referent, as seen in (13b) and (14b), also constitute discourse referents that are highly prominent. When there is not such a discourse referent,

as seen in (14a), the next highest-ranked element on the discourse scale, which is the respective aboutness topic, takes the highest position.

Perspective also has an important influence on the distinction between d- and diese-pronouns. This will be explained in more detail in Subsection 3.4.1. In short, Patil et al. (2023) propose a unified analysis for d- and diese-pronouns based on their avoidance of highly prominent referents. Both d- and diese-pronouns refrain from using the most prominent referents as their antecedents, but they rely on different scales to determine prominence. For d-pronouns, perspectival centers are the most prominent, followed by aboutness topics and other referents. In contrast, diese-pronouns do not consider perspectival centers on their scale, making aboutness topics the most prominent referents for them.

In summary, the influence of perspective on d-pronouns relies on three fundamental assumptions, as outlined by Hinterwimmer (2020): (i) Narrators who are not simultaneously functioning as protagonists can also serve as discourse referents. (ii) Demonstrative pronouns cannot refer to the most prominent discourse referent. (iii) The prominence of discourse referents follows this hierarchy: speakers or evaluative narrators, as well as thinkers/speakers in FID mode, are the most prominent discourse referents; the second most prominent discourse referents are those whose thoughts are presented in the form of indirect speech or viewpoint shifting. Recently, the concept of perspective has evolved, and it is no longer considered as a prominence-lending cue. Instead, it is now perceived as a distinct layer (Patil et al. 2023, Schumacher et al. 2024). This approach suggests the existence of a separate layer in discourse representation, known as the perspective layer, which differs from the discourse layer. Within the perspective layer, there is a perspective-holder who articulates their attitude and who is highlighted as a prominent referent. The perspective-holder can impact prominence relations, surpassing the sentence topic or discourse topic in prominence. Therefore, the perspective layer introduces a competing referent (known as the perspective-holder). Being the perspective-holder imparts additional prominence to that referent, a quality distinct from agents or sentence topics. The concept of perspective introduces a nuanced dimension that sets it apart in terms of its impact and significance. Thus, it can be concluded that perspective has a substantial influence on discourse organization, leading to the assumption that a perspectivally prominent discourse referent is “the highest ranked element on the prominence scale” (Patil et al. 2023: 13).

3.3.9 Interim summary

This section has explored various prominence-lending cues that can influence resolution preferences for both personal and d-pronouns. I have shown that (especially in ambiguous contexts) pronoun resolution is not exclusively guided by morphosyntactic constraints, such as gender, number, and person, but also by a diverse set of both semantic factors (e.g., verb semantics, coherence relations, and world knowledge) and structural factors (e.g., grammatical function, order of mention, and topicality). Therefore, I have shown that both local (e.g., grammatical role, thematic role, sentence topic) and global prominence-lending cues (e.g., perspective) have an influence on pronoun resolution in general and on the interpretation of d-pronouns in particular. While the outcomes discussed in this section may seem diverse, they all imply distinct roles for d-pronouns and personal pronouns. Typically, personal pronouns have a preference for referring to antecedents that are proto-agents, occupying subject positions, being first-mentioned, and serving as the sentence-topic – essentially, the most prominent referent. On the other hand, d-pronouns tend to refer to a proto-patient, often in object positions at the end of sentences, non-topical and thus less prominent. At least studies examining transitive sentences have observed such division of labor. Therefore, several influential accounts of German pronoun resolution propose complementary interpretation tendencies for personal and d-pronouns, where d-pronouns prefer a less prominent referent and personal pronouns prefer a prominent referent (Bosch et al. 2003, Hinterwimmer 2015). However, the preferences of personal and d-pronouns are pronounced differently. The d-pronoun exhibits much more rigidity in its resolution preferences, whereas the personal pronoun is more flexible in its preferences.

Initially, studies focused on individual factors in an attempt to identify a single prominence-lending factor responsible for shaping the resolution preferences of these pronouns. Factors such as word order (e.g., Strube & Hahn 1999), structural parallelism (Chambers & Smyth 1998), coherence relations (Kehler et al. 2008), and verb semantics (Stevenson et al. 1994) were examined in isolation. However, later research demonstrated that a single factor alone could not adequately explain these preferences. Instead, evidence suggests a multi-factor approach, indicating that pronoun resolution likely involves several weighted constraints (e.g., Ariel 1990, Arnold 1998, Lappin & Leass 1994, Schumacher et al. 2016, 2017). These studies collectively highlight the structural factors involved in interpreting personal and d-pronouns, each with implications specific to their respective pronoun types. Yet, a recurring debate in many studies is how to treat these prominence-lending cues regarding a potential interplay. The central

question revolves around whether anaphoric forms conform to a unified scale of prominence. Despite differences between the single-factor approach and the multi-factor approach on what contributes to a referent's prominence level, both accounts seem to agree that distinct anaphoric forms can be categorized based on the significance of their antecedents; for instance, personal pronouns tend to refer to more prominent antecedents than demonstrative pronouns.

In contrast, the *form-specific multi-constraints approach* (Kaiser & Trueswell 2008) proposes a scenario where the referential qualities of anaphoric forms cannot be explained using a singular concept of antecedent prominence. According to this approach, "different anaphoric forms – at least those that are informationally equivalent – can differ in how sensitive they are to different factors" (Kaiser & Trueswell 2008: 713). In this view, it is possible that a specific anaphoric form might primarily rely on word order for reference, while another form could be more influenced by syntactic role. Alternatively, a form might be influenced by both word order and syntactic role, but to varying degrees (Kaiser & Trueswell 2004a, 2008). Supporting evidence for the form-specific approach, while also considering various prominence-lending cues, has been found across multiple languages, including Finnish (Kaiser & Trueswell 2008), Dutch (Kaiser & Trueswell 2004a), Greek (Miltisakaki 2007), English (Brown-Schmidt et al. 2005, Burkhardt 2005, 2007a), and German (Bader et al. 2022, Portele & Bader 2023).

Building upon the assumption that two referring expressions can differ in terms of the scales that determine the maximally prominent referent, other approaches propose a unified model of a prominence hierarchy (Patil et al. 2023). In this model, only one prominence hierarchy is calculated and is considered relevant for all referring expressions. However, some referring expressions are considered 'blind' to certain prominence-lending cues. This means they access/occupy different positions within the hierarchy and take different cues into account when determining the prominence ranking they are sensitive to. Consequently, this approach can lead to varying referential behavior among referring expressions in terms of the influence of prominence-lending cues. Conceptually, this approach is simpler because it compares referring expressions on a single scale of prominence, facilitating the identification of differences and similarities.

Despite ongoing debate about the interplay of individual cues in establishing prominence and reference, understanding pronoun resolution as a process influenced by multiple factors provides valuable insights into language patterns and pronoun functions (Patterson, Schumacher, Nicenboim, Hagen & Kehler 2022). Research also shows that multiple sentence-level cues compete with each other during the dynamic computation of referential prominence and that the sentence topic holds a pivotal role. Schumacher et al. (2016, 2017), for instance, show that

3 *Demonstrative pronouns*

interpretive preferences are most pronounced when feature alignment involves the initial position (i.e., the sentence topic). The prominence-lending cues presented in this section can, for the most part, be analyzed relatively uniformly, as factors like first mention, subject, topicality, and thematic role often overlap in many studies. It is worth noting that most of the aforementioned studies use animate referents. However, [Ellert \(2010\)](#) has demonstrated the significance of the factor animacy in pronoun resolution, as pronouns are resolved more quickly when they follow animate antecedents. Nevertheless, a few studies explicitly aim to tease apart different overlapping prominence-lending cues. For instance, the results of [Schumacher et al. \(2016\)](#), which used dative-experiencer verbs and non-canonical word order to disentangle the prominence-lending cues of grammatical function, topic, and thematic role, reveal that the order of mention cannot be considered the primary cue for pronoun resolution. Furthermore, the examination of dative-experiencer constructions shows that grammatical function is not the foremost determinant in pronoun resolution. Instead, the results demonstrate that thematic role takes precedence over grammatical function. However, it is important to note that thematic role alone cannot be deemed the singular most important factor influencing pronoun resolution. This is evident from the fact that the non-canonical dative-experiencer antecedent clause does not result in a significant interpretive bias across all three experiments. Therefore, these findings suggest that prominence cues interact with one another and contribute to varying extents in the calculation of prominence during pronoun resolution ([Schumacher et al. 2016: 234](#)).

However, the studies mentioned in this section all focus on short items with two potential antecedents in the context sentence. In the existing literature, the ideas that demonstrative pronouns, on the one hand, prefer less prominent discourse referents and, on the other hand, actively exclude the most prominent ones are often used interchangeably. While these formulations might mean the same in transitive contexts, they can lead to different conclusions in ditransitive contexts. In ditransitive scenarios, favoring less prominent antecedents would exclude the two most prominent ones, while specifically excluding the most prominent referent would leave two potential referents, the second most prominent and the least prominent, as viable antecedent for a d-pronoun. There is also the possibility that pronoun reference behavior varies in a gradient manner based on the prominence status of the antecedent. In order to investigate this open question, [Patterson & Schumacher \(2021\)](#) conducted two acceptability judgment experiments using ditransitive contexts to investigate both German demonstrative paradigms *der/die/das* and *dieser/diese/dieses*. The main finding from the two experiments by [Patterson & Schumacher \(2021\)](#) is that d-pronouns (and diese-

3.4 Differences between *d-* and *diese-*pronouns

pronouns) exhibit a gradient preference for the prominence status of the antecedent based on thematic roles. In other words, they tend to prefer the least prominent referent first, followed by the second-prominent referent, and finally, the most prominent referent. This discovery is significant because it deepens our understanding of the tendency of demonstrative pronouns towards less prominent antecedents, by drawing on a less limited set of ordered referents for referential resolution. Concerning the two different notions – whether demonstratives avoid referring to all candidates except the least prominent one or if they simply avoid referring to the most prominent one – the results uncover limitations of both viewpoints. Instead, preferences between the three potential antecedents seem to result from more nuanced degrees of prominence. With this, the study highlights the crucial role that gradience plays in reference resolution.

Overall, concerning the varying prominence-lending cues, the long-standing notion that *d-*pronouns refer to a less prominent referent while personal pronouns prefer a prominent referent, holds true upon examination of the literature. Research, however, has revealed, on the one hand, that the preference for potential antecedents is graded, with the *d-*pronoun showing a preference for a less prominent referent but also being fine with referring to the second most prominent referent. On the other hand, contrary to expectations based on grammatical role, topic, or thematic role as decisive cues, research by [Patil et al. \(2023\)](#) has demonstrated that perspective, specifically the referent that is the perspective-holder, can serve as the highest ranked element on the prominence scale. Given that *d-*pronouns typically avoid referring to the perspective-holder, they reject the most prominent discourse referent, thereby affirming the traditional view that *d-*pronouns do not prefer the most prominent referent. However, recent research has suggested that the perspective-holder is not represented in the discourse layer and thus not equivalent to local referents that are highly prominent due to agentivity or topichood, instead the perspective-holder is represented on another layer, the perspective layer and, therefore, represents a competing yet even more prominent referent.

3.4 Differences between *d-* and *diese-*pronouns

Studies on the usage of pronominal demonstratives in German often focus on differences in the use of the *d-*pronouns *der/die/das* and the personal pronouns *er/sie/es*. Less is known about the differences in the pronominal usage of the demonstratives *der/die/das* and *dieser/diese/dieses*. So far, there are only a few empirical studies on differences concerning the use of the two demonstrative

3 Demonstrative pronouns

forms (Patterson & Schumacher 2021, Fuchs & Schumacher 2020, Patil et al. 2020, Bader et al. 2022). Both d- and diese-pronouns serve various functions beyond establishing reference. They can be employed adnominally and pronominally as anaphoric devices, but both can also be used deictically and serve as identifiers (when paired with a pointing gesture). Nonetheless, there are significant distinctions in how d- and diese-pronouns are used and interpreted. In this section, the referential behavior of diese-pronouns in distinction to d-pronouns will be presented. Each subsection will focus on a factor influencing the use of the two demonstratives.

3.4.1 Previous mention features

Last-mention-preference Diese-pronouns are traditionally ascribed a last-mention preference, according to which *diese* refers only to the latter referential candidate, regardless of its properties such as grammatical or thematic role (Zifonun et al. 1997). This approach is based on theoretical considerations by Zifonun et al. (1997) and represents one of the first observations of the referential behavior of diese-pronouns. The literature often uses an example by Zifonun et al. (1997), reproduced here in (15), to demonstrate that d-pronouns and diese-pronouns do not behave in the same way and that there must be linguistic and extra-linguistic factors that lead to differences in pronominal use (Abraham 2002, Bader et al. 2022, Patterson & Schumacher 2021).

- (15) a. Peter will einen Benz kaufen. Der hat wohl zu viel Geld.
Peter wants to buy a Benz. He-DPRO probably has too much money.
- b. Peter will einen Benz kaufen. *Dieser hat wohl zu viel Geld.
*Peter wants to buy a Benz. *He-DEMPRO probably has too much money.*

(Zifonun et al 1997: 558)

According to Zifonun et al. (1997), the linear order of referents plays a crucial role in the distinct resolution preferences of d-pronouns and diese-pronouns. Consequently, diese-pronouns can solely be utilized to refer to a referent in close proximity to the referring expression. In contrast, d-pronouns can refer to both nearer and more distant referents. As part of their analysis, Zifonun et al. (1997) adopt the concept of anadeixis. According to their perspective, the process of anadeictic reference involves searching the linear chain backward for a suitable antecedent. Within this theoretical framework, (15b) becomes unacceptable since the diese-pronoun can only refer to the closest possible antecedent. But a reference to the latter discourse referent *Benz* is not plausible due to real-world knowledge.

3.4 Differences between *d-* and *diese-*pronouns

However, the notion of a last-mention preference has been discussed controversially. Certain experimental studies fail to provide evidence supporting the last-mention preference. Instead, they showcase that *diese-*pronouns exhibit a similar pattern to *d-*pronouns, favoring an antecedent with lower prominence, irrespective of sentence position (Fuchs & Schumacher 2020, Lange 2016, Özden 2016). For instance, Özden (2016) conducted a sentence completion experiment where she manipulated the order of two potential antecedents (agent-before-patient vs. patient-before-agent, i.e., SVO vs. OVS). Her findings indicate that *diese-*pronouns are more frequently interpreted as referring to the proto-patient, regardless of the antecedent order. A comparable outcome emerges from the research by Lange (2016), who examined *diese-*pronouns in the context of dative-experiencer verbs. Once again, the results highlight that *diese-*pronouns are more commonly interpreted as being coreferent with the (proto-)patient, regardless of the order of referents.

However, studies by Patterson & Schumacher (2021, 2023) reveal that demonstratives (particularly *diese-*pronouns) tend to favor referring to the last-mentioned referent. This preference holds even when the last-mentioned referent is not the least prominent in terms of thematic role (Patterson & Schumacher 2021) and regardless of the focus status of the antecedent (Patterson & Schumacher 2023). This observation aligns with the description provided in Zifonun et al.'s (1997) work. Nevertheless, the results by Patterson & Schumacher (2021) show that referents placed in a medial position received higher ratings than the agent. This confirms that the preferences of demonstratives cannot be exclusively characterized by a preference for the final position; they are also influenced by the prominence of a referent's role. Therefore, the study uncovers evidence supporting a gradient sensitivity to order for both *d-* and *diese-*pronoun.

Patil et al. (2020) explored this preference of *diese-*pronoun for object antecedents. The researchers investigated whether this preference is primarily due to the object antecedent being the last-mentioned referent or if it is influenced by its less prominent grammatical function as the object. Their findings indicate that while the grammatical function plays a significant role in influencing the antecedent preference for *diese-*pronouns, the order of mention of the antecedents also has a minor impact. Specifically, when the object antecedent is mentioned first, it is less strongly preferred as compared to when it is mentioned later in the discourse. This aligns with previous research by Fuchs & Schumacher (2020), who also observed an effect of grammatical or thematic role over the order of mention in the context of antecedent preference for *diese-*pronouns.

3 Demonstrative pronouns

In summary, the evaluation of the last-mention preference factor is not entirely clear. There are empirical studies that challenge the theoretical considerations of last-mention preference. However, these studies are limited to items consisting of transitive sentences. Conversely, in a study that tested ditransitive sentences, being last-mentioned had an impact on resolution preferences. This study, however, indicates no difference between *die* and *diese*. A direct comparison between the results of [Patterson & Schumacher \(2021, 2023\)](#) with the results of, for instance, [Lange \(2016\)](#) and [Özden \(2016\)](#) is difficult, because the two latter studies only examined contexts with two potential antecedents. Although the results by [Patterson & Schumacher \(2021\)](#) show a preference of demonstrative pronouns for the last-mentioned referent, it is also shown that medially placed referents are evaluated better than the proto-agent (highest prominence characteristics in terms of thematic role). Therefore, it seems that Zifonun et al.'s (1997) description may be true to some extent. Still, the preferences for demonstratives cannot be described solely as a preference for final position; rather, the prominence of a referent also plays a crucial role. And most importantly, the last-mention preference cannot be considered a factor in which d-pronouns and diese-pronouns necessarily differ.

Perspectival center Recent cross-linguistic research offers circumstantial evidence that perspective might be a factor influencing the antecedent choice of pronominal demonstratives and personal pronouns (e.g., [Kaiser & Fedele 2019](#), [Hinterwimmer & Bosch 2016](#)). Seminal studies for German have been carried out by Hinterwimmer and colleagues (e.g., [Hinterwimmer & Bosch 2016, 2017](#), [Hinterwimmer et al. 2020](#)). With respect to German, the perspective factor emerges from the discussion of the differences between d-pronouns and personal pronouns (as discussed in Subsection 3.2.4 with respect to evaluation). In Subsection 3.3.8, I have provided a more detailed explanation of the perspective account, focusing particularly on d-pronouns. However, it is worth briefly mentioning this approach here in the context of distinguishing between d-pronouns and diese-pronouns.

[Hinterwimmer & Bosch \(2016, 2017\)](#) observe that d-pronouns do not consistently avoid using maximally prominent referents as antecedents. In a subsequent study by [Patil et al. \(2023\)](#), which specifically explored the differences between d-pronouns and diese-pronouns, the authors propose a unified analysis of both d- and diese-pronouns based on an assumption presented by [Hinterwimmer & Bosch \(2016, 2017\)](#). The basic idea of their approach is that both d-pronouns and diese-pronouns avoid maximally prominent referents as antecedents. However,

3.4 Differences between *d-* and *diese-*pronouns

the two demonstratives differ in the scales they use to determine what qualifies as the most prominent referent. For *d-*pronouns, perspectival centers rank higher in prominence than aboutness topics, and these aboutness topics are, in turn, more prominent than other referents. Conversely, for *diese-*pronouns, perspectival centers do not factor into the relevant scale, making aboutness topics the utmost prominent referents. Thus, Patil et al. (2023) extend the proposition made by Hinterwimmer & Bosch (2017) and put forth the hypothesis that only *d-*pronouns are sensitive to manipulations of perspectival prominence, while *diese-*pronouns are not affected by it.

Patil et al. (2023) conducted an acceptability rating study to examine the hypotheses related to how the two demonstrative pronouns respond to the factor of evaluation. The findings indicate that only *d-*pronouns react to changes in prominence caused by evaluative expressions, while *diese-*pronouns remain unaffected by such changes. The findings of Patil et al. (2023), therefore, offer empirical support for the notion that *d-*pronouns indeed possess the capacity to refer to a discourse referent with information structural prominence (i.e., the aboutness topic). This phenomenon emerges when the abstract speaker or narrator takes on a significant role as a perspective-taker through evaluative expressions. Conversely, the *diese-*pronoun lacks the same capability to refer to discourse referents endowed with information structural prominence.

In summary, this approach accounts for all the examples discussed in this subsection regarding the referential behavior of *d-* and *diese-*pronouns. Moreover, the results of Patil et al. (2023) could be seen as supporting the form-specific account proposed by Kaiser & Trueswell (2008). However, instead of different form-specific prominence scales the authors propose a unified analysis (same scale) for *d-* and *diese-*pronouns (building on assumptions from Hinterwimmer & Bosch 2017). In this analysis, both *d-*pronouns and *diese-*pronouns avoid selecting the most prominent referent as their antecedents. However, they differ in terms of the range of the scale that determine what constitutes the most prominent referent. For *d-*pronouns, perspectival centers are considered more prominent than aboutness topics, which, in turn, are more prominent than other referents. In contrast, the scale relevant for *diese-*pronouns excludes perspectival centers, making aboutness topics the most prominent referents for *diese-*pronouns.

Topic (discourse, sentence) Another important study regarding the referential use of *diese-*pronouns and their influence on topicality was conducted by Schumacher et al. (2024). However, in their study, they did not examine *diese-*pronouns in comparison to *d-*pronouns but rather in comparison to personal pronouns. Nevertheless, the results of their study shall be reported here.

3 *Demonstrative pronouns*

Schumacher et al. (2024) conducted three experiments using referent-selection tasks to investigate whether interpretive preferences for an anaphoric pronoun are solely influenced by local prominence cues or if discourse topicality plays a role. They used self-written narratives as stimuli (cf. Section 4.2 for more details on referential behavior in narratives) to assess whether preferences for personal pronouns and diese-pronouns, observed in prior research, change when the local prominence of referents does not align with the extended context’s discourse topicality.

Experiment 1 focused on narratives featuring Harry Potter, Sherlock Holmes, and Winnetou, divided into character blocks starting with a character introduction. Results show that discourse topic had minimal impact on pronoun resolution, emphasizing the role of local factors. In Experiment 2, the authors investigated the absence of the discourse topicality effect observed in Experiment 1. Using the same material, famous protagonists were presented randomly without introductions or narrative blocks. The results indicate a competition between sentence and discourse topics in referential choices, particularly for the diese-pronoun but not for the personal pronoun. Although the impact of the discourse topic is minimal, interpretive preferences for diese-pronouns changed based on the alignment of the two topic notions. The authors suggest that world knowledge can introduce a protagonist layer, subtly interacting with the discourse topic and discourse layer. Notably, the diese-pronoun seems sensitive to the discourse topic, while the personal pronoun appears unaffected by discourse topic manipulation. Experiment 3 aimed to examine the impact of discourse topicality in the absence of a fictional world by altering stimuli, using specific descriptions instead of proper names, and presenting stories randomly without introductions. The results reveal a reliable effect of discourse topicality on referent-selection. The use of diese-pronouns and personal pronouns changed when discourse and sentence topicality did not align. The data confirm the hypothesis of discourse topicality influence. Compared to Experiments 1 and 2, the results suggest that the fictional world represented by the protagonist layer interacts with discourse topicality in complex ways. In line with Patil et al. (2023), the authors propose that conflicting QUDs from different layers can disable each other (a more detailed explanation on this approach is provided in Subsection 4.3.2). The diese-pronoun is sensitive to local and global prominence-lending cues within the discourse layer but ignores those from the protagonist layer. This implies that the activation of protagonist information makes certain cues (e.g., discourse topic) less relevant, making local cues (e.g., sentence topic) more decisive.

3.4.2 Referential-shift-potential

As already described in Subsection 3.2.1, it is assumed that German personal pronouns take up topics and thus continue the topic of the discourse, while demonstratives take up referents that are not topics and have the potential of shifting the topic of the discourse (Abraham 2002, Diessel 1999). However, in the context of this assumptions it is not explicitly addressed whether there is a difference between *d-*pronouns and *diese-*pronouns.

The existence of differences becomes evident through the findings from Fuchs & Schumacher (2020), who have been successful in illustrating distinct referential dynamics caused by *d-* and *diese-*pronouns in subsequent discourse. In their study, Fuchs & Schumacher (2020) conducted a sentence completion experiment. The results demonstrate that both *d-*pronouns and *diese-*pronouns equally trigger a shift in reference to a less prominent referent (proto-patient). In this regard, no discrepancy emerges between the two demonstratives. However, concerning the structure of the following discourse, the two demonstratives exhibit differing patterns. The referent taken up by the *diese-*pronoun experiences shorter reference within the story, whereas a referent linked to the *d-*pronoun is frequently referred to throughout the story. Furthermore, when the demonstratives referred to the more prominent referent, the *d-*pronoun was capable of inducing a subtle shift to the less prominent referent, which the *diese-*pronoun could not achieve. Based on these findings, Fuchs & Schumacher (2020) conclude that the *d-*pronoun possesses a more robust potential for referential shifts compared to *diese-*pronouns.

In summary, the study of the referential shift potential of *d-* and *diese-*pronouns indicates that the two demonstrative pronouns affect the structure of the following discourse in different ways. Thus, these differences refer to a forward-looking function of the two demonstratives.

3.4.3 Register

An additional aspect for consideration is language register. The underlying notion is that *d-*pronouns are favored in formal language, while *diese-*pronouns are more commonly employed in informal language (Patil et al. 2020, Portele & Bader 2016, Weinert 2011, Bader et al. 2022). This could potentially lead to variations in the pronominal usage of the two demonstratives, depending on the degree of formality in the linguistic context.

Patil et al. (2020) empirically addressed this factor. The authors employed two referent-selection experiments to investigate the extent of differences in the

3 Demonstrative pronouns

usage of *die/der*, *diese/dieser*, and *sie/er* between formal and informal language. The findings suggest that *diese*-pronouns are more common in formal speech, whereas d-pronouns are frequently used in informal speech. Thus, the results from [Patil et al. \(2020\)](#) indicate that linguistic register significantly influences the choice between *die* and *diese*.

However, there are factors that indicate this might not be the sole factor influencing the use of demonstratives. The authors point out that the factor of (written) modality has also impacted the usage of the demonstratives, given that d-pronouns were infrequent overall, even within the informal register. Moreover, the formality of a text is influenced by various factors rather than a singular one, potentially affecting demonstratives as well. Providing a critical perspective on the influence of register on demonstratives, [Weinert \(2007\)](#) offers an additional insight. Conducting a corpus analysis, she investigates the utilization of personal and d-pronouns in both informal conversations and formal academic advising dialogues. Her conclusion is that d-pronouns are also prevalent in formal conversations, indicating that the usage of d-pronouns need not be exclusively associated with informal language use. In line with this view, [Bader et al. \(2022\)](#) also argue, using an example from the German magazine *Der Spiegel*, that *dieser* can be effectively employed in formal language. Given these considerations, formality does not appear to be a standalone factor with substantial influence on how d- and *diese*-pronouns are employed.

3.4.4 Modality

In the preceding subsection, the possible impact of modality on use of d- and *diese*-pronouns was indicated. It is commonly assumed that in written language, *diese* is preferred, while *die* is more frequently used in oral language.

In a study by [Graefen \(1997\)](#), an examination of scientific articles reveals that adnominal and pronominal forms within the *diese*-paradigm are the predominant deictic expressions in this text type. Heightened usage of d-pronouns is attributed to colloquial language interaction ([Graefen 1997: 224](#)). It is explained that the d-pronouns *die/der/das* lack morphological distinctions present in relative pronouns, definite articles, and pronominal demonstratives, leading to reliance on prosodic cues for differentiation. Consequently, the usage of d-pronouns is closely linked to the oral modality of language, excluding the neuter pronominal form *das*, which also frequently occurs in scientific articles. These findings are in line with [Weinert \(2011: 71\)](#), who reports comparable frequencies of d-pronouns and personal pronouns in spoken German, but not in more formal written language. [Weinert \(2011\)](#) argues for modality as a key determinant, although without

3.4 Differences between *d-* and *diese-*pronouns

explicitly distinguishing between formal and informal conversations concerning the occurrence of *d-*pronouns. Furthermore, [Portele & Bader \(2016\)](#) conducted a corpus study and a sentence completion experiment to explore the factors influencing the choice between *d-*pronouns and personal pronouns in written language. Their results reveal a preference for personal pronouns even in contexts where *d-*pronouns would be expected, suggesting that *d-*pronouns are considerably more prevalent in spoken than in written language.

However, it should be noted that the modality factor is closely intertwined with formality, as discussed in the preceding subsection (cf. [Patil et al. 2020](#)). The results from [Graefen \(1997\)](#) could also be interpreted through this lens, especially considering that scientific articles predominantly employ formal language. [Weinert \(2011: 71\)](#) explicitly states that the use of *d-*pronouns is more restricted in formal written language compared to oral communication. Additionally, [Portele & Bader \(2016: 36\)](#) argue that categorizing language into only two modalities is insufficient, as the use of demonstratives can fluctuate across various text types. For instance, referring expressions in informal texts like chats or social media communication tend to resemble spoken language more closely than in scientific or journalistic texts.

3.4.5 Interim summary

The collective experimental research comparing *d-*pronouns and *diese-*pronouns, as presented in this section, provides compelling evidence indicating that (i) both demonstratives exhibit a shared tendency to avoid the most prominent referent (e.g., [Patterson & Schumacher 2021, 2023](#), [Patil et al. 2023](#)), (ii) both demonstratives demonstrate the potential for referential shifts ([Fuchs & Schumacher 2020](#)), and (iii) that the two demonstratives diverge in terms of language register and modality preferences ([Patil et al. 2020](#), [Portele & Bader 2016](#)). Specifically, *diese-*pronouns lean towards formal language, while *d-*pronouns are more common in informal language and spoken contexts. Additionally, some evidence suggesting that *diese-*pronouns show a stronger preference for the last-mentioned referent compared to *d-*pronouns, while *d-*pronouns display a more sustained potential for referential shifts than *diese-*pronouns. However, the concept of perspectival centers has been found to be crucial in reference resolution (e.g., [Sells 1987](#), [Reinhart & Reuland 1991](#)) and also reveals intriguing differences between *d-* and *diese-*pronouns ([Patil et al. 2023](#)). Research has demonstrated that these two categories of demonstrative pronouns respond differently to the presence of a possible perspectival center. *D-*pronouns can access a prominence hierarchy that considers the perspectival center as the most prominent referent, allowing them to refer

3 Demonstrative pronouns

to the aboutness topic, which is generally less prominent or lower in ranking. In contrast, diese-pronouns rely on a prominence hierarchy that excludes the perspectival center. In summary, this approach accounts for all other examples regarding the referential behavior of d- and diese-pronouns discussed in this section.

4 Naturalistic stimuli & narrative processing

4.1 Introduction

The studies presented in the previous chapters are all based on highly controlled experiments that use isolated self-written items, typically consisting of just two sentences. However, in natural language isolated sentences are a rarity. Therefore, a notable limitation of previous studies on pronoun resolution is the absence of naturalistic contexts. This is particularly significant because, as mentioned earlier when discussing prominence-lending cues (Section 3.3), pronoun usage serves as a means to establish common ground between discourse participants, providing cues to one another. Consequently, it becomes necessary to investigate pronoun resolution within naturalistic contexts where communicative goals are apparent and common ground management is essential and well motivated. To address this limitation and move beyond the common practice of using isolated sentences in psycholinguistic research, the current research employs narrative texts. In Part II and III, I will investigate two excerpts of the novels *Tschick* (Herrndorf 2010) and *Auferstehung der Toten* (Haas 1996), therefore, this chapter focuses on narrative texts as naturalistic stimuli.

In the *Introduction to Narratology*, Fludernik (2009: 6) defines narratives as “a representation of a possible world in a linguistic and/or visual medium, at whose centre there are one or several protagonists [...] who are existentially anchored in a temporal and spatial sense.” Studying the referential behavior and processing of narrative texts presents several challenges due to the inherent complexity of comprehending stories compared to processing two-sentence item pairs. Narratives, for instance, enable the use of a much more complex protagonist structure and have the ability to tell many subsequent, rich events than simple two-sentence pairs. Further, the complexity of narratives arises from the need to construct a rich mental model that includes all protagonists and events. But also the social and emotional influence of narratives is different to two-sentence items. Narratives engage the reader⁵ through a complex interplay of cognitive and affective

⁵In this chapter, I will use the term *reader* to refer to the recipient of a narrative. However, it

4 *Naturalistic stimuli & narrative processing*

processes, immersing the reader in characters and intricate plots. Additionally, narrative processing is closely intertwined with emotions. Moreover, perspective serves as a powerful tool that profoundly influences how we understand stories and engage with them. This leads to a crucial question: What are the cognitive implications when we engage with (i.e., read, listen, understand) longer discourses, particularly in the context of narrative texts? For the investigation of pronoun use, narrative texts provide an ideal setting. Previous research, as reported in Section 3.3, has demonstrated that perspectival cues provide maximal prominence to the perspective-holder. Perspectival features are particularly prevalent in longer narrative texts; thus, the influence of perspective is challenging to examine in self-written two-sentence items. Additionally, since the current dissertation aims to explore the naturalistic use of pronouns, it is advisable to employ items where no linguistic manipulation was performed, representing text created primarily to entertain readers rather than investigate pronoun use. Overall, naturalistic stimuli, specifically narrative texts represent an important but challenging tool to investigate language use, which I will outline in the following subsections.

In this chapter, I will introduce several key concepts in relation to longer, more naturalistic discourses and narratives. First, I will delve into the concept of naturalistic stimuli (Section 4.2). Since this dissertation also follows a neurolinguistic approach, I will explain naturalistic stimuli in relation to the context of research using neural approaches. Following that, I will explore various aspects that arise when dealing with (the processing of) narrative texts (Section 4.3). I will begin with the notion of mental models (Subsection 4.3.1), followed by narrative theories concerning narrator instantiation (Subsection 4.3.3), followed by the representation of speech (Subsection 4.3.5), the impact of perspective (Subsection 4.3.4), and finally, the social aspect of engagement with narratives (Subsection 4.3.6). This chapter, therefore, offers an interdisciplinary exploration of the study of longer discourses, drawing from perspectives in narratology, psychology, cognitive science, and linguistics.

4.2 Naturalistic stimuli

When dealing with language at a natural level, our brain is confronted with an overwhelming influx of complex and multimodal sensory inputs. The main goal of neurolinguistics is to find out how the human brain deals with language, i.e.,

is important to note that narratives can also be directed towards listeners or viewers. Any statements made regarding reader comprehension at least also apply to the auditory modality.

how language is acquired, understood, and produced (Hamilton & Huth 2020). In the fields of psycho- and neurolinguistics as well as neurobiology of language, a variety of different methods are applied to investigate speech and language (Schilling et al. 2021). Nonetheless, traditional laboratory settings strongly deviate from the complex naturalistic stimulations caused by speech and are, therefore, insufficient to study natural speech in its fullest extent (Alday, Schlesewsky & Bornkessel-Schlesewsky 2017). Therefore, using naturalistic stimuli in combination with online methods has become a popular approach in modern research.

To begin with, it is important to define the term *naturalistic stimuli* more precisely. Alday (2019: 457) refers to it as a “non-trivial context, beyond the single-sentence level, in a modality used in everyday language use.” However, the notion of natural language commonly includes listening, speech production, turn taking as well as numerous multimodal communication signals such as gestures, facial expressions or eye contact. The definition of naturalistic stimuli used in this dissertation is based on the more limited domain of *natural language perception* (following Hamilton & Huth 2020). While this approach lacks the multimodal aspects of language, it is important to be aware of the fact that ecological validity (i.e., naturalness) and experimental control are two extremes on a continuum. Enhancing one often results in a trade-off with the other (Brilmayer & Schumacher 2021). Hamilton & Huth (2020) suggest that the naturalness of a stimulus lies on a spectrum and propose three questions that can be used to measure the naturalness of a stimulus, as reproduced in the following quote:

- First, is it a stimulus to which a person might reasonably be exposed outside an experimental setting?
- Second, does the stimulus appear in the same context as in real life?
- Third, is the subject’s motivation to perceive and understand the stimulus specific to the experimental setting, or is it a motivation that the subject would also feel in real life?

Quote from Hamilton & Huth (2020: 574)

The topic of naturalistic stimuli has been popular in the cognitive sciences for a number of years, but in recent years there has also been an increase in studies from the disciplines of linguistics and psychology. Using naturalistic stimuli in language research offers several advantages. Firstly, it enhances the ecological validity of the study by closely resembling real-world experiences and environments, enabling a more authentic exploration of cognitive processes. Secondly,

4 *Naturalistic stimuli & narrative processing*

naturalistic stimuli elicit complex and dynamic patterns of brain activity, reflecting actual cognitive processes in real-life situations and leading to more accurate measurements of brain function. Additionally, such stimuli maintain participants' engagement, reducing experimental biases and artificial responses associated with controlled stimuli. By employing naturalistic stimuli, researchers can bridge the gap between brain-based explanations and psychological theories, facilitating a comprehensive understanding of human cognition. Overall, this approach allows for a more realistic investigation of language processing in real-world contexts, leading to deeper insights into the complexities of human cognition.

Despite the advantages that naturalistic stimuli offer, many experimental designs in neurolinguistics continue to rely on conventional techniques that have several shortcomings. Notably, the voltage of the spontaneous EEG significantly surpasses that of ERPs (with spontaneous EEG voltage ranging between 10 and 100 μV , compared to ERP voltage for language ranging between 2 and 8 μV). Consequently, the traditional approach in ERP experiments involves repeated presentation of each condition to achieve a desirable signal-to-noise ratio (SNR) in the recorded brain responses. This technique's major drawback arises from the fact that repetitive stimulus exposure leads to decreased neuronal activation (Grill-Spector, Henson & Martin 2006, Henson 2003). A widely used experimental paradigm within traditional ERP studies that requires critical evaluation is the rapid serial visual presentation (RSVP). Frequently employed in language processing investigations, RSVP involves the rapid display of words from a text (often two-sentence items) at the same spatial location and high presentation rates. While RSVP in combination with ERP recognition helps to identify relevant information related to specific words in the text (Lees et al. 2018), it is worth noting that this controlled paradigm deviates significantly from natural reading. Thus, ERPs captured during RSVP might not be directly applicable to real-life speech processing. Nonetheless, parallels to RSVP findings have been observed in auditory presentation experiments (e.g., Hagoort & Brown 2000), suggesting that RSVP outcomes might not be biased by the presentation method. Moreover, many traditional ERP experiments use isolated sentences as stimuli (e.g., Schumacher et al. 2015). Even though these stimuli are mostly drawn from real-world sources, it is very uncommon in real-life to encounter a sentence that is not embedded in some kind of context. These unnaturalistic designs (e.g., RSVP, decontextualized sentences) might also lead to a decrease of the participant's intrinsic motivation to comprehend or process the sentences (Hamilton & Huth 2020). Undeniably, the traditional ERP technique carries several drawbacks. Nonetheless, it is crucial to recognize that despite their controlled nature, these methods still

offer insights into the neural underpinnings of language processing. However, it cannot be inferred that the perception of natural language elicits brain responses similar to those elicited by the perception of single words or isolated sentences (Schilling et al. 2021).

A compelling alternative to the traditional ERP approach is to conduct experiments with naturalistic language stimuli, where the stimuli consist of coherent sentences that are either taken directly from everyday speech or approximate it (Hamilton & Huth 2020). Popular stimuli for naturalistic approaches to language processing are complete narrative stories of book chapters (e.g., Brilmayer et al. 2019, De Heer, Huth, Griffiths, Gallant & Theunissen 2017, Lerner, Honey, Silbert & Hasson 2011, Wehbe et al. 2014). Narrative stories fulfill the three criteria postulated by Hamilton & Huth (2020) since they are based on real-world sources, they include sentences that occur in natural contexts, and as people voluntarily consume narrative stories, they also help improve motivation and engagement with the stimulus. For instance, a study by Love & McKoon (2011) shows that extending the length of a story text from four to eleven lines heightened participants' engagement and facilitated successful pronoun resolution. The authors further suggest that a shallow level of processing might occur in experimental settings where participants read numerous short, unrelated texts.

Nevertheless, the use of naturalistic stimuli in psycho- and neurolinguistics is still emerging and the incorporation of naturalistic stimuli for investigating real-time language comprehension in the brain is limited but on the rise. In Subsection 8.3.3, I will present EEG research employing naturalistic stimuli as an introduction to the two ERP experiments in this dissertation that also utilize a naturalistic paradigm.

4.3 Particular features of narrative texts

When using naturalistic stimuli in the form of narrative texts for studying language processing, researchers will encounter several aspects of narrative texts that are not typically found in controlled items. This section aims to address aspects and implications that are inherent to narrative texts but are also partly relevant to non-fictional day-to-day language.

4.3.1 Interpretation of narratives

Comprehending narratives, regardless of modality, requires a specific form of common ground management, involving the construction of a mental model. As

highlighted in Section 2.2, mental models are created during language processing, extending to the engagement with narrative stories where the brain constructs vivid mental images and visualizes characters and settings. While the construction of a mental model is essential for any form of language processing, processing (fictional) narratives presents unique challenges. Dealing with a fictional narrative requires distinguishing between the real and fictional world, a distinction that needs integration into a mental model. The construction of mental models for (fictional) narratives is a subject in various fields such as psychology or semantics where scholars explore how the human brain comprehends and processes stories during reading or listening. The underlying idea of the semantic approaches is that while “a plain assertion in an information exchange triggers (or is intended to trigger) an update of the hearer’s beliefs, a fictional statement instead triggers (or is intended to trigger) an update of [their] imagination” (Maier 2017: 7). Effectively comprehending fiction hinges on the crucial ability to distinguish between facts and fiction, i.e., “the content of a fictional narrative must be kept somehow separate from the ‘official’ common ground” (Maier & Semeijn 2021: 6). Attempting to treat ordinary statements within a fictional work as straightforward assertions, thereby representing the interpreter’s understanding of the common ground, poses challenges. This challenge is evident when readers, for instance, engage with Tolkien’s renowned novel *Lord of the Rings*. Despite the text stating that hobbits existed, readers do not assume their actual existence (Semeijn 2021). As a result, the task of modeling an understanding of fiction becomes more intricate.

Various theories regarding narrative processing often begin with the assumption that the real world serves as the default for the fictional mental model. Psychologists like Busselle & Bilandzic (2008) outline a threefold mental model for narrative processing (story world, character world, situation model), with the story world model representing the fictional setting and its logic. Although it initially assumes the real world as a default, deviations may arise later, prompting the audience to adjust their understanding of the story world’s logic. Additionally, Busselle & Bilandzic (2008) propose a character model that encompasses the identities, traits, and goals of individual characters. The character model is also initially based on real-world stereotypes but evolves as the story unfolds. Semantic theories, rooted in the Discourse Representation Theory (DRT), a formal semantics framework addressing meaning interpretation in natural language discourse, also propose mental model approaches for fiction processing. They suggest an additional fiction operator (Maier & Semeijn 2021, Altshuler & Maier 2022) or a separate workspace (Semeijn 2021, Maier & Semeijn 2021) where the fictional mental model is incorporated. For instance, Semeijn (2021) and Maier

4.3 Particular features of narrative texts

& Semeijn (2021) assert that readers establish a new workspace, assuming an unupdated workspace initially as a copy of the current official common ground. The copying approach in both theories facilitates handling anaphoric references within the specific narration (Semeijn 2021). Moreover, using the real world as a default is practical, serving as a heuristic that saves time and energy (Segal 1995). In the context of fiction, this concept underscores that a text is never interpreted in isolation but always within the context of factual information about the real world. For instance, in a fictional narrative like *Lord of the Rings*, readers acknowledge that the sun rises in the east and that water is composed of H₂O, a truth applicable to both the real world and the narrative.

According to Busselle & Bilandzic (2008), the situation model serves as the primary mental model for story comprehension, providing a framework for integrating additional information and narrative details. This model continuously accumulates information and allows readers to update it as they comprehend new story events and actions. It adapts to accommodate new events, while the story world and character models tend to remain stable, serving as the medium through which characters interact and experience events in the story setting. As the narrative unfolds, the situation model integrates new details with existing knowledge to facilitate successful comprehension. Similarly, semantic theories propose that the reader updates the created workspace or fiction operator (Semeijn 2021, Maier & Semeijn 2021). It is suggested that this process of updating is consistent for both fiction and non-fiction.

In addition Busselle & Bilandzic (2008) stress that in order to comprehend a story, there needs to be a deictic shift that guides the audience from their present position into the narrative, enabling them to grasp the significance of the characters' statements and who or where they are referring to. Semeijn (2021) and Maier & Semeijn (2021) further propose that upon concluding reading, the reader performs a closure operation on the updated workspace, merging the isolated information back into the official common ground. This means that the content within the workspace is incorporated into the common ground using a suitable modal fiction operator. This updated common ground no longer assumes the presence of hobbits as a shared belief between the reader and Tolkien. Instead, what is now considered as common ground is solely within the context of the story where hobbits exist. The process of opening a workspace and applying fictive closure has effectively isolated the content of the fictional narrative from the official common ground.

In sum, there are numerous models explaining the processing of (fictional) narratives. I have provided only a brief and superficial overview of some approaches in this subsection. Despite the differences in these approaches, they share certain

4 *Naturalistic stimuli & narrative processing*

commonalities. For example, the idea of an initial mapping/copying process of the real world, followed by an adaptation to the fictional context during processing, is present in the models of [Maier & Semeijn \(2021\)](#) and [Busselle & Bilandzic \(2008\)](#). Another similarity is the recognition that statements in the narrative text cannot be considered assertions in the ‘official’ common ground. [Altshuler & Maier \(2022\)](#) address this by introducing an independent fiction operator that can be updated separately from the common ground or through a distinct workspace for fiction. [Maier & Semeijn \(2021\)](#) integrate the workspace into a special closure operation within the common ground but also keep it isolated from it at the same time. Conversely, the psychological approach by [Busselle & Bilandzic \(2008\)](#) stresses this phenomenon through the necessity of a deictic shift. The approaches of [Maier & Semeijn \(2021\)](#) and [Busselle & Bilandzic \(2008\)](#) both describe the construction of mental models from processing narratives. However, Maier & Semeijn’s (2021) approach refers to the processing of fiction, whereas [Busselle & Bilandzic \(2008\)](#) describe the processing of general narratives and makes no distinction between fiction and non-fiction. It can, therefore, be concluded from these two approaches that the truth aspect is different when dealing with fictional texts. Thus, it makes sense to assume a separate mental model for fictional discourse. With regard to the psychologically based model, I maintain that the content of the narrative operates on different models which are intertwined. Regarding reference and anaphor resolution it is important to note that approaches suggest referring expressions can only relate on the additional narrative mental model that is separate from a real world mental model. Thus a deictic shift is necessary to understand the referring expressions used in the narrative correctly. While the accounts of fictional processing represent a step in the right direction, they are not without their challenges. Both models presented in this subsection lack a ranking of discourse referents, as proposed by the prominence framework. This critique is particularly directed towards the DRT approach, given that this theory is linguistically based rather than purely psychological. As the prominence hierarchy of referents is a promising approach for calculating referential use, a model of narrative processing should incorporate this. Furthermore, the model by [Busselle & Bilandzic \(2008\)](#) has highlighted the importance of social and emotional factors, which play a pivotal role in language processing, especially in the context of narrative texts. However, these factors are not included in the DRT approach and should be incorporated into future models.

4.3.2 **Layers of discourse organization**

A recent development concerning the mental discourse representation involves the consideration of layers. When dealing with longer texts, it becomes crucial to consider protagonists, perspectival features, and knowledge related to the genre or world. This suggests that the QUD is not solely derived from the text but also from broader discourse or background knowledge. Referring to well-known literary characters or stories can introduce new layers of specific (world) knowledge, leading to different QUDs (Schumacher et al. 2024). For instance, mentioning Frodo can activate the storyline of Tolkien's fictional hero, prompting questions like "What happened to Frodo?"

To create a more structured distinction among various sources influencing discourse organization, Schumacher et al. (2024) propose that QUDs can originate from separate worlds or layers of representation. First, the text addresses several QUDs that are related to the discourse topic (cf. Subsection 2.3.2) and form the so-called discourse level. Simultaneously, well-known protagonists or story themes, grounded in world knowledge, may be activated in conjunction with the ongoing discourse, forming an additional layer termed the protagonist layer. This layer is closely linked to fiction, and the processing of fictional names involves an imaginative attitude, as exemplified by introducing Frodo triggering an imaginative world update (Maier 2017). Moreover, Zeevat (2004: 210) points out that protagonists play a pivotal role in the organization of discourse and may even be "more than just topical in the discourse." In line with that, as discussed in Subsection 3.3.8, studies have shown that the presence of a perspectival center can significantly influence reference resolution (e.g., Sells 1987, Hinterwimmer 2019). This implies that perspectival and attitudinal knowledge can provide a distinct perspective on a situation, prompting questions like "What is the perspectival center's attitude towards the propositional content?" Following Schumacher et al. (2024), a formalization of the protagonist layer involves considering an anchor in the discourse layer that points to a fictional world, initiating the introduction of the protagonist layer. Similar conceptualizations have been applied in perspective-taking, where perspectival centers act as anchors for mental representations in free indirect discourse, and different layers of the discourse are associated with perspectival center and narrator (Patil et al. 2023, Altshuler & Maier 2020, Bimpikou 2020, Hinterwimmer 2019).

Schumacher et al. (2024) point out, however, that "[h]ow these layers interact with each other is not well understood." They assume that introducing additional layers may impose limitations on certain referring expressions. When two layers, such as the discourse layer and the protagonist layer, are concurrently active

during references to fictional names, it could impact discourse processing and the resolution of references (cf. results of [Schumacher et al. 2024](#) reported in Subsection 3.4.1).

4.3.3 Role of narrator

When dealing with narratives the concept of the narrator becomes indispensable. In spoken narratives, the concept of a narrator is easy to grasp; it refers to the speaking entity, which is usually referred to as the speaker. In written narratives, the term narrator is more commonly used, but in this context, the narrator is not the originating entity. A notable accomplishment of narratology is the clear differentiation made between the author and the narrator in contemporary discourse. The concept of separating the narrator from the author originates from Barthes' (1968) famous essay *The Death of the Author* suggesting that the narrator can be described as an independent entity⁶. The concept of the narrator is closely intertwined with the idea of perspective, as determining who 'speaks' is relevant in many perspective-focused investigations. For instance, terms like *narrator-oriented* or *non-narrator-oriented* ([Kaiser 2015](#), [Harris & Potts 2009](#)) are often employed in studies to characterize different perspectival viewpoints. The narrator concept can be described as a general way of indicating perspective in a narrative. It is important to note though that perspective shifts can occur even when the narrative style remains constant, and there can also be changes in narrative style within a single narrative. Therefore, it is beneficial to briefly define the concept of a narrator in the literary and narratology tradition. A fundamental understanding of the narrator concept is also crucial for this dissertation as in Part II and III, I will analyze two narrative texts that differ in their narrative structure. This is significant because the narrative structure could act as an influencing factor, operating independently or in conjunction with perspective.

One of the most renowned narrative theories originates from [Genette \(1980\)](#). Genette's (1980) narrative theoretical model is primarily distinguished by its separation of *mood* and *voice*, enabling a more nuanced analysis of the narrator. According to him, a clear difference exists between the question of who serves as the character whose perspective shapes the narrative, and the question of who functions as the narrator. In other words, mood pertains to identifying who perceives the events, while voice addresses the question of who is the narrator.

⁶Recent literature studies again emphasize the importance of authors as mediators of significant discourse, especially attracting scholars interested in exploring texts from marginalized groups and topics such as post-colonialism, migration, and women's writing ([Fludernik 2009](#)).

4.3 Particular features of narrative texts

With respect to mood (*who sees?*), Genette (1980: 189) coined the term *focalization* which is his equivalent for the term perspective, just without the additional emphasis on a visual experience. He proposes three types of focalization: zero focalization, internal focalization, and external focalization. Zero focalization denotes the absence of any specific point of view, allowing for multiple perspectives in a novel. Internal focalization arises when a single character's perspective predominates. Conversely, external focalization describes a 'neutral' narrative situation where characters are observed from an external standpoint, lacking access to their inner thoughts. These forms of focalization share similarities with descriptions found in other narrative theories, such as Stanzel (1984). Consequently, there appears to be a resemblance between zero focalization and Stanzel's (1984) authorial narrator, internal focalization and the personal narrative situation, and external focalization and the neutral narrator. However, it is crucial to recognize that these approaches represent two distinct models, and direct translation between them is not feasible. Focalization exclusively concerns the knowledge horizon of both the narrator and characters, and this interacts differently with the voice categories. In contrast, Stanzel's (1984) narrative situations encompass a fixed combination of properties, with the knowledge horizon being just one component (for a detailed comparison of the accounts by Stanzel 1984 and Genette 1980, cf. Fludernik 2009).

Regarding the category of voice (*who speaks?*), the most fundamental binary opposition lies in the distinction between homodiegesis and heterodiegesis, which corresponds to the conventional terms *first-person narrator* and *third-person narrator*. The terms homo-/heterodiegetic establish a connection between the narrator and the fictional world, determining whether the narrator is a part of that world or not. In that, these terms help alleviate confusion concerning the use of first-person pronouns. In the concept of a first-person narrator, first-person pronouns are employed to refer to the (main) character who is narrating the story, similar to the third-person narrator, where third-person pronouns are used to refer to characters within the story. However, there are instances in texts where a narrator uses a first-person pronoun to refer to themselves (e.g., *'...as I mentioned above'*). Therefore, the terms homo-/heterodiegetic allow for a more precise description of the narrative structure without solely focusing on pronoun use. Genette (1980) further subdivides the term homodiegetic into two types: one in which the narrator is the (main) protagonist of their own narrative (e.g., Maik Klingenberg in Wolfgang Herndorf's *Tschick*), and another in which the narrator assumes a supporting role and acts solely as an observer (Dr. Watson in Conan Doyle's Sherlock Holmes stories). The former is designated as an *autodiegetic narrator* (Genette 1980: 245). In addition to the category of person

(homo-/heterodiegesis), Genette (1980) also defines various narrative *levels*. He explains the distinction in relationships that different characters and events hold within the narrative structure. He articulates this discrepancy in levels as follows: “any event a narrative recounts is at a diegetic level immediately higher than the level at which the narrating act producing this narrative is placed” Genette (1980: 228). This concept implies that when a narrator retells a story, two levels automatically emerge: the first level comprises the narrator and their audience, while the second level encompasses the narrative itself. Consequently, the narrative instance of a first narrative is inherently extradiegetic, while that of a second narrative is inherently intradiegetic, and so forth. Differentiating between person and narrative level can be challenging. Person pertains to the narrator’s relationship with the story, whereas narrative levels elucidate the structure of the narrative concerning internal narration. For instance, a narrator may be extradiegetic because, as a narrator, they never appear in a diegesis. However, simultaneously, they could also be a homodiegetic narrator if they narrate their own story. Further, it is crucial to note that the homodiegetic narrator embodies two ‘I’s’: the narrating ego (i.e., the narrator ego) and the narrated ego (i.e., the character ego). While there may be a distinct boundary between these two (e.g., when the narrating instance recounts a past story), they can also seemingly merge (e.g., when the narrative time aligns with the narrated time).

In this subsection, I introduced various narrator *perspectives* from a literary and narratology standpoint. The narrator is the instance that tells the story. It is the voice that conveys the plot to the reader. I demonstrated that the narrator can adopt diverse positions, i.e., perspectives from which the story is told. However, *perspective* can shift from the narrator to other instances, such as protagonists. This phenomenon is known as perspective shifts and often studied independently of the narrator instance. The perspective, for instance, influences what information the reader receives and how close they are to the thoughts and feelings of the characters. It is important to note that the concepts of narrator and perspective are closely linked, as the choice of narrator often influences the perspective of the story and vice versa. In the next subsection, I will present linguistically based research on the topic of perspective.

4.3.4 Perspective

In the area of narrative processing, perspective-taking plays a pivotal role. While it is possible to indicate perspective in a controlled experiment with isolated items, perspective really comes into play when dealing with longer texts that feature narrators and multiple characters. Research has revealed that readers are

sensitive to subtle perspectival cues that are not explicitly encoded in the morphosyntax of languages like English and German. It has been stated by several scholars that some expressions require the presence of an experiencer, which serves as some kind of epistemic anchor, i.e., from which perspective the evaluative expression is analyzed. This experiencer has been termed as “judge” (Lasersohn 2005), “evaluator” (Patel-Grosz 2012), or “perspectival center” (Harris 2012, Patel-Grosz 2012, Hinterwimmer 2017). In general, it has been suggested that in ‘regular’ non-fiction communication, the default judge (Lasersohn 2005) is expected to be the speaker or writer (e.g., in an email context). However, in the context of fictional narratives, characters can serve as judges, while the narrator may not be as readily available to assume that role (Kaiser 2015). For narratives, perspective shifts can, for instance, occur due to different speech representation strategies (cf. Subsection 4.3.5), but also through specific perspective-establishing cues. In addition, for the processing of fictional narratives, it is important to first of all shift from one’s own egocentric perspective to the perspective of the narrator; this can be described as a *deictic shift* which is necessary for successful understanding (Busselle & Bilandzic 2009). The concept of perspective, however, encompasses a wide range of research fields, as it relates to numerous situations where we shift our point of view. Perspective changes can be triggered linguistically through specific terms indicating a shift, or they can occur in response to social cues.

Various linguistic expressions have been claimed to require interpretations based on perspective. A fundamental question that arises concerning perspective signaling terms is: Who acts as the judge? In other words, it is crucial to determine whose judgment, opinion, or knowledge state is being referred to in order to understand these expressions. Examples of such expressions include predicates of personal taste (e.g., Lasersohn 2005, Stephenson 2007, Patel-Grosz 2012, Potts 2007), evaluative adjectives (e.g., Stojanovic 2015, 2017), subjective adverbs (e.g., Smith 2003), epistemic modals (e.g., Stephenson 2007, Nuyts 1993), or epithets (Patel-Grosz 2014, Harris & Potts 2009). Initially, these expressions are often interpreted as being oriented towards the narrator, suggesting that the judge in each sentence is the narrator (Lasersohn 2005, Stephenson 2007, Kaiser 2015, Corazza 2005, Potts 2005). However, subsequent experimental evidence has demonstrated that these instances can also be understood from a non-narrator perspective (e.g., Harris & Potts 2009, Kaiser 2015, Karttunen & Zaenen 2005). For instance, non-narrator perspectives have been empirically demonstrated in cases involving epithets (Harris & Potts 2009, Kaiser 2015), appositives in both syntactically embedded and matrix clauses (Harris & Potts 2009, Kaiser 2015),

4 Naturalistic stimuli & narrative processing

subjective adjectives in sentences with sensory verbs (Kaiser 2021, Van Krieken 2018), tense (Macrae 2016), or predicates of personal taste (Stephenson 2007).

The interpretation of specific expressions as narrator-oriented or non-narrator-oriented, however, significantly depends on the presentation mode, for instance, whether the sentence is in FID or not. Kaiser (2015), for instance, investigated the perception of judge-dependent expressions and readers' willingness to consider non-default-judges using minimal pairs of sentences with and without epithets and epistemic adverbials ('*Mary looked woefully at Elizabeth. She was sick /Poor girl; she was sick.*'). Contrary to the common belief that English pronouns in subject position predominantly favor subject antecedents, her results reveal that in sentences with epithets and epistemic adverbials, participants tend to interpret the pronoun as referring to the preceding object, indicating a shift to the perspective of the preceding subject and suggesting a non-narrator-orientation. Additionally, Meuser (2022) examined anchoring mechanisms of FID and shows that higher prominence (termed *linguistic activation* in Meuser's 2022 framework) enhances the presence of a referent as the perspectival center. This suggests that linguistic activation influences the availability of a referent as the perspectival center.

In summary, research indicates that whether the default judge is the narrator or not depends on the context (Kaiser 2015, Harris & Potts 2009, Van Krieken 2018). These findings align with the contextual approach proposed by Potts (2007), which suggest that non-speaker-oriented readings stem from pragmatic factors. Collectively, the studies in this subsection emphasize that perspective shifts can be induced in various ways, underscoring the inherent complexity of the concept of perspective in language use. I will explore studies investigating the neural influences of perspective in Subsection 8.3.4.

4.3.5 Representing speech

Language allows us to report events, actions, or verbal and mental expressions uttered by other people. Especially in written language, speech has to be reported because the only way to express what is or was being said is through the text, as there is no phonological representation of the originally uttered statement. Therefore, speech representation is essential for narrative texts. There are numerous ways of representing speech. For instance the statement in (16) can be reported as in (16a-b). The act of reporting speech in the first case (16a) has been referred to by different names such as *direct quotation*, *direct speech*, *quoted speech*, *direct discourse*, or *oratio recta* (e.g., Smith 2003: 159, Clark & Gerrig 1990).

The second case (16b) is known as *indirect quotation*, *indirect speech*, *indirect discourse*, or *oratio obliqua* (Clark & Gerrig 1990). The third case (16c) illustrates the differential behavior of pronoun use in direct and indirect speech. In the direct speech example (16a), a first-person pronoun can refer to Dean. However, in the indirect speech case, the first-person pronoun can only refer to the narrating instance, see (16c). Contrarily, when referring to Dean in indirect speech, only a third-person pronoun is appropriate, as demonstrated in (16b).

- (16) *Hey, I made pizza for you today!*
- a. Dean said: “Hey, I made pizza for you today!”
 - b. Dean said that he had made pizza for her yesterday.
 - c. Dean said that $I_{\text{the narrator}}$ made pizza for you today.

Direct speech is typically indicated by quotation marks, whereas indirect speech is usually expressed in a subordinate clause. Furthermore, clauses presented in direct speech are typically main clauses. It has been argued that a quotation should not be considered a subordinate clause (De Vries 2008: 41). These two types of reporting also differ significantly in terms of the perspective chosen by the narrator. In (16a), the narrator, in a sense, *lends their voice* to Dean. In other words, the narrator is not using the first-person pronoun to refer to themselves but is reporting what Dean did. In contrast, in (16b), the narrator merely conveys the contents of Dean’s statement using their own wording. Here, the narrator describes what Dean did. This variation in perspective affects all deictic components, such as pronouns, adverbial phrases indicating time, the tense conveyed by the main verb, as well as relative indications of location and direction (De Vries 2008: 40). The impact of the indirect speech is illustrated in (16c) where first-person pronouns are interpreted as referring to the narrator instead of referring to the character.

In the context of pronominal referential expressions, a shift in perspective occurs when using direct speech. This shift results in the interpretation that the pronoun *I* refers to Dean, rather than the narrator. In indirect speech, this perspective shift does not occur to the same extent, meaning that only third-person pronouns can be used to refer to Dean. As a result, first-person pronouns are interpreted from the narrator’s perspective, this becomes clear in (16c). Temporal deictic expressions follow a similar pattern. In the direct speech statement (16a), they are interpreted from Dean’s perspective. Therefore, temporal deictic expressions like *today* must be understood in relation to the time when Dean made the statement. In indirect speech, these temporal expressions shift to the

4 Naturalistic stimuli & narrative processing

narrator's perspective. For instance, in (16b), the expression *today* changes to *yesterday*. This implies that the time of the narrator's must be one day after Dean originally uttered the statement. The same principle applies to spatial deictic expressions (Evans 2012, Clark & Gerrig 1990, De Vries 2008).

While deictic expressions lead to different interpretations with respect to the perspectives in indirect or direct speech, other context-sensitive expressions continue to be associated with the protagonist, for instance, predicates of personal taste (Evans 2012, Clark & Gerrig 1990, De Vries 2008). That the statement in (17a) can be linked exclusively to the protagonist, becomes clear in (17b) because in this case, the narrator can express a contradictory view without causing a contradiction.

- (17) a. Dean said that the crust tasted delicious.
b. Dean said that the crust tasted delicious but I hated it.

A third option to recall speech is FID. To illustrate this, recall example (16), in which Dean's statement '*Hey, I made Pizza for you today!*' was echoed in direct and indirect ways. However, a text can also be formulated in such a way that a sentence is understood as Dean's statement, even if it does not contain an explicit verb like *say*, see example (18).

- (18) When Lena returned home, Dean welcomed her with excitement. Today, he had made her favorite pizza for her! Wasn't she lucky to have him?

FID is a particular form of speech or thought representation and can be described as a mixture or a hybrid of direct discourse and indirect discourse (Hinterwimmer & Bosch 2016: 211, Hinterwimmer 2019: 80, Steube 1985: 392). Genette (1980: 174) describes FID as the process where "the character speaks through the voice of the narrator, and the two instances are then merged." And Eckardt (2015: 29) states that "[f]ree indirect discourse gives us the impression that we listen to two persons at once. The main story is told by the narrator, and in addition, we can hear a protagonist's voice."

FID, therefore, exhibits characteristics of both direct and indirect discourse. On one hand, it resembles direct discourse because certain discourse elements, like temporal adverbs and speech act particles, which are typically understood in the context of the narrator, are now interpreted within the character's context. For instance, in (18) the temporal adverb *today* is interpreted with respect to the character's perspective. On the other hand, it resembles indirect speech in that time markers (tense) and personal pronouns are interpreted in relation

to the utterance context (Hinterwimmer & Bosch 2016: 211). In (18) the tense resembles the narrative style of the narrator and only third-person pronouns can be used to refer to the characters. Therefore, a notable feature of FID is the inconsistent behavior of deictic elements (Hinterwimmer 2019). Some elements are interpreted as expressing the protagonist's point of view, necessitating inference, while others are interpreted from the perspective of the narrator⁷.

4.3.6 Engagement

The previous subsections have focused on describing the structural aspects of narrative texts. However, an essential aspect of processing narrative texts is the emotional and social component that frequently emerges during engagement with such texts. It is often described that readers of a narrative experience a phenomenological state where all their mental systems and capacities are completely focused on the events happening in the narrative. They become so immersed in the story that they lose track of time, fail to notice events around them, and feel completely absorbed in the world of the narrative (Green & Brock 2000, Green 2004, Green 2021, Oatley 1999: 455). Green & Brock (2000) call this *transportation*, but this phenomenon is also referred to as *perspective-taking* (Salem et al. 2017), *narrative presence* (Busselle & Bilandzic 2009), or *immersion* (Jacobs 2015). According to Busselle & Bilandzic (2008), a crucial factor for engaging with narrative texts is the deictic shift. From a linguistic perspective, the deictic shift is even necessary for comprehending a narrative. To grasp deictic expressions within the narrative, readers must shift their perspective from the real world to the fictional world and position themselves within the mental models of the story. This shift is crucial to experience the narrative from an internal perspective and adopt the implied point of view of the story. From a phenomenological point of view, a deictic shift in narrative engagement has two significant effects: First, when readers place themselves within the mental model of a story, they feel as if they are directly experiencing the events. Segal (1995) suggests that the deictic shift theory aligns with the phenomenological experience of transportation, as many readers feel fully engaged in the story, experiencing specific emotions with respect to the unfolding story. Oatley (1999: 455) describes transportation as an effect where the audience becomes “an unobserved observer in scenes of the lives of characters in the story world. He or she stands in their bedrooms, hovers at their

⁷Maier (2015) proposes a distinct perspective on FID, advocating for a novel interpretation. According to his argument, FID is characterized as a distinct and highly conventionalized form of *mixed quotation*.

4 *Naturalistic stimuli & narrative processing*

dining tables, drives with them in their cars.” The second phenomenological effect of the deictic shift is that readers identify with the character from whose perspective the story is narrated. They adopt the character’s viewpoint, allowing them to see the fictional world through the character’s eyes. This process of identification involves perceiving the events in the story with the character’s biases and emotions (De Graaf, Hoeken, Sanders & Beentjes 2012, Busselle & Bilandzic 2008, Van Krieken, Hoeken & Sanders 2017). Identification is described by Oatley (1999: 455) as an effect where the audience “takes on the protagonist’s goals and plans.” The importance of congruent character-related information is further empirically underlined by several studies using controlled items (Filik & Leuthold 2013, Troyer & Kutas 2018, 2020, Troyer, Urbach & Kutas 2019) or longer narratives (Chiera et al. 2022). In sum, deictic shift theory helps to explain the transition from the real world to the story world. As readers construct the mental model of the story, they perform a deictic shift, shifting their experiential center from the actual world to the story world.

The concepts of transportation and identification have also been frequently studied empirically and research indicates that the way narrators refer to characters affects how readers identify with them. Most psychological studies investigating narrative engagement use retrospective questionnaires. For instance, it has been shown that using pronouns to describe characters creates a closer viewpoint and stronger identification, as opposed to nominal references which imply a more distant viewpoint (Van Krieken & Sanders 2017). Moreover, the strategic use of third-person pronouns can encourage readers to adopt the perspective of a specific character as has been shown for news narratives (Van Krieken, Sanders & Hoeken 2015). Other perspective-establishing cues that have been mentioned in Subsection 4.3.4, such as tense and perception verbs, have also been shown to facilitate identification (Van Krieken 2018, Macrae 2016).

Moreover, many studies suggest that readers are more likely to adopt the stance of a protagonist when a story is narrated subjectively from their point of view (Salem et al. 2017, De Graaf et al. 2012, Hakemulder & Koopman 2010, Dixon & Bortolussi 1996, Bortolussi & Dixon 2003, Hartung et al. 2016). For instance, De Graaf et al. (2012) manipulated the narrative point of view by making the protagonist the first-person narrator. The results of the study show stronger identification with the highlighted character. Studies also show that FID leads to stronger identification with the protagonist (e.g., Hakemulder & Koopman 2010, Dixon & Bortolussi 1996, Bortolussi & Dixon 2003). For instance, readers tend to perceive a character’s thoughts as more rational when they are represented in FID (Bortolussi & Dixon 2003: 233). Additionally, studies show that FID can

influence the perceived gender of the narrator (Bortolussi & Dixon 2003). Furthermore, findings indicate that FID heightens the perceived visibility of character emotions and thoughts, because readers of a FID versions report deeper insights into the character's inner life compared to those who read non-FID versions (Hakemulder & Koopman 2010).

Other psychological studies further explore narrative processing in relation to emotions, revealing that the emotional and textual content of stories have a profound influence. For instance, research demonstrates that emotional experiences during a story align with the narrative arc (e.g., Nabi & Green 2015, Appel, Schreiner, Haffmans & Richter 2019). This phenomenon has more recently been observed in studies employing online measures like cardiac, electrodermal, and respiration activity (Schmidt, Winkler, Appel & Richter accepted).

4.4 Interim discussion

In this chapter, I emphasized the effectiveness of audio books of novels for investigating natural language processing. Additionally, I introduced various consequences of narrative texts, all of which can be linked to the overarching concept of perspective. The construction of mental models while processing narrative texts begins with a change in perspective, known as the deictic shift. Moreover, narrative theories offer diverse perspectives on how a narrator's viewpoint can be conveyed. The representation of speech through techniques like indirect speech, direct speech, or FID also serves as a clear expression of perspective-taking. These narrative forms, along with linguistic cues, have the power to induce shifts in perspective within narratives. Studies have demonstrated that such shifts in perspective cause neural processing costs (more on this in Subsection 8.3.4). However, perspective not only influences neural processing; it also plays a significant role in shaping our emotional responses while reading or listening to a text. As demonstrated in this chapter, natural texts encompass a multitude of influencing factors compared to simplistic, controlled items. When examining natural language processing, narrative texts prove to be a valuable tool. It is crucial to recognize that within this textual form, perspective has a considerably greater influence than in controlled two-sentence items. Furthermore, the impact of social factors, such as reader engagement, should not be underestimated.

Overall, I propose that employing naturalistic stimuli is a beneficial approach for studying pronoun resolution and processing. Previous research has shown that perspective plays a significant role, influencing the referential behavior of German d-pronouns (e.g., Patil et al. 2023). As highlighted in this chapter, per-

4 Naturalistic stimuli & narrative processing

spective becomes especially evident in longer narrative texts. In my view, narrative texts are ideal for examining the natural usage of d-pronouns. Moreover, employing naturalistic experimental designs is recommended to enhance participant engagement in online experiments, thereby increasing motivation for pronoun resolution. Interestingly, naturalistic stimuli such as narratives elicit emotional responses, an aspect overlooked in previous referential research. Consequently, we lack an understanding of how personal and d-pronouns are influenced by emotions and engagement with the narrative. Therefore, in this research, I investigate two distinct novel excerpts with respect to d-pronouns. These selected texts provide an opportunity to examine d-pronouns under the influence of the special characteristics of narratives, such as the role of the narrator, perspectival features or protagonist structures. This represents a novel approach to investigating pronouns, and I believe that the use of naturalistic stimuli is a promising research design to advance our understanding of pronoun resolution and processing.

Part II

Corpus investigation

So far, the Theoretical Part I of this dissertation has presented a comprehensive review of the research literature concerning the referential behavior of German d-pronouns and personal pronouns. Additionally, it has highlighted the unique consequences associated with longer narrative texts. The corpus investigation in Part II aims to integrate the findings, ideas, and approaches from previous theoretical and psycholinguistic research with an examination of longer narrative texts. This integration is crucial because previous studies have predominantly focused on d-pronouns in isolated short text examples.

A central issue in the study of discourse anaphors revolves around the distribution of referring expressions in discourse. The question of how discourse unfolds in natural language use and which referring expressions are employed has garnered increased attention in recent years (cf. [Hamilton & Huth 2020](#)). To explore personal and d-pronouns in naturalistic discourses, two corpus studies have been conducted. Corpus studies facilitate a systematic and versatile investigation of naturalistic texts. Consequently, corpus-based studies offer an ideal starting point for exploring larger, more natural discourse contexts. Furthermore, corpus analyses enable the examination of assumptions made thus far about referring expressions in discourse based on a more extensive range of natural discourses.

The main goal of the second part is to assess the assumptions made in the literature through an examination of two distinct novel excerpts. To enhance clarity, I will present the analyses of each corpus in separate chapters. These chapters are designed to be largely self-contained, each featuring its own introduction and discussion. Consequently, some overlap between chapters is inevitable. Although, I am investigating both d-pronouns and personal pronouns, I am primarily focused on d-pronouns. Personal pronouns I am examining primarily as a unit of comparison. The outcomes of the corpus investigations provide insights into Questions 1a and 1b formulated in the introduction.

Question 1a: What is the referential behavior of d-pronouns in longer narrative texts in comparison to personal pronouns?

Question 1b: Does the referential behavior of d-pronouns in longer narrative texts differ from previously observed behavior in controlled experiments?

5 The Tschick corpus

5.1 Introduction

This chapter provides a corpus-based analysis of referring expressions, particularly personal and d-pronouns, in an excerpt of the novel *Tschick* (Herrndorf 2010). I will refer to the annotated novel excerpt as the Tschick Corpus. The chapter aims to unravel the intricate interplay of different prominence-lending cues in relation to the referential behavior of personal and d-pronouns in longer narrative texts. As presented in Section 3.3, the resolution of pronouns is influenced by multifaceted factors. The connection between language structure and its communicative functions often indicates that specific structural elements are employed for particular communication purposes (Arnold 1998).

Corpus analyses serve as a powerful tool for systematically examining linguistic structures and their functions. They offer insights into the frequencies of specific linguistic structures or meanings, providing estimations of ‘real’ frequency by allowing a glimpse into the linguistic landscape of naturalistic language. The novel *Tschick* (Herrndorf 2010), serves as an excellent starting point, because the narrative style in this novel resembles spoken language. This narrative text not only enables an examination of naturalistic pronoun use but also provides the advantage of a continuous narrative with clear features of perspective. This stands in contrast to the limitations often present in spoken word corpora, which typically include only short segments of conversation. By constructing a corpus that mirrors conversational language, I bridge the gap between colloquial and formal speech data. The motivation for deviating from corpora dominated by formal language arises from the recognition that the register of a text can significantly influence the choice of referring expressions. As demonstrated by Patil et al. (2020), some referential forms are restricted to formal registers, while others occur more frequently in informal language.

The current chapter is organized as follows: Firstly, in Section 5.2, I outline the underlying research question and my hypotheses for the corpus study. Subsequently, in Section 5.3, I describe the annotation method of the corpus. Following that, Section 5.4 provides a comprehensive overview of the corpus and its characteristics. This includes a description of the novel excerpt (Subsection 5.4.1), the

5 The Tschick corpus

distribution of all referring expressions in the corpus (Subsection 5.4.2), features of all personal pronouns and d-pronouns in the corpus (Subsection 5.4.3), and functions of d-pronouns (Subsection 5.4.4). In Section 5.5, I then present analyses related to the previously outlined research questions, with separate subsections addressing the features of the previous mention⁸ (Subsection 5.5.1), referential distance (Subsection 5.5.2), intervening characters (Subsection 5.5.3), and referential persistence (Subsection 5.5.4). Additionally, in Section 5.6, I conduct an investigation of perspective. Lastly, in Section 5.7, I discuss the analysis of the different aspects of the corpus.

5.2 Research questions & hypotheses

The purpose of this corpus study is to find out how personal pronouns and d-pronouns are used in longer more naturalistic discourse contexts. In Part I of this dissertation, I explored the extensive body of existing research on the referential behavior of personal and d-pronouns. This research has primarily revolved around the form-function correlation of referring expressions (Prince 1981, Heim 1982, Givón 1983, Ariel 1990, Gundel et al. 1993). Further various properties of the previous mention, including its referential form, grammatical role, and thematic role have been explored. Additionally, researchers have employed analyses on referential chains to examine how the prominence of a referent can evolve throughout a discourse and how this evolution influences the choice of a referential form. In the corpus analyses within this dissertation, I will investigate these aspects through four research questions that focus on the form of the previous mention, referential distance, intervening characters, and referential persistence. Research question (RQ) (i) examines features of the previous mention, and then RQ (ii)–(iv) address the criteria for discourse prominence (or in Givón’s terminology topic continuity) proposed by Givón (1983).

RQ (i) Concerning the form-function relation, numerous theories have proposed various cues that play a role in determining the prominence and usage of personal and d-pronouns. Traditionally, a division of labor between these pronoun types has been assumed, with personal pronouns typically referring

⁸Traditionally, the initial linguistic element referring to an extra-linguistic referent is labeled the *antecedent*. In this framework, even within a referential sequence with multiple subsequent anaphors, the antecedent remains constant (Schwarz 1997: 445). However, in the corpus analysis at hand, I focus on the coreferent element that immediately precedes a referring expression. To clarify this deviation from the traditional definition, I employ the term *previous mention*.

to the most prominent referent in preceding discourse, while d-pronouns showing a complementary pattern by preferring less prominent referents as their antecedents (e.g., Bader & Portele 2019, Portele & Bader 2016, Bosch et al. 2003). This division has been examined from various linguistic perspectives, including syntax, semantics, and discourse pragmatics. Many cross-linguistic studies have concentrated on the grammatical role of the previous mention as a significant factor (Bosch et al. 2003, 2007, Kaiser & Trueswell 2008, 2004b), while others have emphasized thematic roles. Notably, in the context of the German language, evidence suggests that thematic role may represent a more influential prominence-lending cue than grammatical role with respect to pronoun resolution of d-pronouns (Schumacher et al. 2015, 2016). In the following corpus analysis, I nonetheless investigate the feature grammatical role in addition to thematic role, because of the strong cross-linguistic research tradition regarding grammatical role. Thus, an examination of these properties in this corpus study allows for comparison with previous research. Moreover, studies have demonstrated that d-pronouns show a graded sensitivity to the prominence status of the discourse referent (Patterson & Schumacher 2021) instead of simply excluding the most prominent referent or picking the least prominent one. This means that d-pronouns neither avoid referring to all but the least prominent candidate, nor do they avoid referring only to the most prominent candidate. Rather prominence seems to lead to more differentiated preferences with regard to several (more than two) potential antecedents. But not only prominence-lending cues, also the referential form of the previous mention has been discussed. Previous studies have made strong claims about the preferred referential form of the previous antecedents of the two pronouns (Abraham 2002: 461, Wiltschko 1998: 163). Therefore, I will also investigate this property. However, to the best of my knowledge, these features of the previous mention have not yet been systematically examined in naturalistic texts as previous psycholinguistic research has primarily focused on short self-written items. Therefore, the **first research question** of this corpus study aims to address is: *Which prominence-lending features (referential form, grammatical function, thematic role) do the previous mentions of personal pronouns and d-pronouns carry?* Regarding the analysis of the referential form of the previous mention, I hypothesize (a) that d-pronouns preferentially refer to a full lexical DP and never refer back to another d-pronoun or personal pronoun, following the observations of Abraham (2002: 461) and Wiltschko (1998: 163). For personal pronouns, a more flexible preference for the referential form of the previous mention is predicted, as Wiltschko (1998: 163) notes, personal pronouns "only need a (salient) discourse referent as their antecedent." Therefore, no specific referential form is predicted

to be excluded as a potential previous mention for personal pronouns. Regarding the grammatical and thematic roles of the previous mention, I hypothesize that d-pronouns prefer less prominent antecedents, while personal pronouns prefer the most prominent ones. Specifically for grammatical roles, I predict (b) that d-pronouns will refer to a discourse referent with a less prominent grammatical role (e.g., the direct object in transitive sentences), while personal pronouns will favor previous mentions with the most prominent grammatical role (e.g., the subject of the sentence). This hypothesis is based on findings from corpus results by [Bosch et al. \(2003, 2007\)](#) and research by [Patterson & Schumacher \(2021\)](#), the latter suggest a gradient sensitivity to the prominence status of the referent. Regarding thematic roles of the previous mention, I predict (c) that d-pronouns will refer to discourse referents with less prominent thematic roles (e.g., the proto-patient in transitive sentences), while personal pronouns will prefer antecedents with the most prominent thematic roles (e.g., the proto-agent). This hypothesis follows work by [Schumacher et al. \(2015, 2016\)](#).

The hypotheses above focus on local prominence factors, however, studies have also shown that wider discourse functions also have an influence on the use and interpretation of personal and d-pronouns. [Givón \(1983\)](#) proposed three measures of discourse prominence: (i) referential distance (how recently the referent has been mentioned), (ii) potential interference (how many other potential antecedents of the referential form there are), and (iii) persistence (how long the entity will remain in the discourse). In the following, I will present a research question for each of these measures.

RQ (ii) Distance between a referring expression and its previous mention is commonly recognized as a general measure of the accessibility of a textually evoked discourse referent ([Givón 1983](#), [von Heusinger & Chiriacescu 2013](#), [Chiriacescu & von Heusinger 2010](#)). The referential distance significantly influences the choice of referential form ([Givón 1983](#), [Ariel 1990](#), [Gundel et al. 1993](#)). Exploring referential distance further offers essential insights into working memory, given that it serves as a metric for referential decay ([Givón 1983](#)). Therefore, it is worth to investigate the referential chains of personal and d-pronouns with respect to referential distance. This leads to the **second research question**: *How do the referential chains of personal and d-pronouns differ in terms of referential distance?* Following the principles of [Givón \(1983\)](#) and [von Heusinger & Chiriacescu \(2013\)](#), referential distance can be measured in sentences or clauses. [Givón \(1983: 13\)](#) states that the distance “is thus expressed in terms of number

of clauses to the left. The minimal value that can be assigned is thus 1 clause.” Following this, in this corpus study, I utilize sentence segments, a more comparable unit for sentence, as the measure of referential distance (cf. Section 5.3 regarding intra-sentential segmentation). Previous studies have made predictions about the referential distance, suggesting that the distance between a d-pronoun and its previous mention is greater than that between personal pronouns and their antecedents (Hint et al. 2020, Krasavina & Chiarcos 2007). These predictions draw on Ariel’s (1990) Accessibility Hierarchy and Gundel et al.’s (1993) Givenness Hierarchy, which position d-pronouns on a scale between full DPs and personal pronouns (cf. Himmelmann 1996: 228). As a result, d-pronouns are considered more definite and explicit than personal pronouns, yet with a preference for a referent that is less accessible, i.e., less prominent. Therefore, following these accounts the referential chain to the previous mention of d-pronouns is assumed to be longer than that of a personal pronoun. However, this approach seems less intuitive when considering prominence assumptions (Himmelmann & Primus 2015, von Heusinger & Schumacher 2019). According to the prominence account, it is also possible that d-pronouns have shorter referential distances than personal pronouns because they are suggested to refer back to less prominent antecedents (Schumacher et al. 2015, von Heusinger & Schumacher 2019). A less prominent previous mention, therefore, should not be located too far away to establish a coreference relation. Consequently, two opposing hypotheses regarding the segment distance of personal and d-pronouns are formed, and this research question will be investigated exploratory. The opposing hypotheses concerning the referential distance of pronouns predict (a) that the referential distance of d-pronouns is longer than the referential distance of personal pronouns (accessibility account) and (b) that the referential distance of d-pronouns is shorter than that of personal pronouns (prominence account). These hypotheses will be investigated by analyzing the sentence segments between critical pronouns and their previous antecedents.

RQ (iii) For an investigation of pronoun resolution and in particular the difference between personal and d-pronouns it is also crucial to investigate intervening referents. Therefore, a **third research question** arises: *How do intervening referring expressions influence the choice of pronoun type?* This question will be examined by analyzing the number of intervening characters, namely animate referents that appear between the critical pronoun and its previous mention. While this type of analysis does not necessarily account for potential competitors, as morpho-syntactic congruence between the pronoun and intervening characters is not the focus, it serves as a measure of memory load, which can also be an

influential factor in terms of accessibility (cf. [Arnold 2010](#) for an overview). Studies, for instance, have shown that speakers and writers are less likely to produce highly prominent referential forms (such as pronouns) when performing a distracting task (e.g., [Arnold & Griffin 2007](#)). In that sense, it does not completely follow the approach by [Givón \(1983\)](#), who defines his measure of potential interference as a measure of how many other potential antecedents of the referential form there are. However, it has been suggested that intervening referents influence the choice of the referential form ([Ariel 1990](#), [Arnold 1998, 2010](#)). [Arnold \(1998: 21\)](#) claims that “the reason that entities become less accessible over time may be the result of interference from other referents which are mentioned in the intervening discourse.” Therefore, I predict that d-pronouns will have more intervening characters than personal pronouns because d-pronouns are generally assumed to refer to less prominent (or accessible in Arnold’s terms) referents and because d-pronouns represent a less explicit referential form.

RQ (iv) When dealing with longer, more naturalistic discourses, investigating the simple antecedent-anaphor relation is not sufficient to describe the underlying referential behavior of the text. Instead, the overall referential usage in relation to textual coherence must also be taken into account. In this context, the varying importance levels of different protagonists need to be considered. In each novel, there are protagonists who are more central than others and it is suggested that they are referred to differently. Therefore, a **fourth research question** emerges: *How is the choice of pronoun type influenced by referential persistence?*

[Givón \(1983\)](#) introduces referential persistence as a measure of textual cohesion. This assumes that more important referents, or more persistent ones, tend to be more anaphorically accessible and cataphorically persistent. The way in which a referent is referred to reflects the speaker’s or writer’s intentions regarding the role this referent will play in the subsequent discourse. Therefore, persistence determines the activation status of the referent in question and should also influence the use of d-pronouns. This idea has also been proposed by [Arnold \(1998, 2010\)](#), who state that more persistent referents are more accessible. [Chiriacescu & von Heusinger \(2009\)](#) defines persistence as a measure of how long a referent will remain in the discourse after its initial introduction. Additionally, [Givón \(1983\)](#) refers to persistence as a reflection of the topic’s importance in the discourse and, as such, a measure of the speaker’s or writer’s topical intent.

In previous literature, referential persistence is often measured by the number of anaphoric expressions used to refer back to a certain discourse referent within a specific text frame (such as the following five sentences) ([Deichsel &](#)

von Heusinger 2011, Chiriacescu & von Heusinger 2009, Givón 1983, Arnold 2010). However, in this corpus analysis, I am examining longer narrative texts consisting of several chapters. Therefore, my interest lies in the referential persistence of each (recurring) protagonist over the entire corpus. Building on these theoretical and empirical assumptions from previous research, I hypothesize that d-pronouns are preferentially used to refer to protagonists with lower referential persistence. This is because they are assumed to refer to a less prominent referent. However, referents that are highly persistent represent very prominent discourse referents. Hence, I predict the personal pronoun to refer to highly persistent protagonists. I also expect the personal pronoun to refer to less persistent referents because it is the default way to indicate referential continuity.

5.3 Annotation method

The goal of the annotation process was to annotate all referring expressions (REs) that refer to an animate referent and assign specific syntactic, semantic, and discourse pragmatic properties to them. To create a uniform comparison group, only REs that refer to animate referents were annotated. The annotations were performed with the web-based multi-layer annotation software WebAnno 3.6.7 (Yimam et al. 2013, 2014). Prior to the annotations, the data has been automatically sentence-segmented. In the preprocessing steps, the sentence segmentation and tokenization were automatically conducted using UDPipe⁹. Inconsistencies were manually checked and corrected. Sentence boundaries were indicated by sentence-final punctuation (such as period, question mark, and exclamation point). The sentences appeared on separate lines in the WebAnno platform. In some rare cases, though, two sentences appeared in one line. Therefore, the number of tokenized sentences does not correspond to the number of actual sentences, because the automatic tokenization did not cause a line break for some characters (e.g., quotation marks). The annotation process was carried out in parallel by three linguistically trained annotators, all being native German speakers. Both corpora underwent multiple rounds of annotation, during which the annotation scheme was refined gradually. Therefore, no inter-annotator agreement analysis was performed. First, the Tschick Corpus was annotated, then the annotations continued with the AdT Corpus. The chapters were always annotated chronologically. The annotation procedure was as follows: Step 1: annotation of sentence segments. Step 2: annotation of all REs that refer to an animate referent.

⁹Link to udpipes: <https://ufal.mff.cuni.cz/udpipe>; the model used: german-gsd-ud-2.4-190531.udpipe. The link was last checked on 13th September 2024.

5 The Tschick corpus

Step 3: specification of the referential form for each referring expression (RE) annotated in step 2. Step 4: adding information on grammatical and thematic roles to each annotated RE from step 2. Step 5: marking the referential chains between the previous mention and RE. The annotation scheme follows the guidelines provided by [Repp, Schumacher & Same \(2023\)](#). A more detailed description can be found in the [Appendix A](#).

Intra-sentential segmentation Both corpora in this dissertation feature a colloquial narrative style with unstructured, spoken-like syntactic constructions, despite being based on written texts. To ensure sentence comparability, intra-sentential segmentation (step 1 of the annotation process) was annotated. Clausal elements were treated as segments, except for restrictive relative clauses, which depend on the referent they modify and were not segmented. Most segment boundaries were identified using commas. Further details on the criteria for segmentation annotations and examples can be found in [Appendix A.1](#).

Referring expressions that refer to animate referents In step 2 of the annotation process, exclusively REs referring to animate discourse referents were marked. Nevertheless, some special cases required specific considerations for the RE annotations, which are explained in [Appendix A.2](#).

Referring expressions and their features In step 3 and step 4 of the annotation process, additional features were assigned to each annotated RE. These features encompassed the referential form, grammatical role, thematic role, and extra annotations for homonymous REs (e.g., formal *Sie* or plural indicators). [Figure 5.1](#) provides an illustration of the annotated RE features. A more comprehensive explanation of the distinct features and individual annotation conventions can be found in [Appendix A.3](#).

Referential chains In the final annotation step, coreference relations, i.e., referential chains, between individual REs were indicated. All REs that refer to the same real-world referent and, thus, belong to a referential chain, were annotated by a drag and drop procedure. A screenshot of the annotation pane in Webanno can be found in the [Appendix A.4](#). No referential chain was annotated for REs that appeared only once or for which no unambiguous coreference relationship could be identified. It is important to note that referential chains did not extend across chapter boundaries, as the annotation was conducted on a chapter-by-chapter basis.

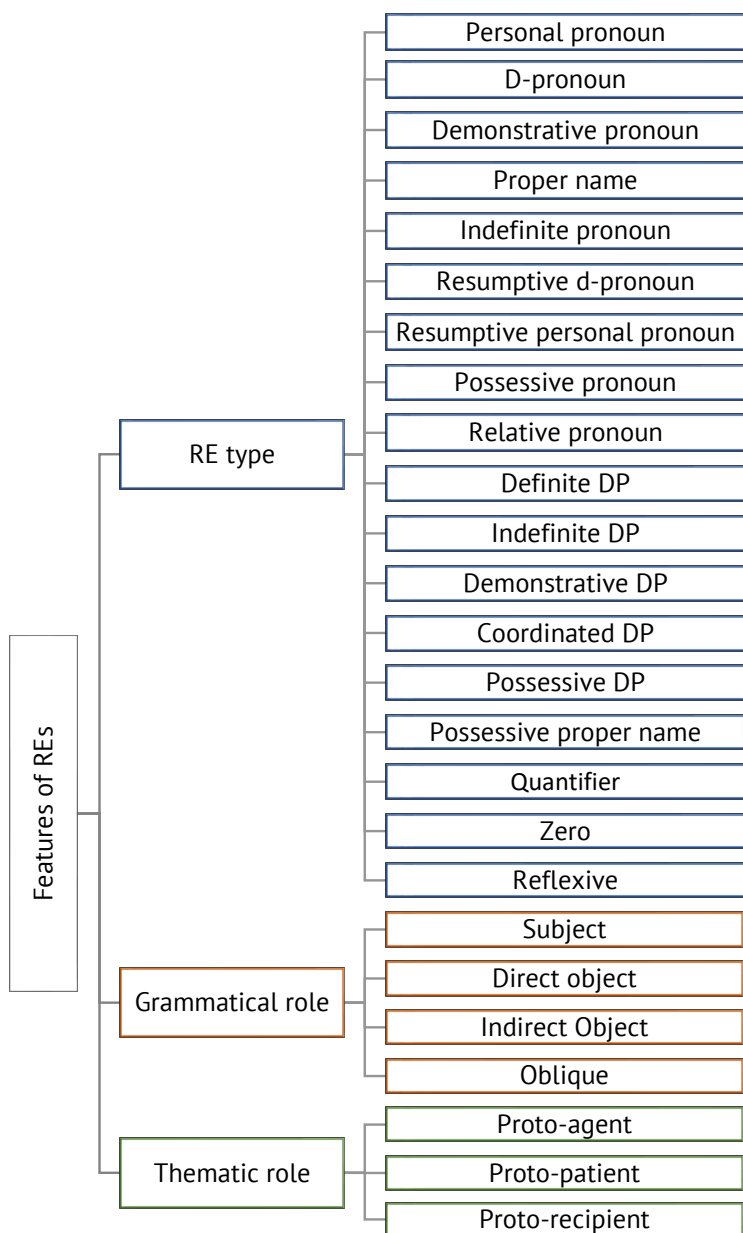


Figure 5.1: Annotated features of referring expressions include referential form, grammatical role, and thematic role. Combinations of determiners and nouns are designated as DPs, accompanied by a specific determiner definition.

5.4 Characteristics of the Tschick Corpus

5.4.1 The novel excerpt

The Tschick Corpus was formed from nine chapters of the novel *Tschick* by Wolfgang Herrndorf (2010), specifically chapters 28 to 31, and 42 to 46. In total the corpus contains 1559 annotated referring expressions that refer to an animate referent. Table 5.1 presents a brief general overview regarding the length of the Tschick Corpus. A dataframe containing only the annotated referring expressions and additional information is freely accessible for download on the Open Science Framework website (<https://osf.io/2s9x6/>). Due to copyright restrictions, the entire corpus can only be shared upon request. The novel *Tschick*, published in 2010, can be categorized as a road novel (Krammer 2021), a coming-of-age novel (Lorenz 2019), and/or an all-age novel (Löwe 2015). *Tschick* has achieved remarkable success since its release, becoming a bestseller in Germany and other countries and being translated into multiple languages. Wolfgang Herrndorf received numerous prizes for the novel, including the German Youth Literature Prize (Deutscher Jugend-Literatur-Preis) in 2011. *Tschick* has also been the source of a highly successful theater adaptation (Gehler 2011), an opera version (Vollmer 2015), a movie adaptation (Akin 2016), and the novel holds a prominent place in the literary curriculum of many German middle and high schools.

The novel is about an unusual friendship between the 14-year-old Maik Klingenberg and the teenage Russian late repatriate Andrej Tschichatschow, nicknamed Tschick. Together, the two teenagers drive through East German provinces in a stolen Lada and experience many adventures. In the excerpt, the teenagers encounter a runaway girl named Isa and later have to deal with Maik's father, the police and a judge. For the current linguistic analysis, the novel is interesting due to two main reasons: First, the novel is characterized not only by a naturalistic and conversation-like narrative style, but especially by the very authentic and timeless use of youth language. This allows the investigation of pronoun resolution in a more ecologically valid setting. A side effect of the colloquial language is that *Tschick* includes very explicit

Tokenized sentences	723
Sentence segments	1633
Mean chapter length (segments)	181.44
Total REs	1559

Table 5.1: Overview of the Tschick Corpus' length.

swearwords and invective. Further, the novel consists largely of a dialogue structure, which is another factor supporting the naturalistic language used in the novel. Second, the novel is written from the first-person narrator Maik's point of view and thus is characterized by an autodiegetic narrator, which is an interesting parameter for later analyses because it makes it possible to assess the role of perspective-taking during referential processing. The narrative style of *Tschick* and its characteristics is illustrated in (19). From the example, the dominant dialogue structure of the novel becomes clear as well as the autodiegetic narration. Also phrases like *Quatsch-mit-Soße-Gesetz* (literal translation 'nonsense-with-sauce-law') or *kapitale Scheiße* ('capital shit') illustrate the colloquial and invective language-use of the narrative. Further, the paragraph illustrates the naïvety of the protagonists.

- (19) «Was willst du mir erzählen? Dass das Wasser von unten nach oben läuft?»
 «Du musst ansaugen.»
 «Noch nie was von Erdanziehung gehört? Das läuft nicht nach oben.»
 «Weil es ja danach nach unten läuft. Es läuft ja insgesamt mehr nach unten, deshalb.»
 «Aber das weiß das Benzin doch nicht, dass es nachher noch runtergeht.»
 «Das ist ein physikalisches Gesetz. Das hat auch einen Namen, irgendwas mit Kräfte. Und Röhren. Kräfte-irgendwas-Gesetz.»
 «Quatsch», sagte Tschick, «Quatsch-mit-Soße-Gesetz.»
 «Hast du das nie im Film gesehen?»
 «Ja, im Film.»
 «Ich weiß das aus einem Buch», sagte ich. Ich sagte lieber nicht, dass es ein Buch für Sechsjährige gewesen war. «Irgendwas mit K. Kapitalkraft. Gesetz der kapitalen Kraft oder so.»
 «Kapitale Scheiße, Mann.»
 «Nein, es ist auch was anderes ... ich weiß! Kommunal, das Prinzip der kommunalen Röhren.» (T 28, 54–70)¹⁰
 “What are you trying to tell me? That the water runs from the bottom to the top?”¹¹
 “You have to suck it in.”
 “Never heard of gravity? It doesn't run upwards.”

¹⁰Examples from the respective corpora are marked in parentheses by an abbreviation of the novel (T = Tschick, AdT = Auferstehung der Toten), the chapter number, and the sentence token number from the WebAnno application (such as AdT 3, 68).

¹¹Translations come from the author of this dissertation and not from the English-language versions of the novels.

5 The Tschick corpus

“Because it’s going down afterwards. It’s running down more overall, that’s why.”
“But the gasoline doesn’t know that it’s going down afterward.”
“That’s a law of physics. It also has a name, something about forces. And tubes. Forces-something law.”
“Rubbish,” said Tschick, “rubbish-with-sauce law.”
“You never saw that in the movie?”
“Yes, in the movie.”
“I know it from a book,” I said. I preferred not to say it had been a book for six-year-olds. “Something about K. Capital Force. Law of capital force or something.”
“Capital shit, man.”
“No, it’s something else ... I know! Communal, the principle of communal tubes.”

5.4.2 Distribution of referring expressions

In this subsection, I will provide an overall distribution of all annotated referring expressions to offer an overview of the general characteristics of the corpus.

Referential form Table 5.2 shows the distribution of the nine most frequent referential forms in the corpus. Combinations of determiners and nouns are designated as DPs, accompanied by a specific determiner definition. For example, an referring expression like *eine Pilotin* (a pilot) is classified as an *indefinite DP*. The table summarizes under ‘other’ referential forms that have been annotated less than 20 times, those forms are quantifier, relative pronoun, coordinated DP, demonstrative DP, possessive proper name, and demonstrative pronoun. From

Referential form	Freq.	%
Personal pronoun	827	53.05
Zero pronoun	179	11.48
Definite DP	133	8.53
Possessive pronoun	128	8.21
Proper name	100	6.41
Indefinite DP	44	2.82
D-Pronoun	43	2.76
Indefinite Pronoun	43	2.76
other	39	2.50
Reflexive	23	1.48
Total	1559	100.00

Table 5.2: Distribution of the 15 annotated referring expressions.

Referential form (shortened)	Freq.	%
Pronoun	1243	79.73
DP	177	11.35
Name	100	6.41
other	39	2.50
Total	1559	100.00

Table 5.3: Shortened overview of referring expression distribution. All annotated referring expressions are grouped into the main categories pronoun, DP, and name.

the 18 available referential forms (cf. Figure 5.1), 15 were annotated in the Tschick Corpus. The referential forms resumptive d-pronoun, resumptive personal pronoun and possessive DP do not occur in the Tschick Corpus. As it becomes clear from Table 5.2, more than half of the annotated referring expressions are personal pronouns. Note that this number includes first-, second- and third-person personal pronouns of both singular and plural forms. D-pronouns take up 2.76 % of the annotated REs in the corpus, this number also includes first-, second- and third-person d-pronouns of both singular and plural forms. Table 5.3 shows a shortened overview of the REs in the Tschick Corpus. All pronoun types as well as all forms of definite and indefinite DPs are grouped together respectively. The label ‘names’ only includes the referential form proper name. It becomes clear that 79.73 % of the annotated referring expressions are pronouns. (Definite and indefinite) DPs and names, however, occur considerably less frequently.

Grammatical & thematic role The mosaic plots in Figure 5.2 and Figure 5.3 show the distribution of grammatical role and thematic role among the three main groups of referential forms (cf. Table 5.3) but excluding ‘other’. Horizontally the plots are divided into the three main groups of referential forms: name (N=100), DP (N=177), and pronoun (N=1243). Vertically the plots are divided into the different features of grammatical role (Figure 5.2) and thematic role (Figure 5.3). Since the figures exclude referring expressions that were marked as ‘other’, in total a distribution of 1520 REs is depicted.

Looking at Figure 5.2, it becomes evident at first glance that pronouns in subject position represent the majority (62.0 %) of the annotated referring expressions across the three main RE groups. Among all referring expressions, the grammatical roles oblique and indirect object appear second most frequently, each with 6.8 %. They are followed by referring expressions with the grammati-

5 The Tschick corpus

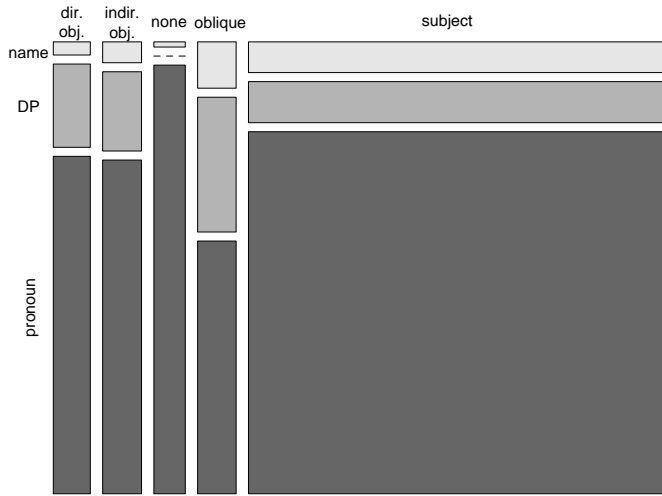


Figure 5.2: Distribution of grammatical roles of all referring expressions grouped by the categories name, DP, and pronoun.

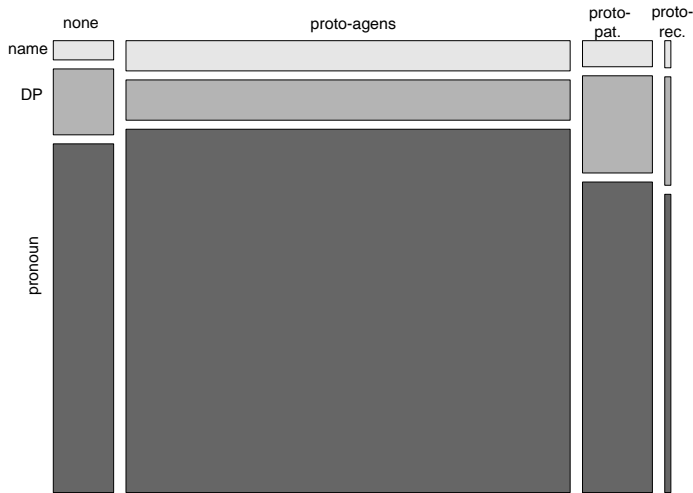


Figure 5.3: Distribution of thematic roles of all referring expressions grouped by the categories name, DP, and pronoun.

cal role direct object (6.5 %) and referring expressions with no grammatical role (5.5 %). For instance, possessive pronouns were not assigned a grammatical role. In addition, when comparing the grammatical roles (horizontally), it can be noted that the grammatical role subject also dominates, constituting 74.3 % of all anno-

tated grammatical roles in the three main groups. Now, looking at the distribution of RE groups (vertically) within the grammatical role subject, it is evident that pronouns constitute the majority, with 83.5%. Conversely, within the pronoun group, subjects represent the largest share, with 75.9%.

Looking at Figure 5.3, it is immediately apparent that pronouns in the proto-agent role make up the majority (64.1%) of the three main RE groups. When comparing the thematic roles, it becomes evident that the thematic role proto-agent is the most prevalent among all thematic roles, comprising 76.5%. The thematic role proto-patient follows as the second most frequent (12.0%), while this is followed by referring expressions with no thematic role (for instance, possessive pronouns; 10.4%) and the grammatical role proto-recipient (1.1%). Examining the distribution within the thematic role proto-agent, pronouns constitute the majority with 83.7%. Conversely, within the pronoun group, the thematic role proto-agent holds the largest share with 78.4%.

5.4.3 Distribution of all personal & d-pronouns

So far, I have provided an overview of the general distribution of all annotated referring expressions. However, this dissertation primarily examines the referential behavior of third-person singular personal and d-pronouns. In this subsection, I will present the distribution of all annotated personal and d-pronouns, considering their person, number, gender, thematic and grammatical role. This comprehensive analysis will offer a detailed overview of the occurrence of personal and d-pronouns in the corpus.

Person, number, gender The current dissertation focuses on personal pronouns and d-pronouns referring to animate referents. Specifically, my interest lies in feminine and masculine third-person singular pronouns. Table 5.4 displays the distributions of grammatical person and number for all annotated personal and d-pronouns. The table reveals that out of the 827 personal pronouns, 22.25% occur in third-person singular. This relatively low count of third-person singular personal pronouns is attributed to the presence of a homodiegetic (in this case autodiegetic) narrator in the novel. Consequently, 44.86% of personal pronouns are in the first-person singular. Table 5.4 also highlights that there are nearly five times as many third-person personal pronouns as there are third-person d-pronouns. Similar to other corpus studies, such as those by Bosch et al. (2003) or Portele & Bader (2016), the personal pronoun–d-pronoun ratio is imbalanced, with significantly more personal pronouns than d-pronouns. However, Bosch et

Referential form	Person	Freq.	%
Personal pronoun	1-sg	371	44.86
	2-sg	76	9.19
	3-sg	184	22.25
	1-pl	163	19.71
	2-pl	19	2.30
	3-pl	12	1.45
	formal	2	0.24
	total	827	100.00
D-Pronoun	3-sg	38	88.37
	pl	5	11.63
	total	43	100.00

Table 5.4: Distribution of person and number of personal pronouns and d-pronouns

Referential form	feminine	masculine	neuter	Total
Personal pronoun	98	85	1	184
D-pronoun	14	22	2	39

Table 5.5: Distribution of the grammatical gender of all third-person singular d-pronouns and personal pronouns

al. (2003) report a ratio of 8:1, and [Portele & Bader \(2016\)](#) even report a ratio of 23:1.

In the upcoming sections, this dissertation will specifically address feminine and masculine pronouns while excluding neuter pronouns. Although, in general, the neuter d-pronoun *das* is a very frequent German referential expression ([Weinert 2011](#)), it is treated separately. This is because it is predominantly employed as a propositional anaphor, referring to events, clauses, or discourse sections ([Weinert 2011](#)). Furthermore, the majority of pronouns in the underlying corpus are feminine or masculine. Previous literature also focused on the investigation of feminine and masculine pronouns. To illustrate that feminine and masculine pronouns represent the largest share of the annotated pronouns, Table 5.5 displays the distribution of the grammatical gender of all annotated third-person singular personal pronouns and d-pronouns.

Since only referring expressions that refer to animate referents were annotated, it might be surprising at first to find three pronouns with a neuter gender. In German diminutives ending on *-chen* and *-lein* as well as some DPs show a

gender-sex-incongruence, i.e., the grammatical gender of the DP that is indicated by the determiner is incongruent with the biological sex of the described referent (*das Mädchen*, engl. ‘the girl’; *das Model*, ‘the model’, *das Schühchen*, ‘the small shoe’). In general, gender-sex-incongruent DPs (not diminutives) can be referred to by either a feminine or a neuter pronoun (Wiltschko 1998: 164). However, the observed three instances of neuter pronouns do not refer to a gender-sex-incongruent DP, rather they can be explained by the following: the neuter personal pronoun occurs in a referential chain that refers to an unknown figure (cf. (20)). During a conversation between Tschick and Maik, however, it is suspected that it is only a shadow. Then in the second to last sentence the narrator renders that *was* (‘something’) is moving behind the containers. This unknown something is then referred to with the neuter personal pronoun. However, the reader can already assume at this point that the figure is the acquaintance Isa. Thus, the neuter pronoun in fact refers to an animate entity. The two neuter d-pronouns are used in predicative constructions respectively, one of which is reproduced in (21). Although all neuter pronouns refer to animate referents, the following analysis only applies to feminine and masculine personal pronouns and d-pronouns.

- (20) «Dreh dich nicht um.» «Was ist?» «Kopf runter. Da ist **jemand**, bei den Containern.» Ich lehnte mich seitlich an den Golf und versuchte, vorsichtig über meine Schulter zu sehen. «Jetzt ist **er** weg. Da war **ein Schatten** hinter der Leitplanke, wo der Flaschencontainer steht.» «Dann lass uns abhauen.» «Da **isser** wieder. Ich rauch mal eine.» «Was?» «Tarnung.» «Scheißtarnung, lass uns abhauen!» Tschick stand auf und schob dabei Schlauch und Kanister mit dem Fuß unter den Golf. Es machte einen Höllenkrach. Ich stand auch vorsichtig auf. Hinter den Containern bewegte sich **was**. Ich sah **es** aus den Augenwinkeln. «Können auch Zweige sein», murmelte Tschick. (T 31, 34–48)

“Don’t turn around.” “What is it?” “Head down. There’s someone there, by the containers.” I leaned sideways against the Gulf and tried to look cautiously over my shoulder. “He’s gone now. There was a shadow behind the guardrail where the bottle container is.” “Let’s get out of here, then.” “There he goes again. I’m going to have a smoke.” “What?” “Camouflage.” “Shitty camouflage, let’s get out of here!” Tschick stood up, shoving the hose and canister under the Golf with his foot. It made a hell of a racket. I stood up carefully, too. Something moved behind the containers. I saw it out of the corner of my eye. “Could be twigs,” Tschick muttered.

- (21) «Was ist denn **das** für ein Scheißidiot?», sagte Tschick. (T 43, 15)
“What kind of fucking idiot is that?” said Tschick.

In order to compare the results of the present corpus study to previous research results, only full forms of feminine and masculine personal and d-pronouns are investigated in the following. Therefore, I excluded two neuter d-pronouns and one neuter personal pronoun. In addition, three contractions of personal pronouns (*isser* ‘is-he’) were also excluded from the further analysis. This yields a total of 36 d-pronouns and 180 personal pronouns in third-person singular, referring to an animate referent.

Grammatical & thematic role of the pronouns In the following, I will describe the distribution of the grammatical role and thematic role of both third-person singular personal pronouns and d-pronouns. Looking at the grammatical role of third-person singular personal and d-pronouns, a clear pattern becomes obvious, as indicated in Figure 5.2: Most d-pronouns (91.67 %) as well as most personal pronouns (80.00 %) occur in subject position (cf. left side of Figure 5.4). In direct object position, d-pronouns occur only in 8.33 % of cases, and personal pronouns in 7.78 % of cases. Additionally, personal pronouns show a few occurrences as oblique (4.44 %) as well as the indirect object position (7.78 %).

Turning to the thematic role of third-person singular personal and d-pronouns (cf. right side of Figure 5.4), a similar pattern is observable as previously indicated in Figure 5.3: The majority of d-pronouns (91.67 %) as well as the majority of personal pronouns (81.67 %) are proto-agents. By a large margin, the thematic role

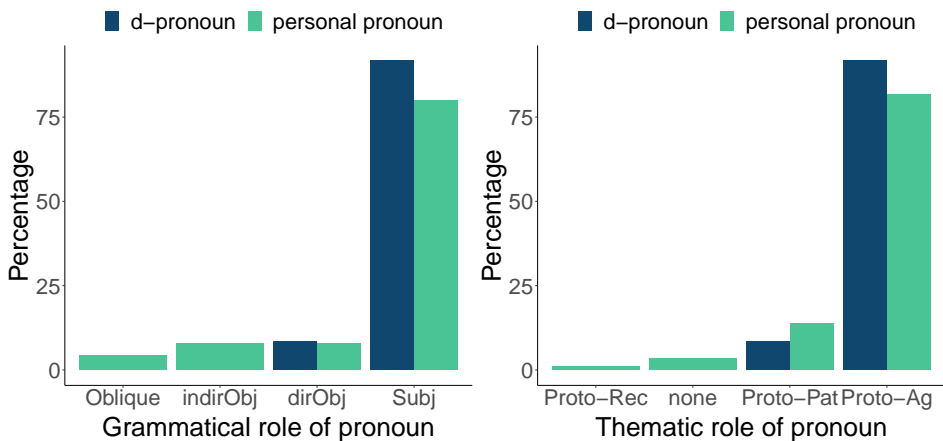


Figure 5.4: Distribution of grammatical role (depicted on left side) and thematic role (depicted on right side) among all feminine and masculine third-person singular personal pronouns (N=180) and d-pronouns (N=36)

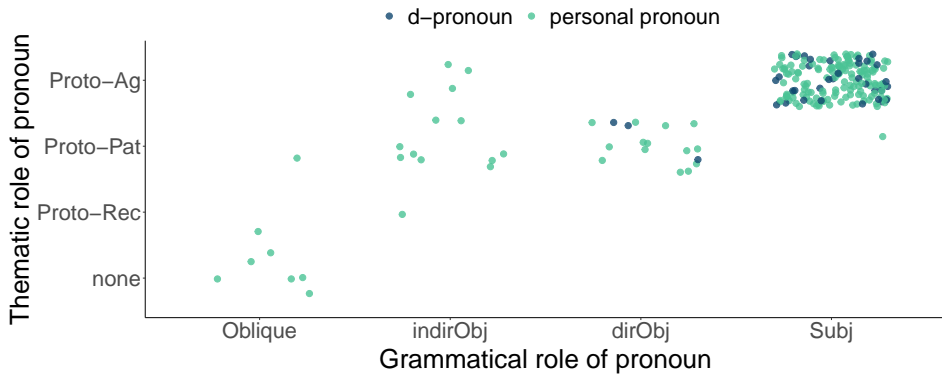


Figure 5.5: Visualization of the distribution of the features grammatical role and thematic role for both personal and d-pronouns.

proto-patient is the second most common for both d-pronouns (8.33 %) and personal pronouns (13.89 %). Personal pronouns additionally show a few instances of being in the proto-recipient role (1.11 %) or having no thematic role at all (3.33 %). Cases in which a personal pronoun has no thematic role are those in which the personal pronoun has been annotated with the grammatical role oblique.

Figure 5.5 combines and visualizes the information stated above: 91.67 % of the d-pronouns in third-person singular serve as the subject and proto-agent of the sentence. Also, 79.44 % of the third-person singular personal pronouns (excluding neuter pronouns) are the subject and the agent of the respective sentence. Hence, the analysis of the features grammatical and thematic role reveals that both pronoun types, in a large majority of cases, occur in the subject position and as the proto-agent of the clause.

The fact that personal and d-pronouns occur with great majority in subject position and in the proto-agent role is in line with previous literature (Ahrenholz 2007, Bosch et al. 2003, 2007, Portele & Bader 2016). Since the large majority (99.44 %) of the annotated personal and d-pronouns in third-person singular occur as subjects and proto-agents, I will analyze only these pronouns in the following sections, yielding 33 d-pronouns and 143 personal pronouns. I will refer to them as the *critical pronouns* (for a similar approach see also Bosch et al. 2003, 2007, Portele & Bader 2016). This approach will increase the comparability of the different previous mention properties.

5.4.4 Functions of d-pronouns

In Section 3.2, various functions of d-pronouns, such as topic shift, information foreground, contrast, disambiguation, and evaluation, were discussed. Here, I illustrate the functions that d-pronouns carry in the Tschick Corpus by categorizing all critical d-pronouns into these functions using different criteria for each, facilitating their classification.

Firstly, I distinguish between structural and semantic functions. The structural functions comprise topic shift, disambiguation, and information foreground, while the semantic functions consist of contrast and evaluation. Concerning the structural functions, I opted to combine the topic shift and disambiguation functions, as oftentimes one cannot distinguish between these two structural functions, and a d-pronoun may fulfill both. I categorized all pronouns according to one of the structural functions. As for the semantic functions, I indicated whether d-pronouns carried the evaluation and/or contrast function or neither. It was possible for a d-pronoun to carry both semantic functions.

The categorization was performed on the basis of different diagnostics. Concerning structural functions, d-pronouns were assigned the disambiguation function when they referred to a less prominent (e.g., proto-patient, object) previous mention (e.g., Diessel 1999, Abraham 2002) or when they clarified the context, indicating that substituting them with a personal pronoun would result in a different interpretation or increase ambiguity (Wiemer 1996, Ahrenholz 2007). An example is provided in (22), where the d-pronoun is coreferent with Tschick, but substituting it with a personal pronoun would lead to the interpretation of coreference with Schubeck. In cases allowing substitution with a personal pronoun without altering interpretation (Bethke 1990), the information foreground function was assigned. An example of this is provided in (23). Here, the d-pronoun picks up the most prominent and only available referent. Substituting it with a personal pronoun would be perfectly acceptable. The only distinction between the personal and the d-pronoun in these instances is that the d-pronoun directs more attention towards the referent, giving it an attention boost, whereas the personal pronoun does not.

- (22) Aber die können den auch abschieben, sagt der Schubeck. Und der wird morgen versuchen, um jeden Preis seine Haut zu retten – ist dir das klar?
(T 45, 68–69)
But they-DPRO can also deport him-DPRO, says Schubeck. And tomorrow he-DPRO will try to save his skin at all costs – do you realize that?

- (23) Der schien ziemlich vernünftig. Und der hieß Burgmüller, falls es jemanden interessiert. (T 46, 70)
He-DPRO seemed pretty reasonable. And his-DPRO name was Burgmüller, in case anyone is interested.

Regarding the semantic functions, contrast was assigned when the d-pronoun emphasized a referent in opposition to an alternative set (e.g., [Bosch & Hinterwimmer 2016](#), [Rooth 1992](#), [Repp 2016](#), [Umbach 2004](#)). For example, in (24), the d-pronoun sets the referent *die* (Isa) in contrast to the alternative set of all other girls. The evaluative function was assessed through an extensive set of tests, examining criteria such as the presence of evaluative adjectives or particles ([Stojanovic 2017, 2015](#)), subjective adverbs ([Smith 2003](#)), predicates of personal taste ([Lasersohn 2005](#), [Stephenson 2007](#), [Stojanovic 2007](#)), expressive intensifiers ([Gutzmann 2019](#)), epithets or epithetic phrases ([Harris & Potts 2009](#)), epistemic modals ([Stephenson 2007](#), [Nuyts 1993](#)), and epistemic *weil*-sentences ([Antomo & Steinbach 2010](#)).

Not all the criteria listed above were applicable to the Tschick Corpus. For instance, the Tschick Corpus lacks instances of d-pronouns in epistemic *weil*-sentences, unlike the AdT Corpus. Further explanations for these constructions are, therefore, provided in Subsection 6.4.4. Despite these variations, the corpus did include evaluative statements identified through the presence of evaluative adjectives as exemplified in (25), subjective adverbs as illustrated in (26), expressive intensifiers as shown in (27), and expressive phrases as in (28). In the examples, the criterion that led to the classification into the functions is marked bold.

- (24) Normalerweise können Mädchen ja nicht laufen, oder nur so schlenkerig. Aber die konnte laufen. (T 29, 142)
Normally girls can't run, or only in a lanky way. But she-DPRO could run.
- (25) Aber sie schien langsamer zu werden, und bald konnten wir sie nicht mehr entdecken. [...] «Wenn die uns nachläuft, ist **megakacke**», sagte Tschick. (T 30, 41)
But she seemed to slow down and soon we couldn't spot her any more. [...] "If she-DPRO runs after us, it's mega shit," said Tschick.
- (26) «Irgendwas musste ich ja sagen. Und Alter, hat die voll gestunken! Die wohnt **garantiert** auf der Müllkippe da. Asi.» (T 30, 36)
"I had to say something. And dude, she-DPRO really stank! She-DPRO definitely lives at the dump there. Lowlife."

5 The Tschick corpus

- (27) «Irgendwas musste ich ja sagen. Und Alter, hat die voll gestunken! [...]»
 (T 30, 35)
“I had to say something. And dude, she-DPRO really stank! [...]”
- (28) Und der hat auch kein solches Elternhaus vorzuweisen, der lebt in der
Scheiße. (T 45, 65)
And he-DPRO doesn't have a home like that either, he-DPRO lives in shit.

From Figure 5.6, it is evident that the information foreground function is the most frequently used structural function of d-pronouns, accounting for 93.94 %. The disambiguation function occurs only marginally, at 6.06 %. Regarding semantic functions, it can be observed that only a few d-pronouns carry the contrast function, while the majority (93.94 %) do not. For the evaluation function, it is nearly at chance level, with 48.5 % carrying an evaluative function. There is one pronoun that carries both a contrastive function and an evaluative function, as illustrated in (24). Appendix B.2 shows the distribution of functions together with text examples. This distribution, especially the fact that there are so few disambiguating d-pronouns, is surprising when compared to previous functional descriptions of the d-pronoun. Previous research has primarily focused on the topic shift function of the d-pronoun (e.g., [Diessel 1999](#), [Abraham 2002](#), [Bosch et al. 2007](#), [Fuchs & Schumacher 2020](#)). The observed distribution may be caused by the narrative style of this text, suggesting that d-pronouns are used differently in dialogues than previously described. The substantial number of information foregrounding d-pronouns indicates that they often refer to highly prominent referents, representing referential continuity similar to the personal pronoun. This aspect has only been marginally discussed in previous

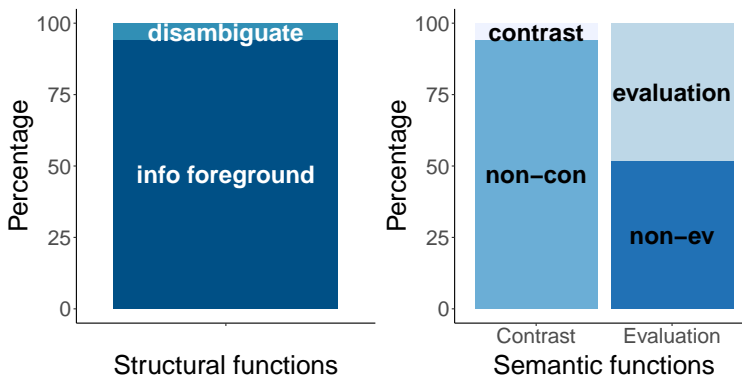


Figure 5.6: Distribution of functions of critical d-pronouns (N = 33)

literature, for instance, by Bethke (1990) or Ahrenholz (2007). The significant number of evaluative d-pronouns can be attributed to the context of the novel excerpt. In the *Tschick* excerpt many emotional scenes are described. Hence, the use of d-pronouns often follows an evaluative function. As I will show later in Section 5.6, numerous d-pronouns are uttered by the character Maik's father and Tschick, both of whom exhibit obscenity. Both the father and Tschick often use d-pronouns to evaluate and depreciate other characters.

Concerning the different usage types of demonstratives proposed by Himmelmann (1996) and Diessel (1999) (cf. Section 3.1 for a brief explanation), it becomes evident that actually all d-pronouns in this corpus fall into the category of anaphoric use. This is due to the narrative structure, where the narrator and the reader are not situated in the same context. Consequently, all referents must be introduced into the discourse with a descriptive full DP. Therefore, a situational use, from a textual perspective, is not applicable. Further, the narrator and the reader do not share common knowledge beyond the information revealed by the narrator. Therefore, the recognitional use is not observed in the corpus. Furthermore, the discourse deictic use is absent among the annotated d-pronouns, as this particular use typically pertains to propositions or events. Though, in the current corpus, exclusively referring expressions that refer to animate referents were annotated.

However, when shifting the perspective to the individual characters using d-pronouns in direct speech, other usage types can also be identified. Out of 43 instances of d-pronouns referring to an animate referent, three would then exemplify situational use. However, the majority of d-pronouns still falls into the category of anaphoric usage. For instance, in (29) and (30), situational uses of d-pronouns become apparent when considering the characters' knowledge during direct speech. In (29), Tschick uses the neuter d-pronoun to refer to Isa for the first time. Isa is present in the utterance situation, as is Maik, to whom the statement is directed. From the characters' perspective, the neuter d-pronoun serves as the first referring expression for Isa. However, from the reader's perspective, there were several previous references to her. Initially, she is introduced with a full DP. Furthermore in (29), the narrator refers to her using a personal pronoun. Thus, from a text perspective, the d-pronoun in the last sentence of (29) does not serve as an introduction for her. Nevertheless, for the characters *Tschick* and Maik, this d-pronoun is the first reference to that particular entity. A similar case can be observed in (30). Here, the passenger is introduced to the reader with the referring expression *jemand* ('someone'). However, Tschick also refers to him using a d-pronoun. In this case, the d-pronoun serves a situational use

5 The Tschick corpus

from the characters' perspective. The passenger is present in the utterance situation of both Tschick and Maik, and in order to introduce that referent into the discourse, Tschick uses the d-pronoun.

- (29) «Ihr Schwachköpfe!», rief sie.
«Bist du bescheuert?»
«Du hast mich gehört, Schwachkopf! Und dein Freund ist auch ein Schwachkopf!»
«Was ist denn **das** für eine Fotze?», sagte Tschick. (T, 29, 57–61)
“*You morons!*” she shouted.
“*Are you stupid?*”
“*You heard me, moron! And your boyfriend is a moron too!*”
“*What kind of cunt is that-DPRO?*” said Tschick.
- (30) Jemand kurbelte das Beifahrerfenster runter. «Hat der dich gesehen?», fragte Tschick. (T, 43, 10–11)
Someone rolled down the passenger window. “Did he-DPRO see you?”, asked Tschick.

5.4.5 Interim summary

In this section, the distribution of personal pronouns and d-pronouns is described concerning various syntactic and semantic properties, including person, number, gender, grammatical and thematic role, as well as pragmatic functions and usage types of d-pronouns. Therefore, an extensive description of the distribution of personal and d-pronouns in the corpus is provided. During this exploration, it became evident that the corpus contains a significantly higher number of personal pronouns (N=827) compared to d-pronouns (N=43). Additionally, a substantial proportion of these personal pronouns consists of first-person pronouns, attributed to the autodiegetic narrator of the novel. To maintain balance, the decision was made to focus the investigation solely on feminine and masculine personal and d-pronouns in third-person singular. This excludes three neuter pronouns (one neuter personal pronoun, two neuter d-pronouns) as well as three instances of contractions (*isser* ‘is-he’). Neuter d-pronouns were also excluded due to their frequent use as propositional anaphors.

With respect to the pragmatic use of d-pronouns, it has been demonstrated that d-pronouns primarily appear in the functions of information foreground and evaluation. Functions such as topic shift or disambiguation are only marginally carried out by the d-pronoun. Moreover, the categorization into usage types

proposed by [Himmelmann \(1996\)](#) and [Diessel \(1999\)](#) showed that basically all d-pronouns occur in anaphoric use.

For the remaining personal and d-pronouns, an analysis of the distribution of grammatical and thematic role features revealed that the majority of both personal and d-pronouns occur as subjects and proto-agents. Since the most significant share of personal and d-pronouns is found in subject position and as the proto-agent, only those pronouns will be included in the upcoming analyses (33 d-pronouns and 143 personal pronouns). The small number of pronouns in object position is not considered in the analysis, as it would not contribute to a reliable investigation. Feminine and masculine personal and d-pronouns in third-person singular, which serve as the subject and proto-agent of the sentence are referred to as *critical pronouns*.

5.5 Addressing the research questions

In this section, I will address the research questions and the corresponding hypotheses that were formulated in Section 5.2.

5.5.1 RQ (i): Features of critical pronouns' previous mention

In this subsection, the status of the critical pronouns previous mention is analyzed. Therefore, research question (i) is addressed:

Which prominence-lending features (referential form, syntactic function, thematic role) do the previous mentions of personal pronouns and d-pronouns carry?

Features of the previous mention can provide crucial insights into pronoun usage in naturalistic and literary contexts. Numerous studies suggest that the characteristics of the previous mention influence the choice of the respective pronoun ([Bosch et al. 2007](#), [Schumacher et al. 2016](#)). As explained in detail in Section 3.3, it has been proposed that personal pronouns exhibit a preference for prominent referents, while d-pronouns favor less prominent ones. Therefore, this subsection presents the distribution of features such as referential form, grammatical role, and thematic role. It is essential to note that I focus solely on the previous mention of the critical pronouns (third-person singular, feminine or masculine, subject, proto-agent). The previous mentions of personal pronouns or d-pronouns in, for example, dative positions are not analyzed. Nevertheless, the previous mention of our critical pronouns may exhibit diverse features, such

5 The Tschick corpus

as being an object or proto-patient. This subsection comprises four paragraphs, each addressing a distinct feature and concluding with an interim summary.

In order to statistically test the difference between critical personal and d-pronouns with respect to the features of their previous mention, multinomial logistic regression models are performed using the function `MULTINOM` in the *nnet* package (Venables & Ripley 2002) in RStudio (RStudio Team 2021). For each multinomial logistic regression model a baseline has to be chosen. P-value calculation for the regression coefficients is calculated using Wald tests (here z-tests). Example (31) illustrates the model that is used for calculating the comparison of personal and d-pronoun with respect to the referential form of the previous mention. The same model syntax is used for calculating the comparison with respect to the features grammatical and thematic role of the previous mention. The results of these models are reported in the respective upcoming paragraphs.

```
(31) mod <- multinom(prevREtype ~ pronounType, data = criticalPronouns)
      z <- summary(mod)$coefficients/summary(mod)$standard.errors
      p <- (1 - pnorm(abs(z), 0, 1)) 2
```

Among the critical pronouns under investigation, one personal pronoun stands out as being mentioned for the first time, lacking a coreferent previously mentioned referent. Example (32) demonstrates this scenario, where it is evident that the personal pronoun *er* deictically refers to Maik, who is present during the dialogue. This instance arises in chapter 45 of the novel, constituting the very first sentence of that chapter. Due to the limitations of annotating referential chains across chapter boundaries in WebAnno (as discussed in Section 5.3), this case is treated as a first-mention occurrence. Consequently, this case excluded from the analysis of the features of the previous mentions.

```
(32) «Er begreift es nicht.» Mein Vater drehte sich zu meiner Mutter um und
      sagte: «Er begreift es nicht, er ist zu dumm!» (T 45, 1–2)
      “He doesn’t understand.” My father turned to my mother and said, “He doesn’t understand, he’s too stupid!”
```

Referential form of previous mention Regarding the analysis of the referential form of the previous mention, it is hypothesized that d-pronouns primarily refer to DPs or proper names (Abraham 2002: 461, Wiltschko 1998: 163), while personal pronouns are expected to be more flexible in their preference for a referential form of their previous mention (Wiltschko 1998). The descriptive statistic of the referential forms of the previous mentions reveals a diverse picture for

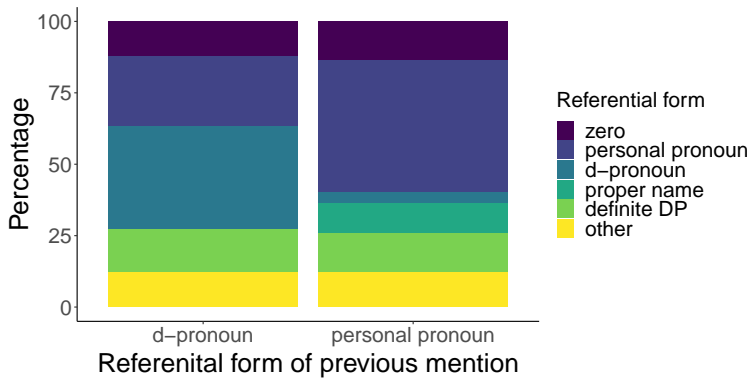


Figure 5.7: Distribution of the referential form of critical pronouns' previous mentions. First-mentioned pronouns are excluded (personal pronoun N=142, d-pronoun N=33).

both critical personal and d-pronouns (cf. Figure 5.7). However, both types of pronouns show a large proportion of references to previous mentions that have the same referential form as the critical pronoun itself.

Examining the right bar for personal pronouns in Figure 5.7, it can be observed that nearly half of the personal pronouns refer to other personal pronouns (46.48 %). The corpus data also reveal that personal pronouns refer to definite DPs (14.08 %), zero pronouns (13.38 %), proper names (10.56 %), and possessive pronouns (8.45 %). Within the corpus, there are five cases (3.52 %) where a personal pronoun refers to a d-pronoun. There is even one case where a personal pronoun lacks a previous mention and serves as the first-mentioned referring expression for that referent in the respective chapter. However, since there is no previous mention, this instance is excluded. Additionally, we find personal pronouns referring once or twice to indefinite pronouns, coordinated DPs, quantifiers, reflexive pronouns, and relative pronouns. These cases, which occur less than 10 % of the time, are summarized under 'other' in Figure 5.7 (unless the previous mention is a d-pronoun).

Turning to the left bar for d-pronouns in Figure 5.7, a pattern similar to that of personal pronouns can be observed. The largest proportion of d-pronouns, specifically over a third (36.36 %), refer to a previous mention that is also a d-pronoun. Following this, d-pronouns refer to personal pronouns in 24.24 % of cases. Consequently, in more than 60 % of all instances, a d-pronoun either refers back to another d-pronoun or a personal pronoun. The corpus data also demonstrate that d-pronouns recurrently refer to definite DPs (15.15 %) and zero pronouns (12.12 %). Furthermore, there are cases where a d-pronoun refers once each to a

5 The Tschick corpus

demonstrative DP, a proper name, an indefinite DP, an indefinite pronoun, and a possessive pronoun. These instances are collectively summarized under ‘other’ in Figure 5.7.

With respect to the inferential statistics, a multinomial logistic regression model is used to statistically test the difference between critical personal pronouns and d-pronouns with respect to the referential form of their previous mention. The model used is illustrated in (31). Pairwise comparisons are calculated between the referential forms of the previous mention, where the baseline condition is personal pronoun (referential form of previous mention). Concerning the difference between the previous mention’s referential forms personal pronoun (baseline) and d-pronoun the model reveals a significant difference between critical personal pronouns and d-pronouns ($z = -4.587$, $p < 0.0001$). For other comparisons of the referential forms of the previous mention such as zero pronoun ($z = -0.829$, $p = 0.407$), definite DP ($z = -1.159$, $p = 0.247$) or other ($z = -0.989$, $p = 0.323$) with the baseline personal pronoun, the model shows no significant differences between two critical pronoun types. The inferential statistic analysis, therefore, reveals that d-pronouns and personal pronouns behave in many respects the same, however, there is a substantial difference in the number of d-pronoun and personal pronoun previous mentions between the two critical pronouns.

The descriptive analysis of the previous mention’s referential form show that both pronoun types preferentially refer to a previous mention that has the same referential form as the pronoun itself. In this respect, a large proportion of personal pronouns refer to other personal pronouns, while a large proportion of d-pronouns refer to other d-pronouns. However, these results, especially in the case of d-pronouns, contradict the initial hypothesis that d-pronouns would primarily refer to proper names or DPs. Consequently, these findings challenge the previously held assumptions about d-pronoun chains (Abraham 2002: 461). As Abraham (2002) directly states that d-pronouns do not refer back to another d-pronoun or personal pronoun. This is a very surprising finding because according to the Accessibility Hierarchy, referential forms like proper names or definite or indefinite DPs represent less accessible (less prominent) discourse referents. With the attributed preference of d-pronouns to refer to less prominent discourse referents, it is, therefore, expected for them to refer to these less prominent referential forms. However, the corpus data show that the d-pronoun instead preferentially refers to highly prominent referential forms, such as personal pronouns and d-pronouns. The fact that a d-pronoun refers to another d-pronoun is particularly unexpected due to the attributed topic shift function of d-pronouns. With

respect to the topic shift function, the d-pronoun is expected to refer to a non-topic referent. Regarding the topic shift function, the less prominent discourse referent should be elevated to a more prominent position through the resumption of the d-pronoun. Therefore, a repeated reference to that boosted referent with a d-pronoun is considered inappropriate, as it is no longer a less prominent referent (Abraham 2002). Instead, the use of d-pronouns in this corpus can mostly be linked to the information foreground function explained in Subsection 3.2.1. Many scholars have identified, what I refer to as *d-pro–d-pro chains* (Bethke 1990, Zifonun et al. 1997, Wiemer 1996). These chains have been described as enhancing conspicuousness (Bethke 1990) or highlighting a referent through (re)orientation (Zifonun et al. 1997). Additionally, it has been demonstrated that d-pronouns can indeed be used interchangeably with personal pronouns (Wiemer 1996). Therefore, these corpus findings do not seem so unexpected after all. Instead, I have shown that Abraham's (2002) very specific assumption has not proven to be correct. D-pronouns in this corpus primarily refer to personal pronouns, and d-pronouns are certainly not unacceptable.

Grammatical role of previous mention Regarding the prominence-lending cue grammatical role, it is hypothesized that d-pronouns preferentially refer to a previous mention with a less prominent grammatical role (e.g., direct object in transitive sentences) (Bosch et al. 2003, 2007). Conversely, personal pronouns are predicted to preferentially refer to a prominent grammatical role (e.g., subject) (Bosch et al. 2003, 2007). Looking at the distribution of the grammatical roles of the previous mentions for critical personal and d-pronouns (as shown in the left plot of Figure 5.8), a clear pattern emerges for both personal pronouns and d-pronouns: it can be observed that the majority of critical personal pronouns (excluding first-mentioned) refer to a subject (78.87%). Only a few cases involve a personal pronoun referring to a different grammatical role. Less than 10% of cases are associated with personal pronouns referring to a previous mention with no grammatical role (7.04%), a direct object (5.63%), indirect object (4.23%), or oblique previous mention (4.23%). For d-pronouns, the majority (81.82%) refers to a previous mention in the subject position as well. Other grammatical roles are rather rare, with less than 10% of all cases involving previous mentions with the grammatical role direct object (6.06%), oblique (6.06%), indirect object (3.03%), or previous mentions with no grammatical role (3.03%).

A multinomial logistic regression model is employed to statistically test the difference between critical personal pronouns and d-pronouns. The same model as depicted in example (31) is used, but in this case, the response variable is the

5 The Tschick corpus

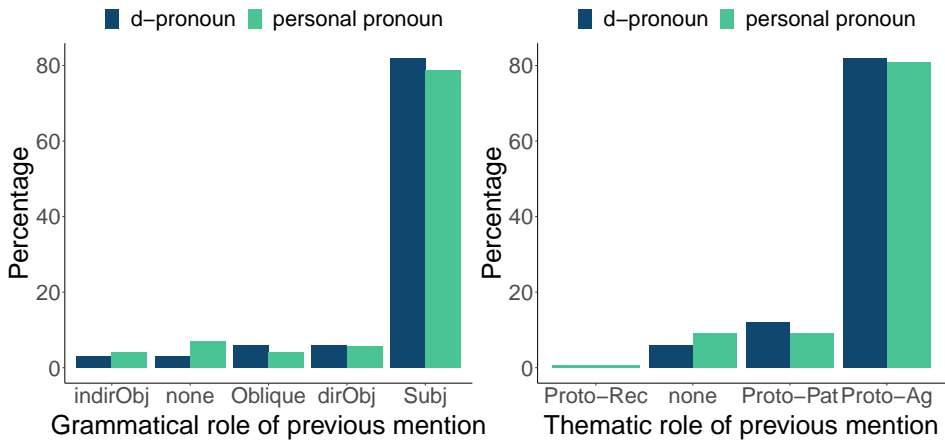


Figure 5.8: Distribution of grammatical role (depicted on left side) and thematic role (depicted on right side) of the critical pronouns' previous mention. First-mentioned pronouns are excluded (personal pronoun $N=142$, d-pronoun $N=33$).

grammatical role of the previous mention¹². Pairwise comparisons are conducted between the grammatical roles of the previous mention, with the baseline condition being the subject (grammatical role of the previous mention). When comparing the grammatical roles of the previous mention, specifically subject and direct object, the model indicates that there is no significant difference between personal pronouns and d-pronouns ($z = -0.044$, $p = 0.965$). Additionally, the comparison between subject and indirect object ($z = 0.335$, $p = 0.737$), subject and oblique ($z = -0.384$, $p = 0.701$), and subject and no grammatical role ($z = 0.822$, $p = 0.411$) reveals no significant effects. Therefore, it can be concluded that there is no distinction in the behavior of personal pronouns and d-pronouns concerning the grammatical role of their previous previous mention.

The analysis of descriptive and inferential statistics concerning the grammatical role of the previous mention reveals that predictions for personal pronouns were confirmed. However, the hypothesis regarding the preference for a direct object previous mention for d-pronouns was not substantiated. This finding is somewhat unexpected, given prior research suggesting that d-pronouns tend to favor the less prominent grammatical role, while personal pronouns lean towards the subject (Bosch et al. 2003, 2007, Bader & Portele 2019, Bader et al. 2022). Cross-linguistic studies have also supported this claim (Kaiser & Trueswell 2004b, 2008). Hence, the striking question arises: why does the current data not align with this

¹²`mod <- multinom(prevGrammaticalRole ~ pronounType, data = crit-prons)`

well-established assumption in the research literature? The answer might lie in the suggestion put forth by [Schumacher et al. \(2015, 2016\)](#) that the grammatical role is not the most influential prominence-lending cue but rather thematic role is a more decisive factor for pronoun resolution. However, a glimpse at the plot for thematic role reveals that this cannot be the explanation, as the thematic role of the previous mention exhibits a similar pattern to the grammatical role. Instead, considerations of text form and perspectival features appear to be beneficial. Studies by [Patil et al. \(2023\)](#), [Hinterwimmer \(2019, 2020\)](#), [Hinterwimmer & Bosch \(2016, 2017\)](#) indicate that d-pronouns can indeed refer to the most prominent referent in terms of local prominence-lending cues when sanctioned by the global prominence-lending cue of perspective. In Section 5.6, I will conduct an analysis on the perspective-holder of the different prominence-lending cues. Additionally, the information foreground function comes into play once more. D-pronouns serve to enhance conspicuousness, highlight a referent, and can also be used interchangeably with personal pronouns ([Bethke 1990](#), [Zifonun et al. 1997](#), [Wiemer 1996](#)). These factors can also contribute to the d-pronouns mostly referring to the most prominent grammatical role.

Thematic role of previous mention For the thematic role of the previous mention, it is hypothesized that d-pronouns preferentially refer to a less prominent referent (i.e., not the proto-agent; [Schumacher et al. 2015, 2016](#)), whereas personal pronouns are predicted to preferentially refer to a proto-agent previous mention ([Schumacher et al. 2015, 2016](#)). Regarding the descriptive analysis of the thematic roles (as seen in the right plot of Figure 5.8), personal pronouns primarily refer to proto-agents (79.86 %). In that, a similar pattern emerges for both personal pronouns and d-pronouns as for the prominence-lending cue grammatical role. With nearly equal frequency, personal pronouns refer to a previous mention with a proto-patient role (9.72 %) or no role at all (9.03 %). Occasionally, a personal pronoun refers back to a previous mention with the proto-recipient role (0.69 %). D-pronouns, on the other hand, predominantly refer to proto-agents (82.35 %). In only 11.67 % of cases, the d-pronoun refers to a proto-patient, while in 6.06 % of cases, a d-pronoun refers to a previous mention with no thematic role.

In terms of inferential statistics, a multinomial logistic regression model is employed to test the statistical difference between critical personal pronouns and d-pronouns. Utilizing the same model as illustrated in example (31), the response variable in this case is the thematic role of the previous mention¹³. When comparing the thematic roles of proto-agent (baseline) and proto-patient, the

¹³mod <- multinom(prevThematicRole ~ pronounType, data = crit-prons)

5 The Tschick corpus

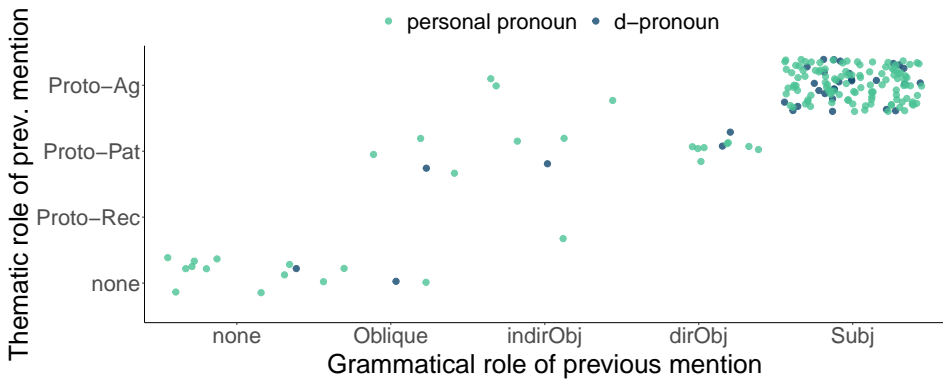


Figure 5.9: Visualization of the distribution of the features grammatical role and thematic role for the previous mentions of personal and d-pronouns. First-mentioned pronouns are excluded (personal pronoun N=142, d-pronoun N=33).

multinomial logistic regression model reveals no significant difference between personal pronouns and d-pronouns ($z = -0.443$, $p = 0.658$). Similarly, when comparing the roles of proto-agent and no thematic role, there is no significant effect between personal pronouns and d-pronouns ($z = 0.535$, $p = 0.592$). Therefore, the statistical analysis indicates that there is no difference between personal pronouns and d-pronouns in terms of the thematic role of their previous mention.

The conducted analyses confirm the predictions for personal pronouns. However, the hypothesis regarding the preference for a proto-patient previous mention for d-pronouns was not supported, which is quite surprising. Despite extensive research suggesting that German d-pronouns typically favor a previous mention with a less prominent thematic role (Schumacher et al. 2015, 2016, Patterson & Schumacher 2021), the current results deviate from these expectations. Similar to the discussed results regarding the grammatical role of the previous mention, perspectival features, as suggested by Hinterwimmer (2019, 2020), Hinterwimmer & Bosch (2016, 2017), and textual features such as information foregrounding (Bethke 1990, Zifonun et al. 1997, Wiemer 1996), might contribute to this unexpected finding. In Section 5.6, I will follow up on the perspective explanation by performing an analysis of the perspective-holders.

For a comprehensive overview and summary of the features grammatical role and thematic role, Figure 5.9 combines the analysis of the grammatical role and thematic role of the critical pronouns' previous mention. Notably, 81.82 % of critical d-pronouns refer to a previous mention with the features subject and proto-

agent, while 78.87 % of critical personal pronouns (excluding first-mentioned) also refer to a previous mention characterized by being subject and proto-agent. From this Figure, it becomes obvious that in the current corpus, d-pronouns and personal pronouns do not exhibit complementary patterns with respect to the preference for the grammatical and thematic role of the previous mention (Bosch et al. 2003, 2007, Schumacher et al. 2015, 2016).

Interim summary In this subsection, I presented analyses of various previous mention features to address the research question: *How do the referential preferences of the pronouns differ with respect to the properties of the previous mention?* The hypotheses were as follows: (a) D-pronouns are hypothesized to prefer DP-previous mentions and never refer back to another d-pronoun or personal pronoun, while personal pronouns are expected to have a more flexible preference for the referential form of the previous mention (Abraham 2002, Wiltschko 1998). (b) D-pronouns are expected to refer to discourse referents that carry a less prominent grammatical role (e.g., not the subject), while personal pronouns refer to discourse referents that carry a prominent grammatical role (e.g., subject) (Bosch et al. 2003, 2007). (c) D-pronouns are expected to refer to discourse referents that carry a less prominent thematic role (e.g., not the proto-agent), while personal pronouns refer to discourse referents that carry a prominent thematic role (e.g., proto-agent) (Schumacher et al. 2015, 2016).

The analysis of all three previous mention features has yielded surprising results. Previous literature often emphasizes the division of labor between personal and d-pronouns. It has been argued that personal pronouns refer to the most prominent discourse referent, while d-pronouns choose a less prominent referent as their previous mention. In line with this assumption, the d-pronoun has been attributed a referential shift potential. That is, when d-pronouns refer to a less prominent discourse referent, this referent is expected to become more prominent in the upcoming discourse (Abraham 2002: 461). However, the analysis of the different features of the previous mention does not align with this idea. The analysis of the referential form of the previous mention reveals that a large proportion of d-pronouns refers to previous mentions with the referential form d-pronouns or personal pronouns. This finding deviates from previous assumptions suggesting that the d-pronoun never refers back to another d-pronoun or personal pronoun, but only refers to full DPs (Abraham 2002, Wiltschko 1998). Also, the results reveal by the analysis of the grammatical and thematic role of the previous mention differs from previous studies suggesting for d-pronouns a preference for a less prominent discourse referent (Bosch et al. 2003, 2007, Schumacher et al. 2016). In fact, the corpus data show that the majority of d-pronouns

5 The Tschick corpus

refer to a subject and proto-agent previous mention and, therefore, show the same pattern as personal pronouns.

Overall, the findings from all three analyses in this subsection fail to confirm the hypotheses outlined in RQ (i). However, it is crucial to note that these results do not suggest an unacceptable or ungrammatical use of pronouns within the underlying corpus. Instead, the deviation in referential behavior observed in *Tschick* from assumptions in the literature can be attributed to the corpus' reliance on a more naturalistic stimulus, employing a conversation-like narrative style. Concerning the functions of the d-pronoun, the referential behavior of d-pronouns aligns with the findings presented in Subsection 5.4.4. Specifically, only two d-pronouns occur in the disambiguation function (aka topic shift function), while the majority serves the information foreground function. Therefore, the corpus data suggests that in natural language use, d-pronouns do not follow the patterns described in previous literature. Furthermore, these findings can be effectively explained by considering perspective. As proposed by [Hinterwimmer \(2019, 2020\)](#), a d-pronoun can refer to a subject and a proto-agent previous mention, as long as the referent that the d-pronoun is referring to is not the perspectival center. In direct speech clauses, where the person making the statement becomes the perspective-holder, a d-pronoun can be employed to refer to a locally prominent previous mention, as long as it does not denote the speaker, who is the perspective-holder. In Section 5.6, I will delve into a more detailed description of the distribution of different perspective-holders in the corpus.

5.5.2 RQ (ii): Referential distance

In this subsection, the referential distance between the critical pronouns and their previous mention is analyzed. Therefore, this subsection addresses research question (ii):

How do the referential chains of the pronouns differ with respect to referential distance?

The distance to the previous mention can reveal valuable insights into the behavior of personal and d-pronouns in naturalistic texts ([Givón 1983](#)). Here, I focus on measuring the distance, in terms of segments, between critical pronouns and their previous mention. To achieve this, I utilized the intra-sentential segments that were previously annotated. Investigating referential distance provides crucial insights into working memory because referential distance is also a measure of referential decay ([Givón 1983](#)).

Concerning the segment distance between critical pronouns and their previous mentions, an open hypothesis was formulated. According to the Accessibility Hierarchy (Ariel 1990), which suggests that more explicit referential expressions correspond to less accessible referential candidates, one might predict that d-pronouns, positioned between definite DPs and personal pronouns on the scale, exhibit longer referential distances to their previous mentions compared to personal pronouns. However, according to the prominence account (Himmelmann & Primus 2015, von Heusinger & Schumacher 2019), one could anticipate that d-pronouns have shorter referential distances than personal pronouns because they prefer locally less prominent referents. In this context, the use of d-pronouns leads to the assumption that the previous mention cannot be too distant, as a less prominent referent occurring far away in discourse would more likely be reintroduced using a definite DP or a proper name. Additionally, given the pointing function of the d-pronoun, its previous mention should be found locally, not too far from the d-pronoun. For this research question, I did not conduct an inferential statistical analysis because the research question was exploratory in nature, with two contrastive hypotheses. I exclude the pronoun occurring as first-mentioned because it has no previous mention.

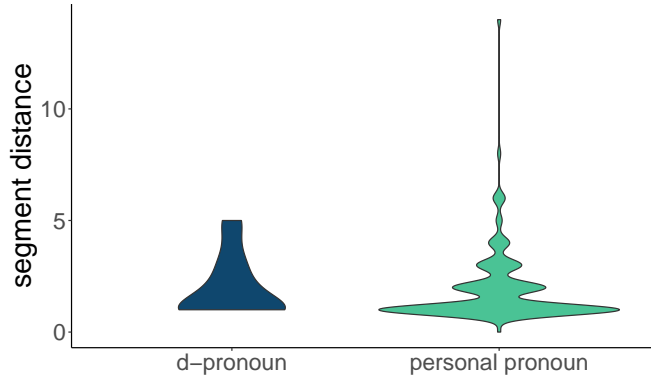


Figure 5.10: Distribution of the segment distance for personal and d-pronouns. First-mentioned pronouns are excluded (personal pronoun N=142, d-pronoun N=33).

Pronoun	Mean	SD	range
Personal pronoun	1.91	1.66	1 – 14
d-pronoun	1.97	1.33	1 – 5

Table 5.6: Mean, standard deviation and range of the segment distance for personal and d-pronouns. First-mentioned pronouns are excluded.

5 The Tschick corpus

The segment distance to the previous mention for personal and d-pronouns is presented in Figure 5.10 and Table 5.6. The figure provides an overview of the distribution, while the table offers the mean, standard deviation, and range of the segment distance. It becomes evident that, on average, both pronoun types typically refer to a previous mention that is relatively close to the respective pronoun in terms of segment distance. When examining the segment distance between personal and d-pronouns and their previous mentions as plotted in Figure 5.10, it initially appears that the two pronoun types exhibit different referential distances. The violin plot for personal pronouns extends much further on the y-axis than that for d-pronouns, indicating observations of personal pronouns with much longer segment distances than d-pronouns. However, in Table 5.6, it can be observed that both pronoun types show a very similar mean segment distance. On average, both pronoun types refer to a previous mention that is approximately 1.9 sentence segments away.

A detailed description of the segment distances for the two pronoun types can be found in Table 5.7 and Table 5.8. Table 5.7 indicates that among the critical d-pronouns, 84.85 % refer to a previous mention that is three segments away or less. More than half of the critical d-pronouns (54.55 %) refer to a previous mention that is in the previous sentence segment. The maximum segment distance observed for d-pronouns in the corpus is five sentence segments to their previous mention, occurring three times (9.09 %). A similar pattern is observed for personal pronouns, as shown in Table 5.8. Most previous mentions (87.50 %) occur within three segments of the personal pronouns. Referential distances of four to six sentence segments also occur in a total of 9.03 %. It is worth noting that both pronoun types almost never (with one instance for the personal pronoun) refer to a previous mention in the same sentence segment. However, the personal pronoun does show one instance of a very long 14-segment distance to the previous mention.

When examining the text example involving the long referential distance between the personal pronoun and its previous mention, it becomes evident that the referent remains activated throughout the extended referential chain. In (33), the 14-segment distance example is illustrated; the pronoun in question as well as its previous mention are marked in bold, coreference is indicated by indices. Despite the previous mention of the personal pronoun *er* in the last sentence occurs 14 sentence segments earlier, the referent, which is the father, remains consistently activated due to the direct speech parts in the paragraph. The fact that the paragraph describes a dialogue between Maik (the autodiegetic narrator) and his father justifies the continued activation of the father as a discourse referent throughout the paragraph. This consistent activation also maintains the

5.5 Addressing the research questions

Segment distance	Freq.	%	% Cum.
1	18	54.55	54.55
2	6	18.18	72.73
3	4	12.12	84.85
5	3	9.09	93.94
4	2	6.06	100.00
Total	33	100.00	100.00

Table 5.7: Segment distance of d-pronouns to the previous mention. First-mentioned pronouns are excluded.

Segment distance	Freq.	%	% Cum.
1	80	56.34	56.34
2	31	21.83	78.17
3	15	10.56	88.73
4	7	4.93	93.66
6	4	2.82	96.48
5	2	1.41	97.89
0	1	0.70	98.59
14	1	0.70	99.30
8	1	0.70	100.00
Total	142	100.00	100.00

Table 5.8: Segment distance of personal pronouns to the previous mention. First-mentioned pronouns excluded.

prominence of the father, allowing for the use of a personal pronoun to refer to the previous mention that is 14 segments away. Note that the great majority (90.61%, n=132) of all personal pronouns are rendered by the narrator of the novel, hence a perspective shift only occurs in less than 10 % of cases.

- (33) [Mein Vater₁ packte mich₂ an den Schultern] [und schüttelte₁ mich₂.]
 [«Weißt du₂,] [wovon ich₁ rede?] [Sag gefälligst was!«]
 [«Was soll ich₂ denn sagen?»] [Ich₂ hab doch ja gesagt,] [ja, es ist mir₂
 klar.] [Ich₂ hab's verstanden.»]
 [«Gar nichts hast du₂ verstanden!»] [Gar nichts ist dir₂ klar!] [Er₂ denkt,
 [es geht um Worte.] [Ein Idiot!«]
 [«Ich₂ bin kein Idiot,] [nur weil ich₂ zum hundertsten Mal –»]

5 The Tschick corpus

[Zack,] [scheuerte er₁ mir₂ eine.] (T 45, 14–23)
[My father grabbed me by the shoulders] [and shook me.]
[“Do you know,] [what I am talking about?] [Say something, please!”]
[“What do you want me to say?”] [I said yes,] [yes, it’s clear to me] [I understood.]
[“Nothing at all you understood!”] [Nothing at all is clear to you!] [He thinks,] [It’s
all about words.] [An idiot!”]
[“I am not an idiot,] [just because I for the hundredth time -”]
[Zack,] [he smacked me.]

Interim discussion This subsection has examined referential distance in terms of segment distance between the critical pronouns and their previous mentions. The corpus analysis reveals that both d-pronouns and personal pronouns exhibit similar segment distances to their previous mentions. In approximately 55 % of cases, both pronoun types refer to a previous mention that is within one sentence segment and in over 80 % of cases (84.85 % for d-pronouns, 88.73 % for personal pronouns), both pronoun types refer to a previous mention that is three or fewer sentence segments away. This finding is comparable to Arnold’s (1998) results, who conducted a corpus analysis based on collections of written narrative texts, specifically traditional tales or children’s stories, primarily containing third-person referents. Arnold’s (1998) investigation included different languages such as English, Spanish, and Mapudungun. Her results indicate that the majority of pronominal references occur when the referent is mentioned within the previous five clauses in all languages (Arnold 1998: 70–72). In the context of Centering Theory approaches, which traditionally focus on only the previous clause, both in theoretical (Grosz et al. 1995) and experimental (Gordon et al. 1993) studies, the results of this current corpus analysis, along with findings from Arnold (1998), suggest that a broader context should also be considered for pronominal coreference relations, even though in the current study, most previous mentions occur very close. Furthermore, personal pronouns exhibit very long referential distances, as discussed earlier, where the referent remains activated in discourse through direct speech or plural reference. Taking a closer look at (33) has shown that even in cases of relatively long referential distance, it does not necessarily imply that the respective discourse referent is not activated over the course of the referential chain. In (33), the respective discourse referent was activated after the mention of the previous referent but before the use of the personal pronoun in question. This activation was achieved through the use of direct speech and an implicit predicate of speech (e.g., ‘he said’). Despite an initial impression that personal pronouns have longer segment distances than d-pronouns based on direct comparisons of absolute referential distances, an examination of the

mean distances provides a different perspective. The data on segment distance suggests that there is no substantial difference between the segment distance of d-pronouns and personal pronouns. Even replacing the personal pronoun with a d-pronoun in examples like (33) would result in an acceptable, albeit slightly marked reading. This further supports the claim that the segment distance of d-pronouns and personal pronouns behaves similarly. Table 5.6 reveals that the mean segment distance for both personal and d-pronouns is very similar. The mean segment distance for d-pronouns is 1.97 segments (SD = 1.66), and for personal pronouns, it is 1.91 (SD = 1.66) segments. In summary, both pronoun types, on average, refer to a previous mention that is nearly 2 segments away. This disconfirms both predictions that the d-pronoun should either show shorter or longer referential distance.

5.5.3 RQ (iii): Intervening referring expressions

In this subsection, the intervening characters between the critical pronouns and their previous mention is analyzed. Therefore, this subsection addresses research question (ii):

How do intervening referring expressions influence the choice of the pronoun type?

The analysis of intervening characters does not consider morpho-syntactic congruence between the pronoun and intervening characters, which results in a broader inclusion of referents compared to potential competitors. It primarily serves as a measure of memory load, which can be a significant factor influencing accessibility. According to Ariel (1990), intervening referents have an impact on the choice of referential form. Based on this, I predict that d-pronouns will exhibit more intervening characters than personal pronouns. This prediction is rooted in the Accessibility Hierarchy, where d-pronouns are considered less accessible than personal pronouns. This difference in accessibility should also manifest in the number of intervening characters. For the analysis of the intervening characters I counted all referring expressions that refer to an animate referent (that were previously annotated). Again, the instance of the first-mentioned pronoun is excluded from the analysis.

The intervening characters between previous mention and critical pronoun is presented in Figure 5.11 and Table 5.9. The figure provides an overview of the distribution, while the table offers the mean, standard deviation, and range of the intervening characters. Looking at Figure 5.11, it is evident that both personal and

5 The Tschick corpus

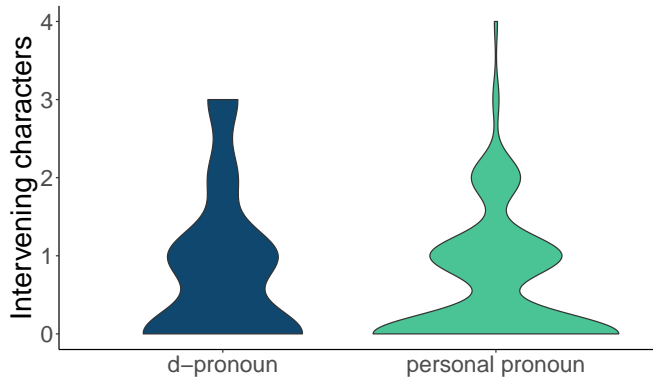


Figure 5.11: Distribution of the intervening characters for personal and d-pronouns. First-mentioned pronouns are excluded (personal pronoun $N=142$, d-pronoun $N=33$).

Pronoun	Mean	SD	range
Personal pronoun	0.60	0.80	0 - 4
D-pronoun	0.79	0.96	0 - 3

Table 5.9: Mean, standard deviation (SD) and range of intervening characters for personal and d-pronouns. First-mentioned pronouns are excluded.

d-pronouns exhibit similar behavior regarding the number of intervening characters between them and their previous mention. In the majority of cases, both pronoun types have either zero or one intervening character. Table 5.9 further supports this observation. It reveals that the means for the two pronoun types are very close. D-pronouns have a mean of 0.79 (SD = 0.96), while personal pronouns have a mean of 0.59 (SD = 0.80). This suggests that, on average, both pronoun types have either zero or one intervening character between them and their previous mention. Notably, d-pronouns tend to have more intervening characters than personal pronouns. However, this difference is not statistically significant, likely due to the substantial difference in the total count of the pronouns. Nevertheless, it suggests a tendency that d-pronouns might exhibit more intervening characters between them and their previous mention than personal pronouns.

A detailed breakdown of intervening characters for the two pronoun types can be found in Table 5.10 and Table 5.11. Table 5.10 reveals that 81.82% of the critical d-pronouns have either zero or one intervening character between the d-pronoun and its previous mention. The behavior of personal pronouns is quite similar. Table 5.11 demonstrates that 86.62% of the critical personal pronouns

Intervening characters	Freq.	%	% Cum.
0	16	48.48	48.48
1	11	33.33	81.82
2	3	9.09	90.91
3	3	9.09	100.00
Total	33	100.00	100.00

Table 5.10: Intervening characters between d-pronouns and their previous mention. First-mentioned pronouns are excluded.

Intervening characters	Freq.	%	% Cum.
0	80	56.34	56.34
1	43	30.28	86.62
2	16	11.27	97.89
3	2	1.41	99.30
4	1	0.70	100.00
Total	142	100.00	100.00

Table 5.11: Intervening characters between personal pronouns and their previous mention. First-mentioned pronouns are excluded.

have either zero or one intervening character between them and their previous mention. Notably, more than half of the critical personal pronouns have no intervening character (56.34 %). In contrast, the frequency of d-pronouns with no intervening character is only slightly lower (48.48 %). On average, d-pronouns show a slightly higher number of intervening characters between the pronoun and the previous mention compared to personal pronouns (cf. Table 5.9). The mean of intervening characters for d-pronouns is 0.79 (SD = 0.80), whereas the mean for personal pronouns is 0.60 (SD = 0.80). This indicates that both pronoun types, on average, have less than one intervening character between them and their previous mention.

Interim discussion This subsection has examined the intervening characters between critical pronouns and their previous mention. In terms of intervening characters, it was predicted that d-pronouns would have more intervening characters than personal pronouns because one function of d-pronouns is to disambiguate or single out a referent in order to emphasize it. The analysis of intervening characters again shows that d-pronouns and personal pronouns behave

in roughly the same way. Nevertheless, there is a small tendency for d-pronouns to have more intervening characters than personal pronouns, but again this difference cannot be explained statistically. The analysis of intervening characters further is in line with the frequencies of the referential distance measured in sentence segments (Subsection 5.5.2). Since the previous mention of d-pronouns usually occurs in a near or adjacent segment, there is less possibility for additional referents to be mentioned. The combination of the data on intervening characters and segment distance reveals that 39.39 % of the critical d-pronouns and 47.18 % of the critical personal pronouns refer to a previous mention that occurs in the adjacent previous segment without an intervening character. These findings suggest that the number of intervening referring expressions does not influence the choice between personal pronouns and d-pronouns.

5.5.4 RQ (iv): Referential persistence

In this subsection, the influence of referential persistence on the use of d-pronouns is investigated. Therefore, this subsection addresses research question (iv):

How is the choice of pronoun type influenced by referential persistence?

D-pronouns are typically characterized as referring to less prominent referents and eliciting a topic shift. However, the analyses presented above suggest that, contrary to traditional views, d-pronouns frequently refer to locally prominent referents – at least this is the case in the current corpus. Furthermore, literature has also suggested that the broader prominence of a protagonist can also influence referential choices, because how a referent is mentioned reflects the speaker's or writer's intentions regarding its role in the ensuing discourse. In this exploratory analysis, I examine referential persistence. According to [Givón \(1983\)](#), persistence reflects the importance of a topic and the speaker's or writer's topical intent. Persistence is defined as the duration that a referent remains in discourse and it is suggested that it plays a role in shaping the use of referential expressions. Prior research suggests that more persistent referents are more accessible ([Givón 1983](#), [Arnold 1998](#), [2010](#)). Therefore, I examine whether d-pronouns exclusively refer to less persistent referents.

However, the concept of persistence as outlined by [Givón \(1983\)](#) focuses on the forward-directed discourse. This means that it is analyzed how often a particular referent is referred to in subsequent discourse. In my analysis, however, I broaden the scope of referential persistence to encompass the entire text base. Therefore,

5.5 Addressing the research questions

my approach deviates from that of [Givón \(1983\)](#). Essentially, my analysis of referential persistence emphasizes the significance of characters within the whole text. This involves identifying central characters, those who are highly prominent or activated, through the analysis of referential chains. The underlying assumption guiding this approach is that characters of importance are referred to more frequently (cf. structural attraction in [von Heusinger & Schumacher 2019](#)).

To analyze the referential chains, it is important to note that these chains were not annotated across chapter boundaries, as it was not feasible with the WebAnno software (cf. Section 5.3). Also it can be assumed that a chapter break marks a meaningful boundary for discourse representation. Therefore, in the annotation output of the corpus, the chain numbers for each referential chain start from one in each chapter. However, in the context of a novel, it is reasonable to assume that a referential chain for a given referent continues across chapter boundaries. Thus, I assume that referents introduced in one chapter can be reintroduced by a simple proper name in another chapter. For the referential chain analysis, chain IDs were mapped to character names to obtain chain information across sentence boundaries. Combined referential chains consisting of at least 15 referring expressions were mapped to character names, indicating recurring characters in the corpus. All referential chains with fewer than 15 REs were marked as ‘other’. This resulted in a total of eight different referential chains

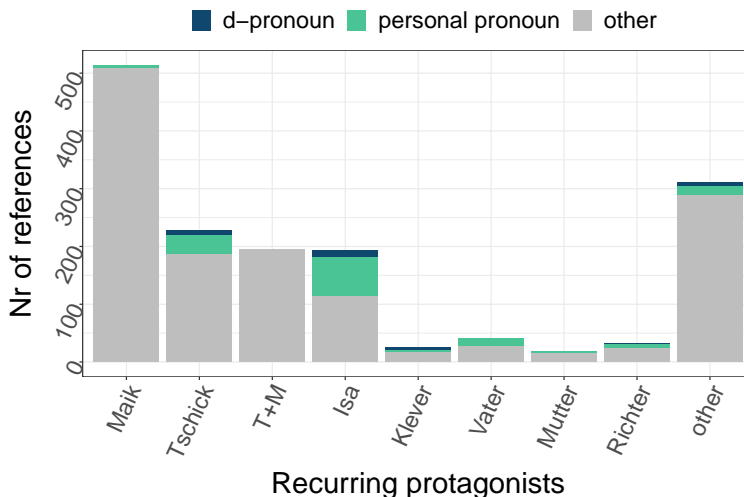


Figure 5.12: Number of references to the recurring characters per chapter. Use of critical personal pronouns (N=143) is indicated in blue, d-pronouns (N=33) in green.

5 *The Tschick corpus*

of recurring characters across the corpus, in addition to those marked as ‘other’ (N=312, constituting 20.01 % of all annotated referring expressions).

Excluding referring expressions marked as ‘other’, the descriptive analysis reveals that the largest proportion of referring expressions, accounting for 41.22 %, refer to the autodiegetic narrator, Maik, who is one of the main protagonists. Of the expressions referring to recurring characters, 18.28 % are part of the referential chain of the other main protagonist, Tschick. In 15.64 % of the relevant referring expressions, a plural expression such as *wir* (‘we’) is used to refer to both Tschick and Maik (termed T+M in Figure 5.12). Consequently, 75.14 % of the referring expressions solely refer to one of the two main protagonists or both. Additionally, 15.56 % of references are made to the protagonist Isa. The character Isa functions in two chapters of the novel excerpt (Chapter 29 and 30) as the referent with the highest persistence. However, since this character does not appear in the other chapters, the overall persistence is lower. Regarding the other recurring characters (i.e., Klever, father, mother, judge), referring expressions refer to them in only less than 4 % of cases.

As for critical d-pronouns, they are present in four referential chains of recurring characters and in referential chains labeled as ‘other’ (refer to Figure 5.12). Figure 5.12 shows the usage of referring expression in the eight most frequently occurring referential chains (recurring characters). Upon examining Figure 5.12, it becomes clear that d-pronouns (highlighted in blue) are not evenly distributed among the various recurring characters. Instead, d-pronouns are predominantly used to refer to Isa, Tschick, or Herr Klever. Notably, d-pronouns are never used to refer to Maik, the narrator.

Interim discussion This subsection has examined the impact of persistence on the usage of d-pronouns. The prediction was that d-pronouns would predominantly refer to less persistent referents, considering that persistence is often associated with the accessibility of a referent (e.g., [Givón 1983](#), [Arnold 2010](#)). The analysis reveals that d-pronouns are, in fact, used to refer to very persistent referents such as Tschick or Isa. As expected, d-pronouns are not used to refer to the most persistent referent, Maik. However, this pattern can be attributed to the story’s autodiegetic narrative style. It is not surprising that the autodiegetic narrator (Maik) does not use a third-person pronoun to refer to himself. Furthermore, this finding aligns with the suggestions by [Hinterwimmer \(2019, 2020\)](#), as the autodiegetic narrator is both the narrator of the story and the speaker in direct speech, maintaining the role of the perspectival center throughout (further discussed in Section 5.6). In terms of the exploratory hypothesis, the distribution

of d-pronouns reveals that they frequently refer to highly persistent referents, such as Tschick or Isa. However, Figure 5.12 also indicates that d-pronouns refer to less persistent referents, although this is not their sole usage. In fact, most d-pronouns refer to the recurring character Isa, who possesses relatively high persistence. These findings suggest that persistence does not significantly influence the use of d-pronouns. Therefore, the initial prediction that d-pronouns would primarily refer to less persistent referents could not be substantiated.

5.6 Additional investigation: Perspective

When moving beyond local prominence markers and considering global prominence features in discourse, perspective also emerges as a critical factor in the analysis of d-pronouns. Hinterwimmer and colleagues (Patil et al. 2023, Hinterwimmer 2019, 2020, Hinterwimmer & Bosch 2016, 2017) have demonstrated that the use of d-pronouns is substantially influenced by perspective. They propose that d-pronouns do not refer to a referent that functions as the perspectival center. They define a perspectival center as follows: “A referent α is the perspectival center with respect to a proposition p if p is the content of a thought or perception of α ” (Patil et al. 2023: 10). According to their findings, abstract speakers or narrators with a prominent perspective are portrayed as discourse referents representing the highest ranked element on the prominence scale, which is used to determine the resolution of d-pronouns. Therefore, only narrators whose perspective is emphasized are treated as discourse referents, similar to speakers in spoken conversations (Patil et al. 2023: 13). When there is not such a discourse referent, the next highest-ranked element on the scale, which is the respective aboutness topic, takes the highest position.

With respect to the current corpus analysis, the use of d-pronouns in this particular novel is often influenced by the assumptions and evaluations (cf. Subsection 5.4.4) of a perspective-holder. This influence is most likely attributed to the dialogue structure of the novel. In this context, the perspective-holder aligns with the concept of a perspectival center, as defined by Hinterwimmer & Bosch (2016, 2017). For the current analysis, the perspective-holder is considered to be the referent (aka protagonist) expressing the narration or a direct speech part, this can be either the autodiegetic narrator or a character through their direct speech. Figure 5.13 shows that the critical d-pronouns and personal pronouns are attributed to three different perspective-holders, i.e., are uttered by three different protagonists: Maik/Narrator ($n=11$), Tschick ($n=12$), and Father ($n=10$). When a d-pronoun appears in direct speech, it is associated with the perspective-holder, i.e., the

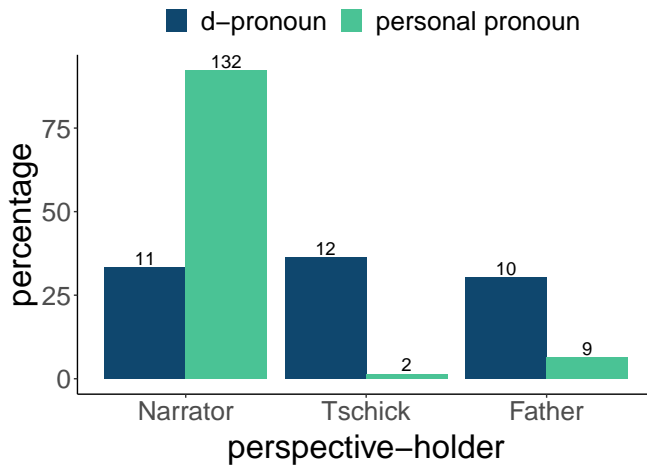


Figure 5.13: Distribution of perspective-holders for personal (N=143) and d-pronouns (N=33). Number above bars indicate the number of tokens.

speaker delivering that speech. D-pronouns within narrative sections are linked to the narrator’s perspective (i.e., Maik). Additionally, two instances are identified where a d-pronoun is used in the protagonist Maik’s direct speech. Since Maik is the narrator of the novel, it was decided to combine all d-pronouns from both neutrally narrated paragraphs and those within direct speech parts spoken by Maik/the narrator. It is important to note that the vast majority (90.61%, $n=132$) of all personal pronouns are presented from the narrator’s perspective, with a perspective shift occurring in less than 10 % of cases for personal pronouns.

Turning to the functions of d-pronouns discussed in Subsection 5.4.4, I observed that more than half of the total instances of d-pronouns express a (neutral) non-evaluative function (cf. Figure 5.6). This, however, does not mean that these neutral instances do not convey a perspective. Instead, as indicated above, even when a non-evaluative function is expressed by the speaker of the direct speech, the perspective still switches to that specific protagonist.

Interim discussion In dialogues, I posit that protagonists expressing direct speech inhabit distinct worlds corresponding to individual mental models on a separate dialogue layer. Readers must distinguish between these separate worlds while engaging with a dialogue within a novel, observing the conversation from a detached, bird’s-eye perspective. Understanding the narrative requires recog-

nizing that a statement is from a specific protagonist articulating their thoughts, while another statement originates from a different protagonist expressing their unique thoughts and feelings. Therefore, in such novels, readers must simultaneously consider the narrator's perspective and maintain a bird's-eye view of the dialogue, always taking into account who the speaker is. This observation specifically applies to narrative texts featuring direct speech segments.

Regarding the layers of narrative in works like *Tschick*, I propose, based on Patil et al. (2023), the existence of an overarching layer connected to the narrator – in this case, an autodiegetic narrator. Additionally, there exists a dialogue layer comprising a discourse referent for each recurring protagonist who utters direct speech. Each protagonist represents a distinct world. During a direct speech segment, the narrator layer is inactive, and the dialogue layer becomes most prominent, reflecting the perspective of the respective speaker rather than that of the narrator. However, despite the inactivity of the narrator layer during these instances, it serves as an overarching framework, as the direct speech is presented through the narrator's voice.

Note that the presence of an (extradiegetic-)autodiegetic narrator in *Tschick*, who also engages in intradiegetic direct speech, leads to specific conceptual considerations for the mental discourse model and layers. Drawing from narrative theories proposed by Genette (1980), which suggest that a homodiegetic narrator embodies both a narrating- and a narrated-ego, I infer that in the context of *Tschick*, the narrator, who is also a character present in the story, is represented and thus available as a discourse referent on both the perspective layer and the dialogue layer. Within this conceptual framework, the assumptions posited by Patil et al. (2023) regarding heterodiegetic narrators are also applicable for homodiegetic ones. The referent holding the perspective is regarded as the maximally prominent entity, except in scenarios involving dialogue where the perspective layer is momentarily deactivated, and the character expressing the dialogue assumes maximal perspectival prominence.

5.7 Discussion

This corpus analysis examined the referential behavior of German d-pronouns and personal pronouns in an excerpt of the narrative text *Tschick*. The *Tschick* Corpus contains a total of 1559 referring expressions referring to animate referents. The analysis focuses on the use of feminine and masculine third-person singular d-pronouns compared to personal pronouns. Specifically, the study examines personal pronouns and d-pronouns in subject and proto-agent positions,

5 The Tschick corpus

which results in 33 critical d-pronouns and 144 critical personal pronouns. The corpus analysis addressed four main research questions regarding the features of the previous mention, referential distance, intervening characters, and referential persistence.

For research question (i) (*Which prominence-lending features do the previous mentions of personal pronouns and d-pronouns carry?*), I formulated concrete hypotheses regarding the referential form, grammatical role, and thematic role of the previous mention of the critical pronouns. The corpus analysis revealed that none of the hypotheses for d-pronouns were confirmed. However, the hypotheses for personal pronouns were confirmed. The results for d-pronouns seem to indicate that they do not tend to refer to a locally less prominent previous mention. Instead, they exhibit a similar referential behavior as personal pronouns, referring to a highly prominent referent in terms of grammatical role, thematic role, and referential form. Also, research questions (ii) (*How do the referential chains of personal and d-pronouns differ in terms of referential distance?*) and (iii) (*How do intervening and competing referring expressions influence the choice of pronoun type?*) revealed unexpected results. However, these examinations were exploratory; hence, open hypotheses were formulated, and no statistical analysis was performed. Specifically, d-pronouns were observed to behave similarly to personal pronouns concerning their referential distance and the intervening characters relative to the previous mention. These findings are quite surprising, as many prior studies had indicated different, or even complementary, patterns for d-pronouns compared to personal pronouns, regarding their referential behavior (e.g., [Abraham 2002](#), [Bosch et al. 2003, 2007](#), [Schumacher et al. 2016](#)).

Overall, in most analyzed aspect, d-pronouns behave like personal pronouns, and on top of that, d-pronouns refer to the highly prominent referent from the preceding discourse. These findings regarding the referential behavior of d-pronouns contradict many results of previous theoretical and empirical research. In the following, I will discuss the individual findings, explain them, and relate them to the characteristics of the text.

5.7.1 Information foreground function

Regarding the referential form of the previous mention, it was hypothesized that d-pronouns avoid to refer to another d-pronoun or a personal pronoun, instead they would only refer to definite DPs and proper names ([Abraham 2002](#): 461, [Wiltschko 1998](#): 163). However, this hypothesis was not confirmed. Instead, the analysis of the Tschick Corpus shows that 36.36 % of the d-pronouns refer to a previous mention that also has the referential form d-pronoun and 24.24 % refer

to a previous mention with the form personal pronoun. This result was surprising at first, but a closer examination of the text reveals that *Tschick* contains many instances of what I am referring to as *d-pro-d-pro chains*. In fact, in *Tschick*, there are 12 instances of d-pro-d-pro chains. These 12 occurrences can be primarily divided into two paragraphs, which are presented in (34) and (35). In the paragraph of example (34), Maik's father is angrily addressing Mike, and a direct speech of Mike's father is provided. The d-pronouns consistently refer to *Tschick*, a third, non-present protagonist. In the paragraph of (35), a dialogue between Maik and *Tschick* is depicted, but the d-pronouns used belong to the same chain and refer to a third, non-present protagonist named Isa. In both examples, the d-pronoun serves a pejorative function.

- (34) Meine Mutter schrie, ich rappelte mich auf, und mein Vater sah zu meiner Mutter und dann irgendwo in den Raum, und dann sagte er: «[...] Und hör genau zu. Du hast nämlich gute Chancen, mit einem blauen Auge davonzukommen. [...] Und normal bist du derjenige, gegen den das Verfahren eingestellt wird, außer du bist zu scheißedämlich. Aber verlass dich drauf: Dein asiger Russe ist nicht so dämlich wie du. **Der** kennt das schon. **Der** hat schon eine richtige kriminelle Karriere hinter sich, Ladendiebstahl mit seinem Bruder, Schwarzfahren, Betrug und Hehlerei. Ja, da guckst du. Die ganze asige Sippschaft ist so. Hat er dir natürlich nicht erzählt. Und **der** hat auch kein solches Elternhaus vorzuweisen, **der** lebt in der Scheiße. In seiner Sieben-Quadratmeter-Scheiße, wo er auch hingehört. **Der** kann froh sein, wenn er in ein Heim kommt. Aber die können **den** auch abschieben, sagt der Schuback. Und **der** wird morgen versuchen, um jeden Preis seine Haut zu retten – ist dir das klar? **Der** hat seine Aussage schon gemacht. **Der** gibt dir die ganze Schuld. Das ist immer so, da gibt jeder Idiot dem anderen die Schuld.» (T 45, 38–72)

My mother screamed, I got up, and my father looked at my mother and then somewhere in the room, and then he said: “[...] And listen carefully. Because you have a good chance of getting off with a black eye. [...] And normally you’re the one against whom the case will be dropped, unless you’re too fucking stupid. But you can count on it: Your trashy Russian is not as stupid as you. He-DPRO knows it already. He-DPRO has a real criminal career behind him, shoplifting with his brother, fare evasion, fraud and receiving stolen goods. Yeah, look at that. The whole clan is like that. He didn’t tell you, of course. And he-DPRO doesn’t have a home like that either, he-DPRO lives in shit. In his seven-square-meter shit, where he also belongs. He’ll-DPRO be lucky if he ends up in a home. But they-DPRO can also deport him-DPRO, says Schuback. And tomorrow he-DPRO will try to save his skin at all costs -

5 The Tschick corpus

is that clear to you? He-DPRO has already made his statement. He-DPRO blames you for everything. It's always like that, every idiot blames the other."

- (35) Beim Weitergehen hatte ich ein paarmal den Eindruck, dass sie uns immer noch folgte. Aber sie schien langsamer zu werden, und bald konnten wir sie nicht mehr entdecken. Die Dunkelheit kroch zwischen den Bäumen durch. Einmal raschelte es im Unterholz, aber das war vielleicht nur ein Tier. «Wenn **die** uns nachläuft, ist megakacke», sagte Tschick. Um ganz sicherzugehen, liefen wir ein bisschen schneller und hockten uns dann nach einer scharfen Biegung in ein Gebüsch und warteten. Wir warteten mindestens fünf Minuten, und als das Mädchen uns nicht nachgeschlichen kam, gingen wir zur Raststätte zurück. «Das mit dem Stinken hättest du nicht sagen müssen.» «Irgendwas musste ich ja sagen. Und Alter, hat **die** voll gestunken! **Die** wohnt garantiert auf der Müllkippe da. Asi.» «Aber schön gesungen hat sie», sagte ich nach einer Weile. «Und logisch wohnt **die** nicht auf der Müllkippe.» «Warum fragt **die** dann nach Essen?» «Ja, aber wir sind hier nicht in Rumänien. Hier wohnt keiner auf der Müllkippe.» «Hast du nicht gemerkt, wie **die** gestunken hat?» «So riechen wir jetzt wahrscheinlich auch.» «**Die** wohnt da, garantiert. Von zu Hause abgehauen. Glaub mir, ich kenn solche Leute. **Die** ist abgedreht. Tolle Figur, aber voll asi.» (T 30, 37 – 55)

As we walked on, I had the impression a few times that she was still following us. But she seemed to slow down, and soon we could no longer spot her. Darkness crept between the trees. At one point there was a rustling in the undergrowth, but it might have just been an animal. "If she-DPRO follows us, it's mega shit," said Tschick. To be on the safe side, we walked a little faster and then crouched down in a bush after a sharp bend and waited. We waited at least five minutes, and when the girl didn't sneak after us, we headed back to the rest stop.

"You didn't have to say that about the stink."

"I had to say something. And dude, she-DPRO really stank!! I bet she-DPRO lives at that dump. Lowlife."

"But she sang beautifully," I said after a while. "And logically she-DPRO doesn't live at the dump."

"Then why is she-DPRO asking for food?"

"Yes, but we're not in Romania here. No one lives at the dump here."

“Didn’t you notice how she-DPRO smelled?”

“That’s probably how we smell now.”

“She-DPRO lives there, guaranteed. Run away from home. Believe me, I know people like that. She’s-DPRO crazy. Great figure, but total trash.”

The d-pronouns in the paragraphs in (34) and (35) primarily serve the information foreground function, closely related to attention (re)orienting (cf. Subsection 3.2.1). This function of d-pronouns has been neglected in past (psycho-)linguistic research, which has emphasized the topic shift function and the corresponding reference to a less prominent referent of d-pronouns. However, the current corpus analysis reveals that it is quite common for a d-pronoun to refer back to another d-pronoun and to a referent that is prominent. Ahrenholz (2007) also observes this usage in his corpus analysis of spoken German. He attributes an attentional-orienting function (which he terms “focus maintenance”) to the d-pronoun. According to him, using a d-pronoun keeps the respective reference more focused than it would be when using personal pronouns. In line with that, Wiemer (1996) suggests that the personal pronoun and the d-pronoun can be used interchangeable when there is no competing referent in the discourse. This interchangeability is evident in paragraphs (34) and (35), since in both referential chains (referring to Tschick and Isa, respectively), personal pronouns are also employed to refer to the discourse referent. Additionally, substituting a d-pronoun with a personal pronoun or vice versa does not lead to an unacceptable interpretation. In fact, changing a personal pronoun to a d-pronoun is feasible without altering the meaning (cf. (36)). However, switching from a d-pronoun to a personal pronoun results in a slightly different reading, particularly in terms of the statement’s expressivity (cf. (37)). This exemplifies the information foreground function. However, the two paragraphs can only be compared to a limited extent because in (34), an uninterrupted direct speech of only one protagonist is rendered, whereas in (35), a dialogue of two protagonists is rendered in several short direct speeches. In addition, paragraph (35) also contains passages in which no direct speech is rendered, but only the narrator’s voice reports.

- (36) Dein asiger Russe ist nicht so dämlich wie du. Er kennt das schon. Er hat schon eine richtige kriminelle Karriere hinter sich.

Your trashy Russian friend is not as stupid as you. He already knows this. He already has a real criminal career behind him.

- (37) Ja, da guckst du. Die ganze asige Sippschaft ist so. Hat der dir natürlich nicht erzählt.

Yes, there you look. The whole trashy clan is like that. He-DPRO didn’t tell you that, of course.

5 The Tschick corpus

The information foreground function is further evident in the lack of ambiguous contexts. While there is one syntactically ambiguous passage in the Tschick Corpus, contextual clues easily disambiguate the pronoun, resolving it on semantic grounds as referring to the protagonist Tschick. The syntactically ambiguous passage is presented in (38). Discourse referents, shown in parentheses, were included for clarity and are not part of the original text; the syntactically ambiguous pronoun is marked in bold. In this regard, the corpus stands apart from many prior psycholinguistic studies, as they typically involve intentionally constructed ambiguous scenarios. The large absence of referentially ambiguous contexts for d-pronouns in the corpus, despite the presence of numerous instances of d-pronouns, underscores that the d-pronoun's function goes beyond merely disambiguating referential conflicts. Its full function cannot be exclusively attributed to the prominence cues of the previous mention.

- (38) Der₁ [Tschick] kann froh sein, wenn er in ein Heim kommt. Aber die₂ [das Jugendamt] können den₁ auch abschieben, sagt der Schuback₃. Und **der**_{1/*3} wird morgen versuchen, um jeden Preis seine_{1/*3} Haut zu retten – ist dir₄ das klar? (T 45, 67–69)

*He-DPRO₁ [Tschick] will be lucky if he₁ ends up in a home. But they-DPRO₂ [the youth welfare office] can also deport him-DPRO₁, says Schuback₃. And tomorrow **he**-DPRO_{1/*3} will try to save his_{1/*3} skin at any cost - is that clear to you₄?*

5.7.2 Backward-looking function

With respect to the backward-looking function, the corpus analysis examined the features grammatical role, and thematic role of the previous mention of the critical pronoun (as discussed in Subsection 5.5.1). The analysis revealed that d-pronouns and personal pronouns display remarkably similar patterns.

Regarding the grammatical role of the previous mention, it was hypothesized that d-pronouns favor previous mentions with a less prominent grammatical role, such as the direct object in transitive sentences (Bosch et al. 2003, 2007, Patterson & Schumacher 2021). The results of the corpus study, however, do not support the hypothesis instead the results show a similar pattern for d-pronouns as for personal pronouns, with both types of pronouns primarily referring to subjects (d-pronoun 82.35 %, personal pronouns 77.78 %). Thus, the results contradict newspaper-based corpus findings by Bosch et al. (2003) who showed that d-pronouns favored non-subject previous mentions in 76.4 % of cases, while personal pronouns predominantly preferred antecedents in the subject role (referents with nominative case) in 86.7 % of cases.

In terms of the thematic role of the previous mention, it was hypothesized that d-pronouns favor referents with a less prominent thematic role, such as proto-patient in transitive sentences (Schumacher et al. 2016, Patterson & Schumacher 2021). The hypothesis regarding the thematic role of the previous mention was not confirmed as the results show that d-pronouns, similar to personal pronouns, tend to prefer a proto-agent previous mention (d-pronoun 82.35 %, personal pronouns 79.86 %). The findings, therefore, do not align with previous psycholinguistic studies that suggested d-pronouns prefer referents with the proto-patient role (Schumacher et al. 2016).

But how can this unexpected referential pattern of d-pronouns be explained? First of all, it is essential to consider that the current study analyzed a text that is unique in at least two aspects. On the one hand, it is a naturalistic text, i.e., no manipulations were carried out, instead an existing (literary) text was used for the analysis. In earlier psycholinguistic studies, however, hypotheses were tested using self-written, highly controlled items, which typically contained two to three potential antecedents (Patterson & Schumacher 2021, Schumacher et al. 2016). In this regard, it is worth considering that presenting self-written items in isolated sentence pairs, as used in some studies, may not accurately reflect the way speech is naturally processed, especially when compared to the more naturalistic stimuli found in a novel (Hamilton & Huth 2020). On the other hand, the text adopts a very conversational style of narration. However, some studies on d-pronouns also base their analyses on corpora, but these corpora are compiled from newspaper articles (Bosch et al. 2003). Comparing the current corpus results with those of Bosch et al. (2003) poses a challenge because newspaper articles and the novel *Tschick* not only belong to different media but also use different linguistic registers. *Tschick* uses a colloquial narrative style, while newspaper articles typically employ very neutral, standardized language. Therefore, while it is easy to draw comparisons with Patterson & Schumacher (2021), Schumacher et al. (2016), Bosch et al. (2003), it should be done with caution, as the context and presentation of stimuli differ to a certain extent.

Second of all, the perspectival features of the text license the reference of d-pronouns to locally highly prominent referents. I will delve into this explanation in the following subsection.

5.7.3 Perspective

The deviation of the *Tschick* Corpus analysis from previously assumed distributions of prominence-lending features, including grammatical and thematic roles, as well as the referential form of the previous mention, may primarily result

5 *The Tschick corpus*

from the text's inherent features. Specifically, the dialogue structure, corresponding perspectival features, and its conversation-like narrative style permit the observed usage of d-pronouns.

The novel *Tschick* is primarily composed of direct speech. In direct speech, each passage is consistently presented from the perspective of the person making the statement. The analysis of perspective in Section 5.6 indicated that d-pronouns are used by various perspective-holders. This observation can be attributed to the dialogue structure of the text. When multiple characters have direct speech segments alongside narrated parts, various characters will use referential forms like the d-pronoun. As suggested by Patil et al. (2023) and Hinterwimmer (2019, 2020), the choice of referential expression, especially between a d-pronoun and a personal pronoun, is linked to the perspective-holder. Specifically, the prominence scale of a d-pronoun is influenced by perspective-taking, where the perspective-holder represents the most prominent referent in a discourse. A d-pronoun can only refer to a referent that is not the perspectival center of the passage. Thus, it can be used for a subject or proto-agent previous mention if a perspective-holder is available and the referent is not the perspectival center. The unexpected prevalence of subjects/agents as previous mentions for d-pronouns reflects the influential role of the perspectival center in the corpus. Looking at the passages (34) and (35), it becomes clear that the protagonist referred to by the d-pronoun is never the perspective-holder of the rendered utterance. In (34), the perspective of Maik's father is expressed and presented in direct speech. Similarly, in (35), each direct speech reflects the perspective of the respective speaker.

Patil et al. (2023) argue that perspectivally prominent abstract speakers/narrators are represented as discourse referents. However, in *Tschick*, the dialogue structure introduces a concrete speaker, not an abstract one. Consequently, this speaker is automatically the most prominent perspective by virtue of its concreteness. Additionally, d-pronouns have been linked to evaluative statements due to their ability of expressing the individual perspective of the perspective-holder (Patil et al. 2023). In the current corpus, however, only 39.39% of cases involve a d-pronoun with an evaluative function, while 81.82% of d-pronouns refer to a locally prominent referent (in terms of grammatical role and thematic role). Therefore, the corpus findings suggest that the claim of Patil et al. (2023) has to be extended to encompass other ways to make a narrator more prominent and thus include other functions such as information foreground.

Since the novel *Tschick* is narrated from the perspective of the autodiegetic narrator Maik, it cannot be assumed that the narrator's voice is entirely neutral, even in paragraphs that do not contain direct speech and in which only

the narrator is present. Nevertheless, passage (35) shows a clear distribution of the use of personal pronouns and d-pronouns between the narrator's voice and direct speech. In fact, in (35) which is rendered by the autodiegetic narrator, a d-pronoun is never used to refer to Isa. The referential chain from paragraph (35) that is referring to Isa is illustrated in (39), and the underlined referring expressions are those that occur in the passages rendered by the narrator. It seems as if the autodiegetic narrator (Maik), who tells the story from his perspective, tries to maintain a particularly neutral and not overtly emotional tone. Note that exchanging the personal pronoun *sie* with a d-pronoun *die* in a passage rendered by the narrator would not lead to an unacceptable reading but rather to a more marked, more emotional interpretation (cf. (40)).

- (39) sie – sie – sie – die – das Mädchen – die – Die – sie – die – die – die – Die
 – Die
PERSPRO – PERSPRO – PERSPRO – DPRO – THE GIRL – DPRO – DPRO – PERSPRO – DPRO
 – DPRO – DPRO – DPRO – DPRO

- (40) Beim Weitergehen hatte ich ein paarmal den Eindruck, dass **die** uns immer noch folgte. Aber **die** schien langsamer zu werden, und bald konnten wir **sie** nicht mehr entdecken.

As we walked on, I had the impression a few times that she-DPRO was still following us. But she-DPRO seemed to slow down and soon we could not spot them anymore.

5.7.4 Reference development

Regarding referential chains, I formulated two research questions regarding the referential distance measured in sentence segments as well as intervening characters. Both measures are a marker of accessibility (Givón 1983, Chiriacescu & von Heusinger 2009, Arnold 1998). It is suggested that a longer referential distance reflects lower accessibility due to referential decay, similarly more intervening characters reflect lower accessibility due to larger memory costs.

With respect to referential distance, the data reveal that d-pronouns and personal pronouns behave almost similarly. Previous literature has suggested that d-pronouns show longer referential distances than personal pronouns. This assumption is based on the accessibility account (Ariel 1990). Another assumption is based on the prominence account (von Heusinger & Schumacher 2019), suggesting that d-pronouns show shorter referential distances than personal pronouns due to the assumption that they refer to a less prominent referent. However, the corpus results cannot confirm either approach. Instead, concerning seg-

5 *The Tschick corpus*

ment distance, d-pronouns and personal pronouns, on average, show a similar segment distance to the previous mention.

With respect to intervening characters, the hypothesis was that d-pronouns show more intervening characters than personal pronouns (Arnold 1998). The analysis reveals a small tendency for d-pronouns to have more intervening characters than personal pronouns. However, this result lacks reliability due to the small difference, which might not reach statistical significance. Additionally, the very small count of d-pronouns contributes to a lack of statistical power. Nevertheless, it hints at a tendency predicted for d-pronouns. Given their attention (re)orienting function, this aligns with the expectation that d-pronouns show more intervening characters. The d-pronoun, with its ability to (re)orient attention in discourse, shift the topic, and generally mark certain referring expressions, is likely capable of handling a larger memory load than the personal pronoun, which only continues current reference and does not carry any additional function.

Concerning referential persistence, it has been demonstrated that d-pronouns also refer to highly persistent referents, such as Tschick or Isa. However, it is essential to consider the dialogue structure of the story in this analysis. Therefore, the measure of persistence carries a different weight since it is not a continuous measure where the referential form indicates cognitive states in the traditional sense. Instead, the fact that several characters are engaged in conversation influences the choice of the referential form. D-pronouns are consistently not used to refer to the narrator, Maik. This result is in line with the perspective account by Hinterwimmer (2019, 2020) as well as the fact that the story is narrated from Maik's perspective. It would be highly unnatural for an autodiegetic narrator to employ a third-person pronoun, especially a d-pronoun, to refer to themselves. Additionally, it has been observed that d-pronouns are exclusively used to refer to Isa, Tschick, Herr Klever, and the judge. Also it was shown that two-thirds of d-pronouns are used in direct speech by either Tschick or the father. In contrast, the narrator, Maik, tends to use personal pronouns rather than d-pronouns when referring to other characters. However, it is plausible that more d-pronouns, including from the narrator's perspective, would occur with a more complex referential structure (more recurring protagonists), given that an essential function of d-pronouns is to (re)orient attention. However, at this point, such conclusions are speculative. It is crucial to bear in mind that the narrative text, from a linguistic standpoint, was crafted by a non-naturalistic acting entity – the author. Thus, the narrator's (aka Maik's) limited use of d-pronouns could potentially reveal something about his personality. Some approaches attribute a pejorative

function to the use of d-pronouns, and Maik, depicted as introverted, may consciously avoid this form of expression. The author appears to use d-pronouns as a literary device to distinguish characters like Tschick and the father from Maik and his manner of expression. Nevertheless, the corpus reveals instances where Maik indeed uses d-pronouns to refer to people. In these situations, as well as in many other contexts involving d-pronouns, an evaluation of the referred-to person is evident (cf. Section 3.2). The consistent presence of d-pronouns in the corpus, along with research by [Hinterwimmer \(2019, 2020\)](#) and [Patil et al. \(2023\)](#), suggests that the use of d-pronouns is significantly influenced by the perspective-holder. The potential influence of the protagonist structure on d-pronoun usage remains speculative and requires further investigation.

5.7.5 Implications for prominence

With respect to prominence, the current findings suggest that local cues, such as grammatical or thematic roles of the previous mention, do not exert as much influence on referential behavior as anticipated based on prior literature. Notably, many previous studies present results from highly controlled experiments, frequently investigating isolated two-sentence pairs. In addition, other measures of prominence, such as referential distance, intervening characters, and referential persistence did not demonstrate a difference in the use of d-pronouns compared to personal pronouns. Instead, the corpus analysis reveals that global cues such as perspective and the information foreground function play a pivotal role in permitting this unexpected use of d-pronouns. In the context of *Tschick*, the majority of pronouns carry the information foreground function, thereby referring to a locally prominent referent. Moreover, the content of the storyline, where Tschick harbors a dislike for Isa and Maik's father disapproves of Tschick, encourages the use of d-pronouns due to their role in expressing evaluation. Therefore, when dealing with an extended narrative text, the impact of local prominence-lending cues seems to diminish, with more global cues, such as information foregrounding, perspective-taking and narrative style, assuming control over the usage of d-pronouns.

6 The AdT Corpus

6.1 Introduction

This chapter presents a corpus analysis of an excerpt from the novel *Auferstehung der Toten* (also abbreviated as *AdT*). Its structure mirrors the preceding chapter on the Tschick Corpus, intending to unravel the intricate interplay of different prominence-lending cues concerning the referential behavior of personal and d-pronouns in longer narrative texts. Similar to *Tschick*, the novel *Auferstehung der Toten* reflects spoken language, making it an excellent source for examining referential behavior in more naturalistic contexts. Given the similarity of the structure and some of the results with the Tschick Corpus, I will keep the explanation of the analyses and the discussion of the results concise and refer to the Tschick Corpus analysis at various points.

6.2 Research question

The primary objective of this corpus study (just as in Chapter 5) is to explore the usage of personal pronouns and d-pronouns within longer narrative texts. However, the novels *Auferstehung der Toten* and *Tschick* exhibit vastly different narrative structures. In contrast to *Tschick*, *Auferstehung der Toten* features a heterodiegetic narrator. Notably, the narrator in *Auferstehung der Toten* assumes a prominent role by consistently offering evaluations of characters and events. Additionally, while *Tschick* is characterized by its rich dialogue structure but a limited number of characters, *Auferstehung der Toten* introduces a multitude of characters yet contains less direct speech parts. These disparities present an opportunity to broaden the scope of my analyses by examining an alternative narrative text. Specifically the distinct narrative structure of *Auferstehung der Toten* gives reason to examine the possible influence of the heterodiegetic narrator on referential behavior. In the analysis presented in Chapter 5 on the Tschick Corpus, I was able to refute some of the initially proposed hypotheses regarding the referential behavior of d-pronouns. Nonetheless, the current chapter examines the same parameters as the previous one, as outlined in Section 5.2, to ensure

comparability of the results concerning the different narrative properties of the corpora.

6.3 Annotation method

The segmentation and annotation process was the same as for the Tschick Corpus described in Chapter 5, Section 5.3. A detailed description can also be found in Appendix A.

6.4 Characteristics of the AdT corpus

6.4.1 The novel excerpt

The AdT Corpus was formed from the first four chapters of the novel *Auferstehung der Toten* (Haas 1996). Table 6.1 presents a brief overview of the corpus' length. A dataframe that exclusively includes the annotated referring expressions is available for download on the Open Science Framework website (<https://osf.io/2s9x6/>). However, sharing the complete corpus is subject to copyright restrictions and can only be done upon request. The crime novel *Auferstehung der Toten* is the first volume of the Brenner series by Austrian author Wolf Haas and was published in 1996. The Brenner novels are a highly successful series of crime novels, currently consisting of 9 volumes, which build on each other and also contain numerous cross-references, but in each of which an independent plot line is developed and concluded. Notably, the novel *Auferstehung der Toten* was awarded the German Crime Fiction Prize (Deutscher Krimi Preis) in 1997.

The central protagonist of the novels is Simon Brenner, a former police detective working as a private detective, who solves the murder cases through a combination of coincidence and intuition rather than through systematic investigative work. In *Auferstehung der Toten* a murder case has to be solved in which the bodies of a wealthy American couple were found frozen to death in a chairlift in Zell am See, Austria. Detective Simon Brenner initially is a member of the

Tokenized sentences	799
Sentence segments	1823
Mean chapter length (segments)	455.75
Total REs	1705

Table 6.1: Overview of the AdT Corpus' length.

police team that unsuccessfully investigates the case. After a falling out with his superior Nemeč, Brenner quits and from then on works as a private detective, for the insurance company of the two victims.

One reason for the linguistic study of the novel is its frequent use of d-pronouns. Southern German dialects are generally known for using many d-pronouns in spoken language and for replacing personal pronouns with d-pronoun (Patel-Grosz & Grosz 2017). Since the author of the novel is from Austria and the story is set in an Austrian village, there are also numerous d-pronouns in the novel. Another key motivation for the linguistic study of the novel is its distinctive narrative style. In the novel *Auferstehung der Toten* (as well as in all other Brenner volumes), the events are narrated by an omnipresent, heterodiegetic narrator. Almost exclusively, the situations described involve the presence of Brenner (except for chapter 1), and to a large extent, his thoughts, impressions, and feelings in these situations are described, but not those of the other people involved. The narrator does not appear as a protagonist and their identity is not revealed in the first five volumes. Rather, they always comment on and evaluate the events as well as the people involved and generally always have an opinion on everything. They are, therefore, a very dominant narrator. The dominance of the narrator becomes further evident by the very high proportion of narrative speech compared to character speech (Nindl 2009a,b). But most importantly, the narrator uses a style strongly reminiscent of oral language. The sentences are usually quite short and contain few embeddings but numerous left and right dislocations, there are repeated omissions and sentence breaks. Elliptical structures are used especially often. Moreover, as a past tense, the colloquial past perfect tense predominates over the preterit, which would be the common past tense in conceptually written texts. Moreover, the corpus is characterized by a simulated dialogicity (Nindl 2009a) typical of the Brenner novels. This means that the narrator repeatedly addresses the reader directly by using the second-person personal pronoun which enhances the oral language impression (Hinterwimmer 2020, Nindl 2009b, see Nindl 2009a for a detailed examination of the linguistic devices used by Haas). By using these stylistic features the author creates an artificial illustration of oral communication patterns. The following examples (41) and (42) illustrate the features mentioned.

- (41) Das gehört jetzt eigentlich nicht hierher. Aber dem Brenner ist es auch nicht anders gegangen. Der sitzt in seinem heißen Zimmer und soll über seine Arbeit nachdenken, aber statt dessen denkt er über seine Wohnung nach. Und jetzt paß auf, was ich dir sage. Zufall ist das keiner gewesen, weil Zufall in dem Sinn gibt es keinen, das ist erwiesen. (AdT 3, 48–52)

That doesn't really belong here. But Brenner didn't have it any other way. He's-DPRO sitting in his hot room and should be thinking about his work, but instead he's thinking about his apartment. And now pay attention to what I'm telling you. It wasn't a coincidence, because there is no such thing as a coincidence, that's been proven.

- (42) Weil wie er am nächsten oder übernächsten Wochenende Besuch hat – wählerisch in dem Sinn ist der Brenner auch nicht immer gewesen, und das war eine ziemliche – aber bitte, mir kann es ja egal sein. (AdT 3, 80)
Because as he has visitors the next weekend or the weekend after – Brenner hasn't always been picky in that sense either, and that-DPRO was quite a – but please, I couldn't care less.

Moreover, the Brenner novels have already served as the basis for numerous studies on the perspective and behavior of referring expressions in interaction with free indirect discourse (Hinterwimmer 2018, 2019, 2020) as well as for a more general analysis of its particular language and text structures (Nindl 2009a,b).

6.4.2 Distribution of referring expressions

Referential form The AdT Corpus contains a total of 1705 referring expressions in total that refer to an animate referent. Table 6.2 displays the distribution of the ten most frequent referential forms among all annotated RE). Combinations of

Referential form	Freq.	%
Personal pronoun	559	32.79
Proper name	290	17.01
Definite DP	217	12.73
Zero pronoun	127	7.45
Possessive pronoun	122	7.16
D-pronoun	109	6.39
Indefinite pronoun	90	5.28
Indefinite DP	65	3.81
other	54	3.17
Quantifier	47	2.76
Relative pronoun	25	1.47
Total	1705	100.00

Table 6.2: Distribution of the 15 annotated referring expressions (REs).

Referential form (shortened)	Freq.	%
Pronoun	1032	60.53
Name	290	17.01
DP	282	16.54
other	101	5.92
Total	1705	100.00

Table 6.3: Shortened overview of referring expression distribution. All annotated referring expressions are grouped in the main categories pronoun, DP, and name as well as other.

determiners and nouns are labeled as DPs, each accompanied by a specific determiner definition (e.g., indirect DP). Under ‘other’ referential forms annotated less than 20 times are summarized, including coordinated DP, possessive proper name, reflexive pronoun, resumptive d-pronoun, and demonstrative DP.

Out of the 18 available referential forms (cf. Figure 5.1) 15 referential forms were annotated in the AdT Corpus. The most frequently annotated referential form, accounting for one-third of the instances ($N = 563$), is the personal pronoun. D-pronouns occur at a frequency of 6.39 % in the AdT Corpus. A condensed overview of the referring expressions in the AdT Corpus is presented in Table 6.3. It is evident that 60.76 % of the annotated referring expressions are pronouns, while DPs and names occur almost equally often with approximately 17 %.

Grammatical & thematic role Figure 6.1 and Figure 6.2 show the distribution of the features grammatical role and thematic role among the three main groups of referential forms (Table 6.3) but excluding the referential forms ‘other’. Horizontally the plots are divided into the three main groups of referential forms: name ($N=290$), DP ($N=282$), and pronoun ($N=1036$). Vertically the plots are divided into different features of grammatical role (Figure 6.1) and thematic role (Figure 6.2).

Examining Figure 6.1, it becomes immediately apparent that pronouns in subject positions constitute the largest share (48.7 %) of the annotated referring expressions within the three main RE groups. Additionally, when comparing the grammatical roles (horizontally), it is noteworthy that the grammatical role of the subject also holds the largest share, comprising 70.9 % of the total grammatical roles. The role oblique comes in second most frequently with a significant margin at 9.2 %, followed by expressions with the grammatical role of direct object (8.5 %), those with no grammatical role (7.1 %), and expressions with the gram-

6 The AdT Corpus

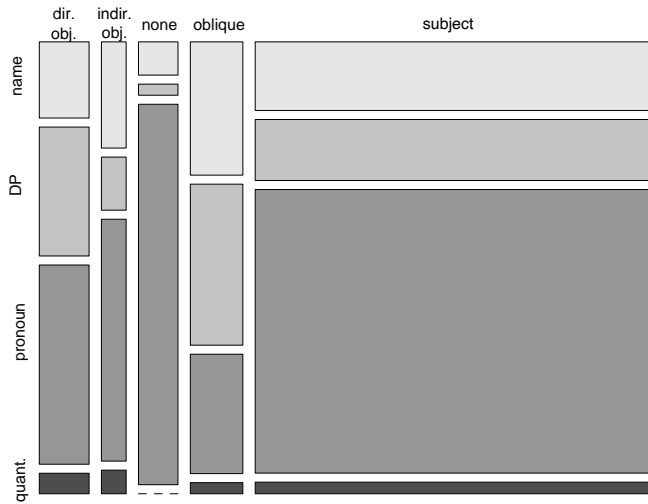


Figure 6.1: Distribution of grammatical roles of all referring expressions grouped by the categories name, DP, and pronoun, excluding other.

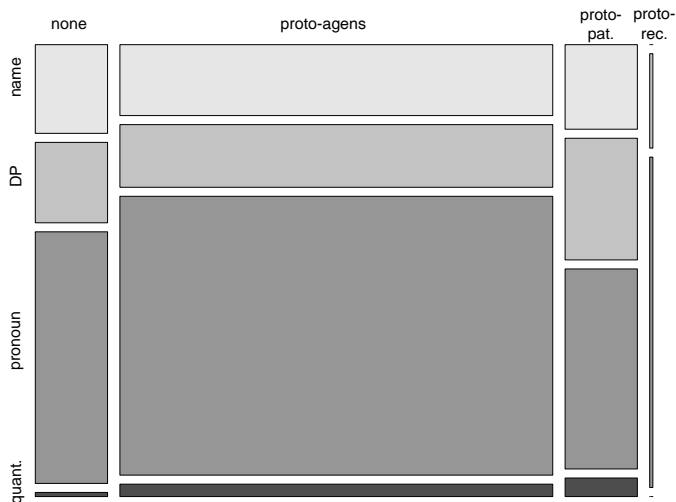


Figure 6.2: Distribution of thematic roles of all referring expressions grouped by the categories name, DP, and pronoun, excluding other.

grammatical role of indirect object (4.2%). Upon closer examination of the distribution within the grammatical role of the subject (vertically), pronouns account for the largest share at 64.3%. Conversely, within the pronoun group, subjects hold the majority at 75.7%.

Looking at Figure 6.2, it is evident at first glance that pronouns in the proto-agent role constitute the largest share (50.5 %) among the three main referential forms. Furthermore, when the three main groups of referring expressions are combined, the thematic role proto-agent holds the largest share (74.7 %). The thematic role proto-patient (12.1 %), as well as REs with no thematic role (12.7 %), show a similar distribution among the three main RE groups. Only 0.6 % of the REs in the three main groups show the thematic role proto-recipient. Examining the distribution of the thematic role proto-patient reveals that pronouns constitute the largest subgroup (64.3 %). Conversely, within the pronoun group, the thematic role proto-patient has the largest share (78.5 %).

6.4.3 Distribution of all personal & d-pronouns

Person, number, gender Table 6.4 shows the distribution of grammatical person and number for all annotated personal pronouns and d-pronouns. The table highlights that the majority of personal pronouns occur in the third-person singular (53.64 %). Out of the 109 d-pronouns, 90.83 % are found in the third-person singular.

This dissertation specifically examines feminine and masculine pronouns; hence, the analysis in the following sections will exclude neuter pronouns. Table 6.5 illustrates that feminine and masculine pronouns constitute the majority of annotated pronouns in the third-person singular. Additionally, Table 6.5 reveals that the corpus includes seven neuter d-pronouns in the third-person singular. All of these instances are confined to predicative constructions, as can be seen from the selection in (43)–(46).

- (43) Und jetzt geht der Brenner her und kriegt ein Dreivierteljahr später heraus, wer es gewesen ist!
 Jetzt muß man wissen, was **das** für ein Mensch gewesen ist. (AdT, 2, 99–100)
And now Brenner comes here and finds out three quarters of a year later who did it!
Now you have to know what kind of person that-DPRO was.
- (44) «[...] Wo ist eigentlich die Amerikanerin?»
 «In Amerika.»
Das ist aber jetzt eine andere Amerikanerin gewesen, von der die beiden da geredet haben. (AdT 2, 186–188)
[...] Where is the American woman?

6 The AdT Corpus

In America.

But that-DPRO was a different American woman they were talking about.

- (45) Er hat schmutzige Gummistiefel angehabt und einen alten Filzhut am Kopf. **Das** ist der Gschwentner-Bauer gewesen. (Adt 4, 89–90)
He was wearing dirty rubber boots and an old felt hat on his head. This-DPRO was the Gschwentner farmer.
- (46) Aber der andere Zuschauer, der zuerst ganz oben am entgegengesetzten Ende der Asphalteisbahn gestanden ist, ist jetzt heruntergekommen. **Das** ist aber kein Zuschauer gewesen, sondern eine Zuschauerin. (Adt 4, 126–127)
But the other spectator, who was initially standing at the top at the opposite end of the asphalt ice rink, has now come down. But that-DPRO wasn't a spectator, it was a female spectator.

Referential form	Person	Freq.	%
Personal pronoun	1-sg	99	17.71
	2-sg	85	15.21
	3-sg	298	53.31
	1-pl	26	4.65
	2-pl	2	0.36
	3-pl	40	7.16
	formal	9	1.61
	total	559	100.00
D-Pronoun	3-sg	97	90.83
	pl	12	9.17
	total	109	100.00

Table 6.4: Distribution of the person and numerous of all third-person singular d-pronouns and personal pronouns

Referential form	feminine	masculine	neuter	Total
Personal pronoun	28	270	-	298
D-pronoun	9	81	7	97

Table 6.5: Distribution of the grammatical gender of all third-person singular d-pronouns and personal pronouns

Just as for the Tschick Corpus, in the following I will only report on feminine and masculine personal and d-pronouns of third-person singular. This yields a total of 90 d-pronouns and 298 personal pronouns in third-person singular, referring to an animate referent.

Grammatical & thematic role Here, the distribution of the grammatical role and thematic role of both personal pronouns and d-pronouns is addressed. The distribution of the grammatical role for both personal pronouns and d-pronouns (cf. left side of Figure 6.3) indicates that the majority of pronouns appear in subject position, as previously shown in Figure 6.1. Specifically, 88.89 % of d-pronouns and 74.83 % of personal pronouns are found in the subject position. The second most common grammatical role for personal pronouns is the direct object (12.75 %), while for d-pronouns, direct object and oblique both show the second most frequent distribution with 4.44 % each. The grammatical roles of indirect object and oblique are observed, with an interesting distinction in preferences between the two pronouns. The personal pronoun tends to occupy more instances of indirect object positions (8.39 %) than oblique positions (4.03 %), while the d-pronoun displays a preference for oblique positions (4.44 %) over indirect object positions (2.22 %).

Turning to the distribution of the thematic role of personal pronouns and d-pronouns (cf. right side of Figure 6.3), a pattern similar to that illustrated in Fig-

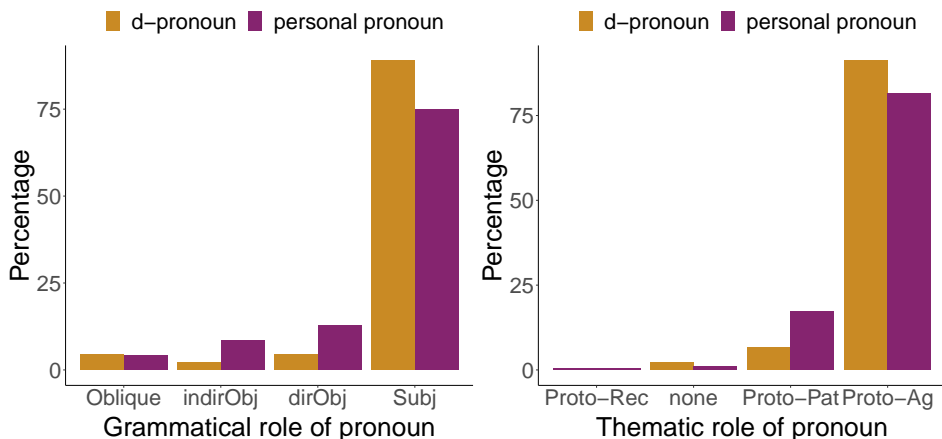


Figure 6.3: Distribution of grammatical role (depicted on left side) and thematic role (depicted on right side) among all feminine and masculine third-person singular personal pronouns (N=298) and d-pronouns (N=90)

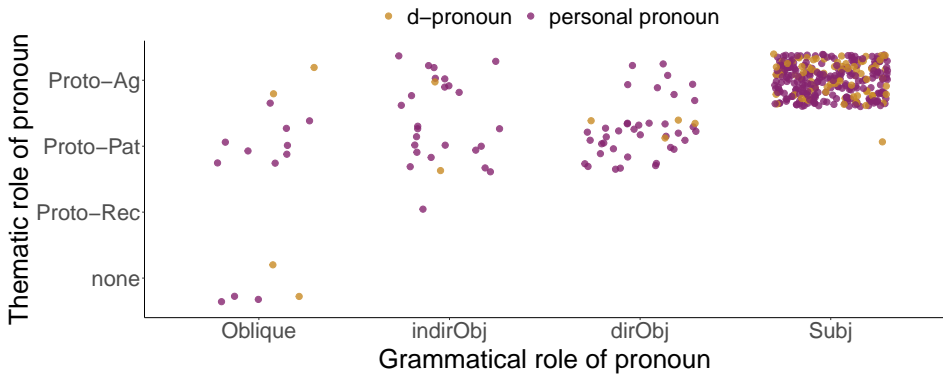


Figure 6.4: Visualization of the distribution of the features grammatical role and thematic role for both personal pronouns (N=298) and d-pronouns (N=93).

ure 6.2 emerges. The majority of personal pronouns (81.54 %) and d-pronouns (91.11 %) predominantly function as proto-agents. Additionally, personal pronouns take on the role of proto-patients in 17.11 % of cases, while d-pronouns do so in 6.67 % of cases. A small percentage (2.22 % for d-pronouns and 1.01 % for personal pronouns) lacks a thematic role, and there is a singular instance (0.34 %) of a personal pronoun serving as the proto-recipient.

Figure 6.4 is combining the above described distribution of grammatical and thematic roles, we see that 87.78 % of third-person singular d-pronouns occur as subjects and agents. Also 74.83 % of third-person singular personal pronouns are the subject and the agent of the respective sentence. Thus, the analysis of the features grammatical and thematic role has shown that both types of pronouns occur most frequently in subject position and as an agent of the clause. In fact, putting both pronoun types together, we see that 99.67 % of subject pronouns (N=303) are as well proto-agents (N=302). As in Chapter 5, in the following sections addressing the research questions, I will only analyze feminine and masculine third-person personal pronouns and d-pronouns that serve as subject and proto-agent. I will again refer to them as the *critical pronouns*. Thus, the following analyses deal with 78 d-pronouns and 223 critical personal pronouns.

6.4.4 Functions of pronouns

In this subsection, I categorize all critical d-pronouns in the AdT Corpus into the different functions explored in Section 3.2. I categorize these functions into

structural and semantic categories, employing distinct criteria for classification. The topic shift and disambiguation functions were combined because as there is no clear line to draw between the two functions. This is evident from example (47), where the d-pronoun refers to Vergolder. Positioned as the subject with the proto-agent role, the d-pronoun refers to a locally less prominent referent, resulting in a topic shift. Additionally, the d-pronoun disambiguates the context because substituting it with a personal pronoun would lead to the interpretation of coreference with Brenner. The categorization was performed on different tests, which were already presented in Subsection 5.4.4. The information foreground function is employed when the d-pronoun selects the most prominent and often times the only available referent. The only distinction between the personal and the d-pronoun in these instances is that the d-pronoun directs more attention towards the referent, providing it with an attention boost, whereas the personal pronoun does not. This is illustrated in (48).

- (47) Und der Brenner hat den Vergolder Antretter erst jetzt erkannt. Der ist der Moar der anderen Mannschaft gewesen (...). (AdT 4, 106)
And Brenner has only now recognized the Vergolder Antretter. He-DPRO was the moar of the other team (...)
- (48) Der Detektiv gehört aber eigentlich nicht zu Zell. Der ist natürlich nur wegen der Liftgeschichte dagewesen. (AdT 2, 4)
But the detective doesn't actually belong to Zell. He-DPRO was only there for the lift story, of course.

With respect to the semantic functions, contrast was, for instance, assigned in (49), where the d-pronoun sets the referent Simon Brenner in contrast to the alternative set of more talented police officers or detectives. The most extensive set of tests was used for the evaluative function, assessing criteria such as the presence of evaluative adjectives or particles (Stojanovic 2017, 2015), subjective adverbs (Smith 2003), predicates of personal taste (Lasersohn 2005, Stephenson 2007, Stojanovic 2007), expressive intensifiers (Gutzmann 2019), epithets or epithetic phrases (Harris & Potts 2009), epistemic modals (Stephenson 2007, Nuyts 1993), and epistemic *weil*-sentences (Antomo & Steinbach 2010). Epistemic *weil*-sentences, identified by their verb-second position, are, therefore, also known as *weil*-verb-second (WV2) constructions. Contrary to justifying the statements in the preceding proposition, these sentences provide reasons at the illocutionary level for the speaker's or writer's attitude. For instance, in the causal sentence in (50), the narrator communicates why they assume that *der* (Vergolder) would

have had a motive, thereby constructing the knowledge base leading to the inference stated in the first subclause (Antomo & Steinbach 2010). Not all the criteria listed above were applicable to the AdT corpus. However, the corpus included evaluative statements classified as such based on the presence of evaluative adjectives or particles, as exemplified in (51) and (52), subjective adverbs as illustrated in (53), epithets or epithetic phrases in (54), and epistemic modals in (55). In the examples, the criterion that led to the classification into the functions is printed in bold.

- (49) Und noch etwas ist kein Zufall gewesen. Daß ausgerechnet der Brenner, der praktisch auch sonst nicht so ein konzentrierter Typ gewesen ist, daß ausgerechnet der für so einen Fall wieder der Richtige gewesen ist. (AdT 3, 98–99)
And something else was no coincidence. The fact that Brenner of all people, who was not such a focused guy in other respects, that he-DPRO of all people was the right person for such a case.
- (50) Motiv hätte der schon eines gehabt, **weil** der erbt ein paar Millionen, und nicht daß du glaubst, Schilling. (AdT 3, 130)
He-DPRO would have already had a motive, because he-DPRO inherited a few million, and not that you think, Schilling.
- (51) (...) der war gar nicht so **ungut**, wie alle immer getan haben. (AdT 2, 162)
He-DPRO wasn't as bad as everyone always claimed.
- (52) Der hat **halt** geglaubt, daß er die ganze Welt niederreißen muß vor lauter wichtig. (AdT 2, 182)
He-DPRO just believed that he had to tear the whole world down because he was so important.
- (53) (...) **eigentlich** hat der ein richtiges Milchgesicht. (AdT 3, 117)
He-DPRO actually has a real milk face.
- (54) Der ist **ein Original**, das kannst du laut sagen. (AdT 4, 4)
He's-DPRO an original, you can say that loud.
- (55) Der hat ihr aber nicht viel bieten **können**. (AdT 2, 207)
But he-DPRO wasn't able to offer her much.

Figure 6.5 illustrates the distribution of semantic and structural functions. We see that the information foreground function is the most commonly utilized structural function of d-pronouns, constituting 78.2%. The disambiguation function occurs only marginally, at 21.8%. In terms of semantic functions, it

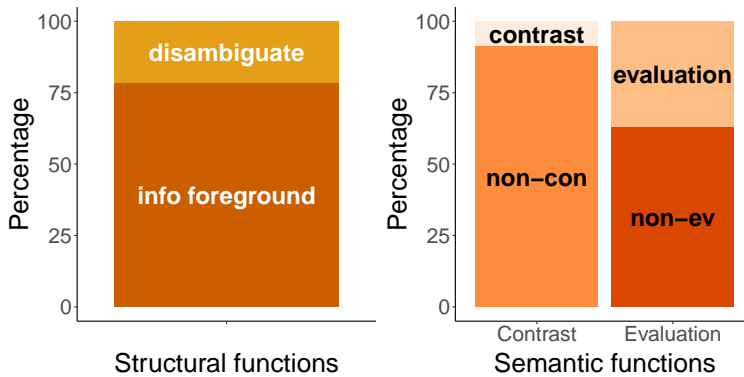


Figure 6.5: Distribution of functions of critical d-pronouns (N = 78)

is noticeable that only a few d-pronouns carry the contrast function (8.97%), while the majority (91.0%) do not. For the evaluation function, 37.2% carry an evaluative function, whereas 62.8% do not carry an evaluative function. There are two pronouns that carry both a contrastive function and an evaluative function, one of them is illustrated in (49). Appendix B.1 displays the distribution of functions along with text examples. It is surprising that the disambiguation function (aka the topic shift function) only occurs in 21.8% of cases, despite being prominently discussed in prior studies (e.g., Diessel 1999, Abraham 2002, Bosch et al. 2007, Fuchs & Schumacher 2020). Given a similar distribution observed in the Tschick Corpus, where a prominent dialogue structure was present, it can be inferred that this pattern of d-pronoun functions is linked to the conversational narrative style resembling spoken language found in both novels in this corpus investigation. The large amount of evaluative d-pronouns can be attributed to the highly conversational narrator of the novel, who frequently provides commentary on characters and events and expresses opinions on a wide range of topics.

Regarding the various usage types of demonstratives as proposed by Himmelmann (1996) and Diessel (1999), it is evident that all d-pronouns in this corpus fall into the category of anaphoric use. This is attributed to the narrative structure where the narrator and the reader are situated in distinct contexts, necessitating the introduction of all referents into the discourse with a descriptive full DP. Consequently, a situational use, from a textual standpoint, is not applicable. Furthermore, as the narrator and the reader do not share common knowledge beyond what is revealed by the narrator, the recognitional use is not observed

in the corpus. Additionally, the discourse deictic use is absent among the annotated d-pronouns, as this particular use typically pertains to propositions or events. However, in the current corpus, only referring expressions that denote animate referents were annotated.

6.4.5 Interim summary

In this subsection, I presented the distribution of personal pronouns and d-pronouns, considering their syntactic, semantic, and pragmatic properties. This comprehensive overview aimed to provide insights into the distribution of personal and d-pronouns in the corpus. The analyses revealed a significant discrepancy: the corpus contained a notably higher number of personal pronouns (N=563) than d-pronouns (N=109). To maintain a comparable set of pronouns, my focus in the investigations centered on feminine and masculine personal and d-pronouns in the third-person singular, excluding seven neuter d-pronouns. Neuter d-pronouns were also omitted due to their frequent use as propositional anaphors.

Regarding the structural functions of d-pronouns, the analysis revealed a predominant occurrence in the function of information foreground. Conversely, the disambiguation function is observed to a minimal extent. Similarly, for the semantic function of contrast, which is only marginally present. However, the evaluation function is represented in almost half of the d-pronouns. Furthermore, the categorization into usage types proposed by [Himmelmann \(1996\)](#) and [Diessel \(1999\)](#) showed that all d-pronouns occurred in the anaphoric usage type.

An examination of the distribution of grammatical and thematic role features highlighted that the majority of both types occurred as subjects and proto-agents. Given this prevalence in subject position and as proto-agents, these pronouns will be the exclusive focus of the subsequent analyses. Pronouns in object positions and with the proto-patient or proto-proto-recipient role, due to their limited presence, are not considered for this analysis, as they would not contribute substantially to a reliable investigation. Following the same analysis pattern as in Chapter 5, I will focus on investigating the critical 78 d-pronouns and 223 personal pronouns.

6.5 Addressing the research questions

6.5.1 RQ (i): Features of critical pronouns' previous mention

In this subsection, I examine the features of the previous mentions of the critical pronouns. This subsection, therefore, addresses research question (i):

Which prominence-lending features (referential form, syntactic function, thematic role) do the previous mentions of personal pronouns and d-pronouns carry?

As in Chapter 5, Subsection 5.5.1, multinomial logistic regression models are employed to statistically evaluate the differences between personal and d-pronouns concerning specific comparisons of their previous mention's features. Refer to (31) for the model. Again, I focus here solely on the previous mention of the critical pronouns.

Among the critical pronouns under investigation, there are six personal pronouns and one d-pronoun that occur as the first-mentioned referent of the referential chain in the specific chapter. Consequently, these pronouns are excluded from the analysis of the features of the previous mentions.

Referential form of previous mention For the analysis of the referential form of the previous mention, it is hypothesized that d-pronouns refer to a previous mention that has the referential form DP or proper name (Abraham 2002: 461, Wiltschko 1998: 163), personal pronouns, on the other hand, are predicted to be more flexible in their preference regarding the referential form of their previous mention (Wiltschko 1998).

In Figure 6.6, on the right bar for personal pronouns, it can be seen that over a third of personal pronouns refer back to another personal pronoun (40.55 %). This is followed by personal pronouns that refer back to proper names (23.50 %) and possessive pronouns (13.36 %). In 9.22 % of cases, a personal pronoun refers back to a d-pronoun. Additionally, there are cases of personal pronouns referring back to zero pronouns (5.53 %), definite DPs (4.15 %), reflexive pronouns (1.84 %), possessive proper names (0.92 %), and relative pronouns (0.92 %); all these cases are summarized under 'other' in Figure 6.6. Personal pronouns in this corpus never refer to a definite DP. There are six cases in which a personal pronoun is initially introduced as a referring expression in the respective chapter. Since there is no previous mention, these instances are excluded.

When examining the left bar for d-pronouns in Figure 6.6, it is evident that the majority of d-pronouns refer back to a proper name (32.47 %). Following this, d-pronouns refer to another d-pronoun in 16.88 % of cases and to personal pronouns in 14.29 %. In 11.69 % of cases, the previous mention of a d-pronoun has the referential form definite DP and in 10.39 % possessive pronoun. The corpus also contains cases where a d-pronoun refers to indefinite DPs (3.90 %) and relative pronouns (5.19 %). Additionally, a d-pronoun refers once each (1.30 %) to an indefinite pronoun, possessive proper name, resumptive d-pronoun, and a zero

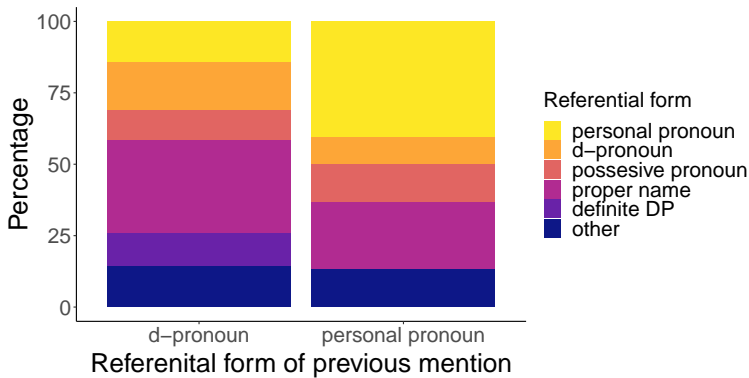


Figure 6.6: Distribution of the referential form of critical pronouns' previous mentions. First-mentioned pronouns are excluded (personal pronoun N=217, d-pronoun N=77).

pronoun. The cases that occurred less than 10 % are summarized under 'other' in Figure 6.6. There's even one case where a d-pronoun has no previous mention but represents the first-mentioned RE of that referent in the respective chapter; this instance is excluded from the analysis.

Regarding the inferential statistics, the same analyses were performed as in Subsection 5.5.1: a multinomial logistic regression model was employed to assess the difference between critical personal pronouns and d-pronouns concerning the referential form of their previous mention. The model, depicted in example (31), enables pairwise comparisons among the referential forms of the previous mention, using the baseline condition of personal pronoun (referential form of previous mention). Concerning the difference between the previous mention's referential forms personal pronoun (baseline) and d-pronoun, the results of this analysis reveal a significant difference between critical personal pronouns and d-pronouns ($z = -3.444$, $p < 0.001$). Furthermore, significant differences between critical personal pronouns and d-pronouns is observed for the comparisons between previous mention's referential form personal pronoun and definite DP ($z = -3.650$, $p < 0.001$), personal pronoun and proper name ($z = -3.396$, $p < 0.001$), and personal pronoun and other ($z = -3.232$, $p < 0.01$). However, there is no significant difference in the comparison of the referential forms of previous mention for the comparison personal pronoun and possessive pronoun ($z = -1.547$, $p = 0.122$). In summary, these findings indicate a difference in the referential behavior between personal pronouns and d-pronouns with respect to the referential form of their previous mention.

The analysis of the referential form of the previous mentions for both critical

personal pronouns and d-pronouns reveals a diverse pattern. However, a common trend is that both pronoun types predominantly refer to referents with a similar type of referring expression or to proper names. Nevertheless, it is important to note that personal pronouns and d-pronouns exhibit contrasting distributions in this regard. Personal pronouns primarily refer to other personal pronouns, with proper names being the second most frequent choice. On the other hand, d-pronouns predominantly refer to proper names, and their second most frequent choice is to refer to another d-pronoun. The personal pronoun's tendency to refer to other personal pronouns is expected, as personal pronouns are often used to signal referential continuation. Similarly, the frequent use of d-pronouns to refer to proper names aligns with the idea that the referent has been newly introduced or reactivated and is made more prominent by the d-pronoun. This observation is consistent with the Accessibility Hierarchy (Ariel 1990) and Givenness Hierarchy (Gundel et al. 1993). One unexpected finding is that d-pronouns also often refer to other d-pronouns. Prior literature has explicitly excluded this possibility (Abraham 2002, Wiltschko 1998). However, such occurrences were observed in the Tschick Corpus as well (cf. Subsection 5.5.1), where numerous references to other d-pronouns were noted for d-pronouns. As discussed for the Tschick Corpus, this referential behavior may be attributed to the function of the d-pronouns, on the one hand, and to perspective, on the other hand. The usage of d-pronouns in this corpus can primarily be associated with the information foreground function explained in Section 3.2. What I term *d-pro-d-pro chain* has been described in previous literature and is characterized as emphasizing a referent through reorientation (Zifonun et al. 1997) or conspicuousness (Bethke 1990). Furthermore, from a perspective-based approach, Hinterwimmer (2019) suggests that a d-pronoun can refer to a previously mentioned subject or proto-agent, provided that a perspectival center is established and the respective referent does not coincide with it. Given the presence of a dominant narrator who frequently provides evaluations in the novel, d-pronouns may be used as long as they do not refer to the perspectival center itself.

Regarding the hypothesis that d-pronouns exclusively refer to DPs or proper names, the results do not entirely support this claim. While it is evident that a majority of d-pronouns do refer to proper names, a significant proportion of them also refer to other referential forms, including d-pronouns and personal pronouns. These findings diverge from prior assumptions about d-pronoun chains, as proposed by Abraham (2002: 461) and Wiltschko (1998: 163), who asserted that d-pronouns do not refer back to other d-pronouns or personal pronouns. My corpus data reveals that other functions, such as foregrounding, have a stronger influence on referential behavior than simply meeting the formal requirements

for referential chains, such as referring back to a less prominent referential form with a d-pronoun.

Grammatical role of previous mention Regarding the prominence-lending cue grammatical role, it is hypothesized that d-pronouns preferentially refer to a previous mention with a less prominent grammatical role (e.g., direct object in transitive sentences) (Bosch et al. 2003, 2007). Conversely, personal pronouns are predicted to preferentially refer to a prominent grammatical role (e.g., subject) (Bosch et al. 2003, 2007).

Looking at the grammatical roles of the previous mention, we see strong preferences for subject previous mentions for both critical personal pronouns and d-pronouns (cf. left side of Figure 6.7). We see that the majority of personal pronouns refer to a subject previous mention (68.20 %). Further, the corpus shows that personal pronouns repeatedly refer to a previous mention that has no grammatical role (13.36 %). Only in a few cases a personal pronoun refers to a previous mention with a different grammatical role: in less than 10 % of cases a personal pronoun refers to a previous mention with the grammatical role direct object (7.83 %), indirect object (6.45 %), and oblique (4.15 %). Regarding d-pronouns, we see as well that the majority (58.44 %) refer to a previous mention in subject position. D-pronouns refer to direct objects second most often, with 14.29 % of the cases. In addition, d-pronouns refer to a previous mention with the oblique role in 11.25 % and to a previous mention with no grammatical role in 10.39 % of cases, this is followed by d-pronoun referring to indirect objects (5.19 %).

Concerning the comparison of the grammatical roles of the previous mention subject (baseline) and direct object the multinomial logistic regression model revealed no significant difference between personal pronoun and d-pronoun ($z = -1.737$, $p = 0.082$). Also, the comparison of subject and indirect object ($z = 0.142$, $p = 0.887$) and the comparison of subject and no grammatical role ($z = 0.275$, $p = 0.783$) yielded no significant difference between personal pronoun and d-pronoun. However, the comparison of the grammatical role subject and oblique revealed a significant difference between personal pronoun and d-pronoun ($z = -2.333$, $p < 0.05$). Nevertheless, it can be concluded that personal pronouns and d-pronouns mostly do not differ in their preferences for the grammatical role of their previous mention.

The analysis of both the descriptive and the inferential statistical data on the grammatical role of the previous mention shows that the predictions for personal pronouns are confirmed. However, the hypothesis that a direct object is preferred as a previous mention for d-pronouns cannot be confirmed. This result

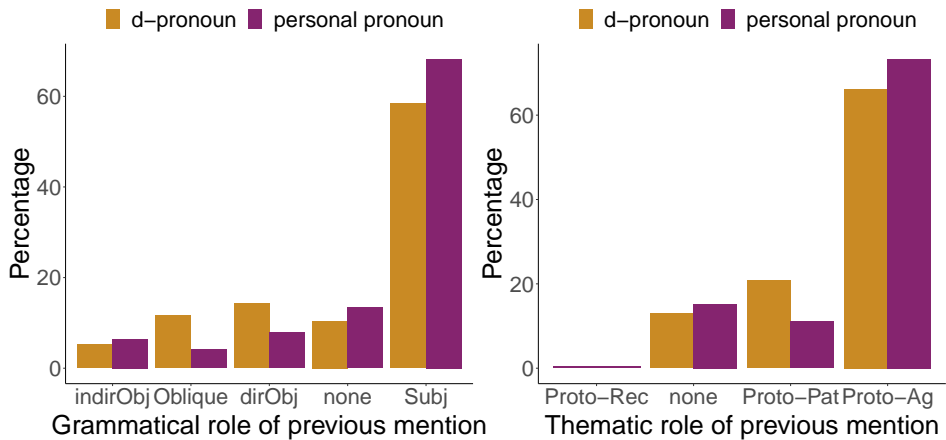


Figure 6.7: Distribution of grammatical role (depicted on left side) and thematic role (depicted on right side) of the critical pronouns' previous mention. First-mentioned pronouns are excluded (personal pronoun N=217, d-pronoun N=77).

is somewhat surprising, as previous research suggests that d-pronouns tend to favor the less prominent grammatical role, while personal pronouns tend to favor the subject (Bosch et al. 2003, 2007, Bader & Portele 2019, Bader et al. 2022). Cross-linguistic studies have also supported this claim (Kaiser & Trueswell 2004b, 2008). Nevertheless, the results from the Tschick Corpus exhibit a similar pattern. In line with this analysis, the text form and perspectival features are argued to contribute to this referential pattern. Studies by Patil et al. (2023), Hinterwimmer (2019, 2020), Hinterwimmer & Bosch (2016, 2017) indicate that d-pronouns can indeed refer to the most prominent referent in terms of local prominence-lending cues when sanctioned by the global prominence-lending cue of perspective. In Section 6.6, I will conduct an analysis on the perspective-holder. However, referencing a direct object is still the second most common, albeit by a large margin. In general, there is a much more diverse picture for the reference to the grammatical role of the previous mention than observed for *Tschick*. This is likely attributed to the more complex protagonist structure, including more protagonists than in the *Tschick* Corpus.

Thematic role of previous mention Turning to the examination of the thematic roles associated with the previous mentions of the critical pronouns, I hypothesize that d-pronouns exhibit a preference for referring to less prominent referents (i.e., not the proto-agent; Schumacher et al. 2015, 2016). On the other

hand, personal pronouns are expected to primarily reference proto-agent previous mentions, in accordance with predictions outlined in earlier research (Schumacher et al. 2015, 2016).

In the descriptive analysis of the thematic roles, as depicted on the right side of Figure 5.8, both personal and d-pronouns exhibit a clear preference for proto-agent previous mentions. Personal pronouns primarily reference proto-agents (73.27%). The second most common scenario involves personal pronouns referring to previous mentions with no assigned grammatical role (15.21%), followed by antecedents with the proto-patient role (11.06%). In one case (0.46%), a personal pronoun refers to a previous mention with the proto-recipient role. Similarly, the majority of d-pronouns (66.23%) also refer to proto-agent previous mentions. However, they display a second preference for proto-patients, accounting for 20.78%. In 12.99% of cases, d-pronouns refer to antecedents with no explicitly defined thematic role.

In the inferential statistical comparison of the thematic roles between the proto-agent (baseline) and proto-patient, the multinomial logistic regression model revealed a significant difference between personal pronouns and d-pronouns ($z = -1.980$, $p = 0.048$). However, for all other comparisons, such as proto-agent and proto-recipient ($z = 0.190$, $p = 0.849$) and proto-agent and no thematic role ($z = 0.191$, $p = 0.848$), there was no significant difference found between personal pronouns and d-pronouns. This suggests that, in the corpus, personal pronouns and d-pronouns generally exhibit no significant variation in terms of the thematic role of their previous mention.

The analyses conducted confirm the predictions for personal pronouns. However, the hypothesis proposing a preference for a proto-patient previous mention for d-pronouns lacked support, which is rather surprising with respect to the hypotheses. Despite extensive research suggesting that German d-pronouns typically lean towards a previous mention with a less prominent thematic role (Schumacher et al. 2015, 2016, Patterson & Schumacher 2021), the current results diverge from these expectations. However, the findings show a similar tendency as observed in the Tschick Corpus. Also like the findings of the grammatical role of the previous mention, features related to perspective might contribute to this discovery (Hinterwimmer 2019, 2020, Hinterwimmer & Bosch 2016, 2017). In Section 5.6, I will delve into the perspective explanation by conducting an analysis of the perspective-holders. Nevertheless, referring to a proto-patient remains the second most frequent, though by a considerable margin. Similar to the grammatical role, there is, in general, a much more varied pattern for the reference to the grammatical role of the previous mention compared to what was observed

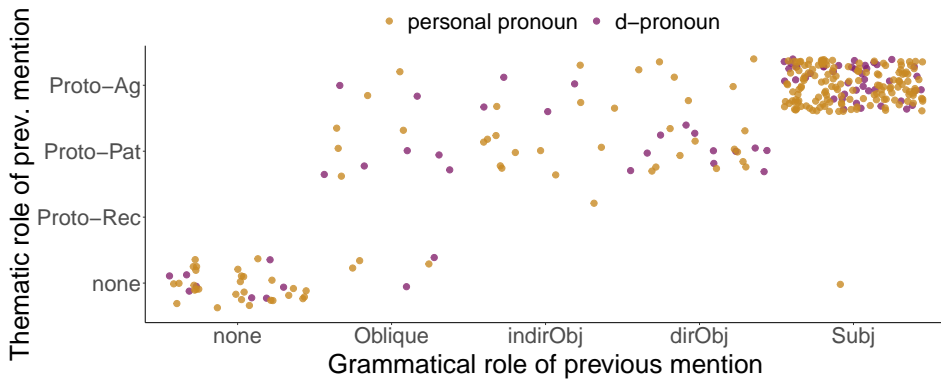


Figure 6.8: Visualization of the distribution of the features grammatical role and thematic role for the previous mentions of personal and d-pronouns. First-mentioned pronouns are excluded (personal pronoun $N=217$, d-pronoun $N=77$).

in Tschick. This is likely due to the more intricate protagonist structure, which involves more protagonists than in the Tschick Corpus.

For a comprehensive overview and summary of the features grammatical role and thematic role, Figure 6.8 combines the analysis of grammatical and thematic role of the critical pronouns' previous mention (excluding first-mentioned): 58.44 % of critical d-pronouns refer to subject and agent previous mentions, and 67.74 % of critical personal pronouns refer to subject and agent previous mentions. However, 14.29 % of d-pronouns refer to a direct object and proto-patient previous mention, whereas only 5.07 % of personal pronouns refer to a previous mention with these features.

Interim discussion In this subsection, I presented analyses of various previous mention features to address the research question: *How do the referential preferences of the pronouns differ with respect to the properties of the previous mention?* The hypotheses were as follows: (a) D-pronouns are hypothesized to prefer DP-previous mentions and never refer back to another d-pronoun or personal pronoun, while personal pronouns are expected to have a more flexible preference for the referential form of the previous mention (Abraham 2002, Wiltschko 1998). (b) D-pronouns are expected to refer to discourse referents that carry a less prominent grammatical role (e.g., not the subject), while personal pronouns refer to discourse referents that carry a prominent grammatical role (e.g., subject) (Bosch et al. 2003, 2007). (c) D-pronouns are expected to refer to discourse referents that carry a less prominent thematic role (e.g., not the proto-agent), while

personal pronouns refer to discourse referents that carry a prominent thematic role (e.g., proto-agent) (Schumacher et al. 2015, 2016).

This subsection presented analyses of different previous mention features, including referential form, grammatical role, and thematic role. The examination of all three previous mention features yielded surprising results. The analysis of the referential form of the previous mention revealed that most d-pronouns refer to proper names, aligning yet with previous research findings (Abraham 2002, Wiltschko 1998). However, the corpus data also demonstrate that d-pronouns frequently refer to other d-pronouns and personal pronouns. Therefore, this discovery contradicts previous assumptions about d-pronouns, which explicitly argue that d-pronouns never refer to other d-pronouns or personal pronouns (Abraham 2002, Wiltschko 1998). The results of the analysis of the grammatical and thematic role of the previous mention as well diverge from previous studies (Bosch et al. 2003, 2007, Schumacher et al. 2016). However, there is also a substantial number of references to direct objects and proto-patient previous mentions, aligning with predictions from previous literature (Bosch et al. 2003, 2007, Schumacher et al. 2016). Nevertheless, the noticeable preference for subjects/proto-agents observed with d-pronouns is surprising but can be explained by the conversational narrative style of the novel. The analysis in Section 6.4.4 has revealed that most d-pronouns are used in the information foreground and evaluation function. Interestingly, since this corpus contains 20 % references to the proto-patient, I examined whether these instances serve a disambiguation function. It turns out that 6 out of 16 d-pronouns referring to a proto-patient from a previous mention indeed fulfill the disambiguation function. However, since only a fraction of the d-pronouns that refer to a proto-patient carry the disambiguation function, an obligatory conjunction of the properties cannot be assumed.

Since the use of the d-pronoun is often linked to the evaluation of the perspective-holder/narrator, this aligns with previous assumptions suggesting that a d-pronoun can only be used to refer to a referent that is not the perspectival center of the text. Thus, d-pronouns can refer to a locally prominent previous mention (i.e., subject/agent) when the referent indicated by the d-pronoun is not the perspectival center (Hinterwimmer 2019). Overall, the hypotheses regarding the referential behavior of d-pronouns have not been confirmed. The referential behavior of personal pronouns, however, appears as predicted. In Section 6.6, I will further describe the perspectival properties of the corpus concerning the use of the critical pronouns.

6.5.2 RQ (ii): Referential distance

In this subsection, the referential distance between the critical pronouns and their previous mention is analyzed. Therefore, it addresses research question (ii):

How do the referential chains of the pronouns differ with respect to referential distance?

Here, I examine segment distances between pronouns and their previous mention. Similar to Chapter 5, I will use the annotations of intra-sentential segmentation. The study considers two hypotheses: one based on the accessibility hierarchy, predicting longer distances for d-pronouns, and another following the prominence account, suggesting shorter distances. The idea behind the latter is that d-pronouns may prefer locally less prominent referents. This context implies that d-pronouns should have previous mentions nearby since they point to their antecedents. However, for this research question, only descriptive analyses are conducted because it is exploratory in nature with two opposing hypotheses. I exclude the pronouns occurring as first-mentioned because they have no previous mention annotated.

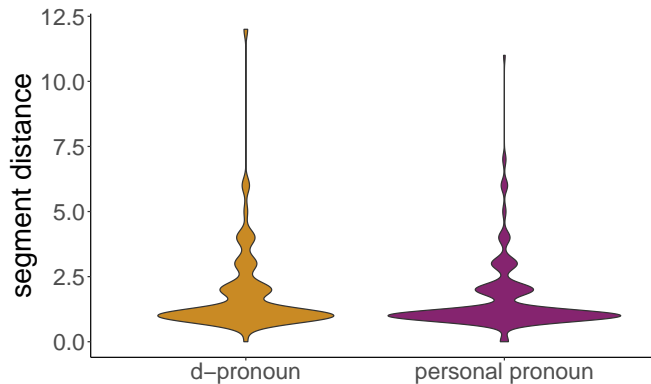


Figure 6.9: Distribution of the segment distance for personal d-pronouns. First-mentioned pronouns are excluded (personal pronoun N=217, d-pronoun N=77).

Pronoun	Mean	SD	range
Personal pronoun	1.62	1.34	0 – 11
d-pronoun	1.84	1.68	0 – 12

Table 6.6: Mean, standard deviation and range of the segment distance for personal and d-pronouns. First-mentioned pronouns are excluded.

The segment distance to the previous mention for personal and d-pronouns is illustrated in Figure 6.9 and Table 6.6. The figure provides a visual representation of the distribution, while the table shows the mean, standard deviation, and range of segment distances. The analysis of the segment distance between personal and d-pronouns and their previous mentions shows that the two pronoun types exhibit similar behavior. Figure 6.9 illustrates that both pronoun types share a comparable distribution, with the majority falling within distances of one to two segments. Table 6.6 further confirms that, on average, both pronoun types maintain a similar segment distance, typically between one and two segments. However, d-pronouns tend to exhibit a slightly longer distance of two segments on average, with a mean of 1.84 segments (SD = 1.68). Personal pronouns, on the other hand, have a mean of 1.62 (SD = 1.34). It is worth noting that the reliability of this difference may be questioned due to the significant difference in the number of personal and d-pronouns. Nonetheless, this comparison suggests a tendency that d-pronouns might have slightly longer segment distances to their previous mentions compared to personal pronouns.

A detailed description of the segment distances for the two pronoun types can be found in Table 6.7 and Table 6.8. Table 6.7 shows that 79.22 % of the critical d-pronouns refer to a previous mention either two or one sentence segments away, with 61.04 % referring to a previous mention just one sentence segment away. The minimum segment distance is zero, signifying that the previous mention of the d-pronoun occurs in the same sentence segment as the d-pronoun. On the other hand, the maximum segment distance is 12 sentence segments, with both the minimum and maximum segment distance occurring only once (1.30 %). Distances of 3 – 6 segments also appear with some frequency. In two cases (2.60 %), there is a substantial distance of six sentence segments between the d-pronoun and the previous mention (cf. (56) and (57)). For example, in (56), Brenner's activation persists through the six sentence segments due to the narrator's account of Brenner's situation. This is because the narrator uses Brenner's situation as an example of an abstract scenario, keeping the referent Brenner activated. Consequently, even after six segments, Brenner can be readily referred to with a d-pronoun. In (57), the referent indicated by the d-pronoun is not consistently kept active throughout the six sentence segments. Furthermore, (57) showcases an unusual method of introducing a new referent: the initial reference occurs in direct speech in the form of a second-person singular personal pronoun *du* ('you'). In the subsequent segments, the speaker of the direct speech is characterized, and no further reference is made to the referent initially referred to as *du*. Only after six segments this referent is revisited using a d-pronoun. Notably, the pronoun is initially ambiguous, but it is promptly clarified by an explanatory

6.5 Addressing the research questions

Segment distance	Freq.	%	% Cum.
1	47	61.04	61.04
2	14	18.18	79.22
3	6	7.79	87.01
4	5	6.49	93.51
6	2	2.60	96.10
0	1	1.30	97.40
12	1	1.30	98.70
5	1	1.30	100.00
Total	77	100.00	100.00

Table 6.7: Segment distance of d-pronouns to the previous mention. First-mentioned pronouns are excluded.

Segment distance	Freq.	%	% Cum.
1	144	66.36	66.36
2	36	16.59	82.95
3	16	7.37	90.32
4	7	3.23	93.55
0	5	2.30	95.85
6	4	1.84	97.70
5	2	0.92	98.62
7	2	0.92	99.54
11	1	0.46	100.00
Total	217	100.00	100.00

Table 6.8: Segment distance of personal pronouns to the previous mention. First-mentioned pronouns are excluded.

subordinate clause *'den er gemeint hat'*. However, the discourse structure permits the use of the d-pronoun because the characterization of the speaker of the direct speech represents a comment, indicating a subordinated structure. This is why the referent, *du*, is still easily accessible after the end of the comment.

- (56) [Dann hat es sich der Brenner überlegt] [und hat **seinen** Job hingeschmissen.] [Wenn du heute 44 bist] [und seit 19 Jahren bei der Polizei,] [dann überlegst du dir so was,] [und da muss ich ehrlich sagen,] [Hut ab,] [weil **der** hat in dem Moment überhaupt keine Aussicht auf was anderes

gehabt.] (AdT 2, 51)

[Then Brenner changed his mind] [and quit his job] [When you are 44 today] [and have been with the police for 19 years.] [then you think about something like that,] [and I have to say honestly,] [hats off to him,] [because at that moment he-DPRO had no prospect of anything else at all].

- (57) [«Du Haggl?»] [ruft ein kleiner, ausgemergelter Mann,] [den der Brenner nicht gekannt hat.] [Er hat schmutzige Gummistiefel angehabt] [und einen alten Filzhut am Kopf.] [Das ist der Gschwentner-Bauer gewesen.] [Und **der**, den er gemeint hat, das war der Fux Andi,] [der ist erst achtzehn oder neunzehn gewesen,] [aber hat schon eine volle Glatze gehabt.] (AdT 4, 88–91)

[“You Haggl?”] [shouts a small, emaciated man,] [whom Brenner did not know.] [He was wearing dirty rubber boots] [and an old felt hat on his head.] [That was the Gschwentner farmer.] [And the one-DPRO he meant, that was the Fux Andi,] [who was only eighteen or nineteen,] [but already had a full head of hair.]

Examining the text paragraph with a maximum segment distance of 12 segments (cf. (58)), it becomes evident that the narrative shifts away from the initially introduced referent, Brenner, and instead focuses on the two fatalities and Vergolder. The referent Brenner – if at all – is only minimally activated over these twelve segments (because he is represented on the protagonist layer, cf. [Schumacher et al. 2024](#)). Starting from the third sentence segment, the narration centers around the insurance issue, and it is explained that the victims are the in-laws of the protagonist, Vergolder Antretter. The d-pronoun that follows in the last segment initially appears ambiguous, as it could also refer to the currently most prominent referent, Vergolder. Therefore, it is disambiguated by a subsequent afterthought ‘*also der Brenner*’, which is necessary because the referent is no longer activated. This ambiguity, resolved with an afterthought, resembles what was observed in (57).

- (58) [Und Anfang März taucht **der Brenner** auf einmal wieder auf.] [Aber nicht als Polizist, sondern als Privatdetektiv.] [Es war nämlich eine Versicherungsgeschichte.] [Die Toten sind ja die amerikanischen Schwiegereltern vom Vergolder Antretter gewesen.] [Dazu muß du wissen,] [daß sie steinreich gewesen sind.] [Beide über achtzig und steinreich.] [Ist ja schon der Vergolder selber steinreich,] [bestimmt der reichste Mann in Zell,] [weit vor dem Eder, weit vor dem Bürgermeister und meilenweit vor dem Fürstauer.] [Aber gegen seine Schwiegereltern ist der immer noch ein armer Schlucker gewesen.]

[Natürlich haben sich die Zeller darüber gewundert,] [daß **der** zuerst als Polizist verschwindet, also der Brenner, und dann taucht er drei Wochen später als Privatdetektiv wieder auf.] (AdT, 2, 30)

[And at the beginning of March, the Brenner suddenly reappears.]

[But not as a policeman, but as a private detective] [It was an insurance story.]

[The dead were the American in-laws of the gilder Antretter.] [You have to know] [that they were filthy rich.] [Both over eighty and filthy rich.] [Vergolder himself is already filthy rich] [certainly the richest man in Zell,] [far ahead of the Eder, far ahead of the mayor and miles ahead of the Fürstauer.] [But he-DPRO was still a pauper compared to his parents-in-law.]

[Of course, the Zell people were surprised] [that he-DPRO first disappears as a policeman, that is, Brenner, and then he reappears three weeks later as a private detective].

A similar pattern as for d-pronouns emerges for the personal pronoun (cf. Table 6.8). Specifically, 82.95 % of the critical personal pronouns refer to a previous mention that is either two or one sentence segments away, with 66.36 % referring to a previous mention just one sentence segment away. In five instances (2.30 %), a personal pronoun refers to a previous mention within the same sentence segment, resulting in a minimal distance of 0 sentence segments. The maximum segment distance observed once, is 11 sentence segments. Additionally, quite large distances of 4 – 7 segments also occur regularly. When examining text examples where personal pronouns have a long referential distance from their previous mention, it becomes evident that the respective referents remain activated over the course of the long referential chain. This occurs because the segments involve a dialogue between Brenner and another character (cf. (59)). Similar cases have been observed in the Tschick Corpus, see Subsection 5.5.2.

(59) [«Mandl»,] [brummt der Brenner.] [Er hat gleich gemerkt,] [wie der Grant über den gelackten Lokalreporter mit dem aristokratischen Getue in ihm hochsteigt.]

[«Kaiser haben wir aber keinen mehr,] [Mandl.»]

[«Liftkaiser, Dorfkaiser, Immobilienkaiser!»] [kontert der Mandl so schnell,] [daß dabei sein Kopf einen leichten Zucker macht.] [Dadurch hat sich eine Haarsträhne gelöst,] [weil mit Gel niedergeklebt,] [und jetzt ist sie aufgestanden] [und hat ganz unnatürlich gezittert.]

[Früher, [wie er noch bei der Kripo war,] hat der Brenner ihn manchmal geärgert] [und statt Mandl «Madl» zu ihm gesagt.] (AdT 2, 135–140)

[“Mandl”,] [grumbles Brenner.] [He immediately noticed] [how the grant rose up

in him about the lacquered local reporter with the aristocratic posturing].
[«But we don't have an emperor anymore,] [Mandl.»]
[«Liftkaiser, Dorfkaiser, Immobilienkaiser!»] [Mandl counters so quickly] [that his head makes a slight twitch] [This has caused a strand of hair to come loose] [because it is stuck down with gel] [and now it has stood up] [and has trembled quite unnaturally]
[In the past, [when he was still at the police station,] Brenner sometimes teased him] [and called him “Madl” instead of Mandl].

Interim discussion This subsection has explored referential distance, specifically focusing on the segment distance between the critical pronouns and their previous mentions. The corpus analysis reveals that both d-pronouns and personal pronouns display similar segment distances to their previous mentions. Approximately 60 % of the time, both pronoun types refer to a previous mention that is just one sentence segment away, and in over 85 % of cases (86.08 % for d-pronouns, 87.89 % for personal pronouns), both pronoun types refer to a previous mention that is located within three or fewer sentence segments.

This finding is consistent with the results in the Tschick Corpus and also supported by Arnold (1998). However, unlike *Tschick*, where this was observed primarily for personal pronouns, the AdT Corpus data demonstrate that very long segment distances are possible for both pronoun types. By a closer examination of (56), it is evident that even in cases of relatively long referential distances, it does not necessarily mean that the respective discourse referent is not activated throughout the referential chain. Nonetheless, there are instances where the referent loses its activation during a lengthy distance (cf. (58), (59)), and in such cases, reference by a pronoun is facilitated by a clarifying and disambiguating subordinate clause.

From the calculated mean segment distances for both pronoun types, a slight tendency of d-pronouns for longer distances becomes apparent. The mean segment distance for d-pronouns is 1.83 segments (SD = 1.68), whereas for personal pronouns, it is 1.62 (SD = 1.34) segments. However, given the low count of d-pronouns and the minimal observed differences, this effect cannot be considered reliable. In summary, both pronoun types, on average, refer to a previous mention that is nearly two segments away. Additionally, when examining the detailed description of the segment distances for the two pronoun types, no substantial differences were found. In fact, I have demonstrated that both pronoun types can be used with long segment distances. Consequently, this analysis refutes both predictions that the d-pronoun should exhibit either shorter or longer referential distances.

6.5.3 RQ (iii): Intervening characters

In this subsection, I analyze the intervening characters between the critical pronouns and their previous mentions. This examination is related to research question (ii):

How do intervening referring expressions influence the choice of the pronoun type?

The analysis of intervening characters mainly measures memory load, a significant influence on accessibility. As per Ariel (1990), intervening referents affect referential form choice. I predict d-pronouns will have more intervening characters than personal pronouns, given their lower accessibility on the Accessibility Hierarchy, resulting in this difference in intervening characters. I exclude the pronouns occurring as first-mentioned from the analysis as they have no previous mention.

The intervening characters between the previous mention and the critical pronoun are displayed in Figure 6.10 and Table 6.9, which is providing details such as

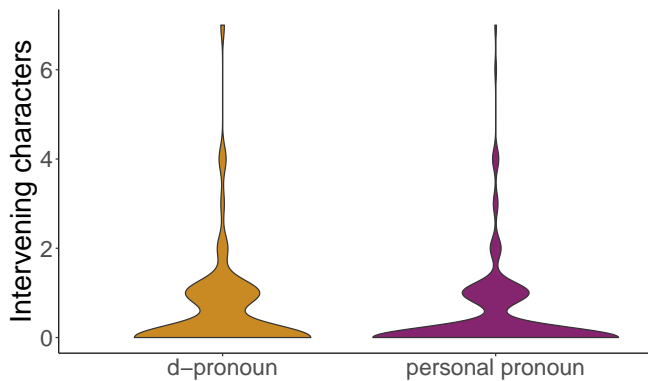


Figure 6.10: Distribution of the intervening characters for personal and d-pronouns. First-mentioned pronouns are excluded (personal pronoun $N=217$, d-pronoun $N=77$).

Pronoun	Mean	SD	range
Personal pronoun	0.44	0.98	0 - 7
D-pronoun	0.58	1.13	0 - 7

Table 6.9: Mean, standard deviation (SD) and range of intervening characters for personal and d-pronouns. First-mentioned pronouns are excluded.

the mean, standard deviation, and range of intervening characters. From Figure 6.10 it becomes evident that personal and d-pronouns show very similar behavior in terms of the number of intervening characters between them and their previous mention. Both types of pronouns occur predominantly in cases where zero or one character intervenes. Means of the two pronoun types confirm this observation (cf. Table 6.9). D-pronouns show a mean of 0.58 (SD = 1.13), whereas personal pronouns show a mean of 0.44 (SD = 0.98), suggesting that both pronoun types, on average, have zero or one intervening characters between them and their previous mention.

A more detailed picture of the distribution of the intervening characters is given in Table 6.10 and Table 6.11. Table 6.10 illustrates that 90.91% of the critical d-pronouns show either zero or one intervening character(s) between the

Intervening characters	Freq.	%	% Cum.
0	49	63.64	63.64
1	21	27.27	90.91
2	3	3.90	94.81
4	2	2.60	97.40
3	1	1.30	98.70
7	1	1.30	100.00
Total	77	100.00	100.00

Table 6.10: Intervening characters between d-pronouns and their previous mention. First-mentioned pronouns are excluded.

Intervening characters	Freq.	%	% Cum.
0	158	72.81	72.81
1	43	19.82	92.63
2	7	3.23	95.85
4	4	1.84	97.70
3	3	1.38	99.08
6	1	0.46	99.54
7	1	0.46	100.00
Total	217	100.00	100.00

Table 6.11: Intervening characters between personal pronouns and their previous mention. First-mentioned pronouns are excluded.

d-pronoun and its previous mention. The personal pronoun behaves very similar in this respect. Table 6.11 shows that 92.63 % of the critical personal pronouns have either zero or one intervening character(s) between them and their previous mention. More than half of the critical pronouns have no intervening character, with 72.81 % for personal pronouns and 63.64 % for d-pronouns.

Interim discussion This section explored intervening characters between critical pronouns and their previous mention. The initial prediction suggested that d-pronouns would have more intervening characters than personal pronouns. However, the analysis results indicate that both d-pronouns and personal pronouns exhibit similar patterns concerning intervening characters. This observation aligns with the findings related to referential distances measured in sentence segments (cf. Subsection 6.5.2). Given that previous mentions of d-pronouns are typically in near or adjacent segments, there is limited opportunity for additional referents to be introduced between them. Although there is a slight tendency for d-pronouns to show more intervening characters than personal pronouns, this difference is not statistically significant. Consequently, the hypothesis regarding intervening characters is not substantiated. Furthermore, when considering the longer segment distances of d-pronouns and personal pronouns, it becomes evident that establishing a successful coreference relation over very long distances often necessitates additional discourse-organizational structures. These structures may include disambiguating subclauses or techniques to keep the referent activated, as exemplified in (56). When combining the data on intervening characters and segment distances, it is noted that 54.54 % of the critical d-pronouns and 59.90 % of the critical personal pronouns refer to a previous mention in the immediately preceding segment (segment distance = 1) without any intervening characters. These findings suggest that the number of intervening referring expressions does not influence the choice between personal pronouns and d-pronouns.

6.5.4 RQ (iv): Referential persistence

In this subsection, I investigate the influence of referential persistence on the use of the critical personal and d-pronouns. Hence, research question (iv) will be addressed:

How is the choice of pronoun type influenced by referential persistence?

In addition to the pronoun-antecedent relation, the overall prominence of a narrative must also be taken into account. This includes considering how protagonists influence referential choices. This analysis delves into referential persistence; however, I diverge from Givón's (1983) approach, which defines persistence as the duration a referent remains in discourse, primarily focusing on forward-directed discourse. Instead, I adopt a broader scope by considering the entire text base. Therefore, my analysis of referential persistence is identifying central characters within the story. This analysis aims to determine if d-pronouns exclusively refer to less persistent referents, with prior research indicating that more persistent referents are generally more accessible (e.g., Givón 1983, Arnold 2010). Similar to Chapter 5, Subsection 5.5.4, I perform an exploratory analysis and examine whether d-pronouns are primarily associated with overall less persistent referents.

Like in Subsection 5.5.4, I assume that referential chains in the novel persist between chapters. I created the chains for the recurring characters in the same way I did for the Tschick Corpus. Specifically, I constructed referential chains comprising at least 15 referring expressions to represent the chains of the recurring characters. This process resulted in a total of 17 recurring characters identified throughout the corpus. Additionally, there are those marked as 'other' (N=635, accounting for 37 % of the annotated referring expressions), referring expressions that refer to the narrator (N=45, making up 2.76 % of the annotated referring expressions), and referring expressions in which the narrator directly addresses the reader (N=39, representing 2.29 % of the annotated referring expressions). Excluding expressions referring to the narrator and the reader, as well as those marked as 'other', a descriptive analysis revealed that the largest proportion of referring expressions (41.47 %) are references to the detective Simon Brenner, who serves as the main protagonist in the novel. This means that nearly half of the recurring referring expressions exclusively refer to the main protagonist. In contrast, references to non-main characters account for less than 9 % of cases.

Regarding the critical d-pronouns (highlighted in orange), they are found in 13 referential chains of recurring characters and in chains marked as 'other' (cf. Figure 6.11). Figure 6.11 shows the usage of referring expressions within the 17 most frequent referential chains. Concerning the initial exploratory hypothesis, the distribution of d-pronouns indicates that they are frequently used to refer to highly persistent referents. Figure 6.11 also illustrates that d-pronouns are commonly employed to refer to almost all characters. Furthermore, it is evident that d-pronouns do refer to less persistent referents, although this is not their exclusive usage.

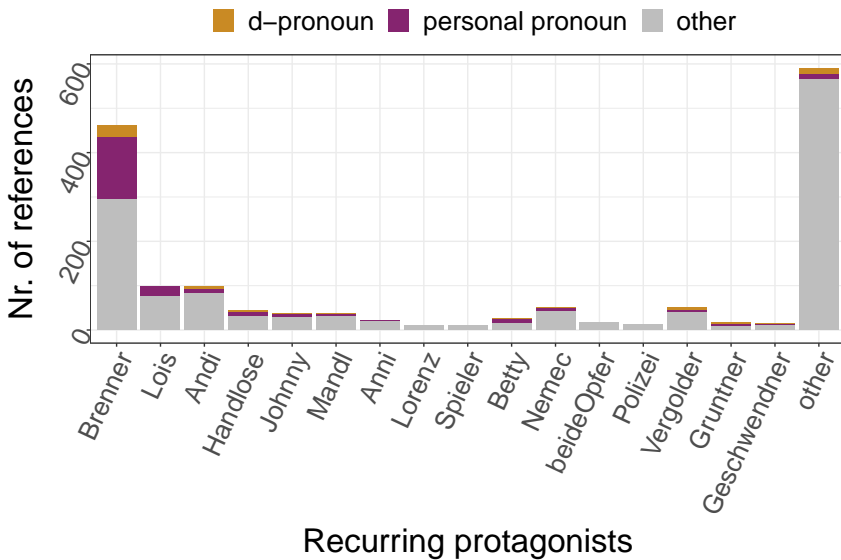


Figure 6.11: Number of references to the recurring characters per chapter. Use of critical personal pronouns (N=223) is indicated in orange, d-pronouns (N=28) in purple.

Interim discussion In this subsection, the influence of persistence on the use of d-pronouns has been explored. The prediction was that d-pronouns would mainly refer to less persistent referents, given the common association between persistence and the accessibility of a referent (e.g., [Givón 1983](#), [Arnold 2010](#)). However, in fact, the majority of d-pronouns are used to refer to the main protagonist, Simon Brenner, who also possesses the highest level of persistence. Consequently, the hypothesis that d-pronouns primarily refer to less persistent referents could not be supported. D-pronouns indeed also refer to nine different recurring characters with low persistence (less than 9%). This was expected, but from [Figure 6.11](#) it becomes clear that this is not the majority of d-pronoun uses. In the AdT Corpus it becomes even clearer than in *Tschick* that d-pronouns can also refer to the referent with the highest persistence. These results indicate that the level of persistence does not have a substantial impact on the utilization of d-pronouns. As a result, the hypothesis proposing that d-pronouns would predominantly refer to less persistent referents could not be confirmed.

6.6 Additional investigation: Perspective

When examining d-pronouns in discourse beyond local prominence markers, the consideration of global prominence features, particularly perspective, plays a pivotal role. According to researchers like Hinterwimmer and colleagues (Hinterwimmer 2019, 2020, Hinterwimmer & Bosch 2016, 2017, Patil et al. 2023), the use of d-pronouns is significantly influenced by perspective. Their findings suggest that speakers or narrators with a prominent perspective are treated as maximally prominent discourse referents. In the context of the current corpus analysis, the use of d-pronouns is significantly influenced by the assumptions and evaluations of the narrator. The AdT Corpus is distinctive due to its unique narrator, who is omnipresent, consistently evaluating and commenting on events or characters, and generally always expressing their opinion. This narrator holds a dominant role, often acting as the perspectival center of the novel, particularly as he frequently evaluates characters or events. Following Hinterwimmer (2019, 2020), it is appropriate to use a d-pronoun to refer to a referent that is not the perspectival center. Although the novel includes FID cases where a protagonist serves as the perspectival center, these instances will not be discussed in this corpus analysis, which focuses on the use of d-pronouns.

Connecting these findings to the functions of d-pronouns outlined in Subsection 6.4.4, multiple instances of d-pronoun usage convey a neutral information foreground function. Patil et al. (2023), however, suggest that only narrators with a prominent perspective are considered discourse referents, resembling speakers in spoken conversations. In the absence of such a discourse referent, the next highest-ranked element on the scale, namely the respective aboutness topic, assumes the top position in the prominence hierarchy. Yet, in the current corpus, even in neutral cases (e.g., marked with the information foreground function), a d-pronoun can refer to a highly prominent previous mention. The question arises as to why this is the case. This observation can be explained by the fact that this corpus study examines longer narrative discourses. Patil et al. (2023) base their assumptions on shorter self-written narratives, and in those cases, their claims are valid. However, in AdT, where there is a prominent and evaluative narrator, who is accessible as a discourse referent even in statements where they express a neutral viewpoint. This is because the narrator, as a discourse referent, is prominent throughout most parts of the story (not in FID). Therefore, the narrator uses d-pronouns for different functions and not exceptionally for the evaluative function. Another factor supporting the finding that the narrator is present as a discourse referent even in neutral statements is the fact that the narrator is, in literal terms, a discourse referent. They often use first-person pronouns to refer

directly to themselves. In (60), an illustration of a d-pronoun in information foreground function is presented. It is apparent that the sentences containing the d-pronoun do not express an evaluation. Nevertheless, the d-pronoun is still referring to a highly prominent referent. This is made possible by the unique status of the narrator in the novel.

- (60) Jetzt hat es sich zufällig ergeben, daß **der Polizist Simon Brenner**, Kriminalinspektor oder welchen Rang **der** gehabt hat, bei der Polizei gekündigt hat. Jetzt muß man wissen, daß **der** 19 Jahre bei der Kripo gewesen ist [...].
Now it happened that the policeman Simon Brenner, criminal inspector or whatever rank he-DPRO had, resigned from the police. Now you have to know that he-DPRO has been with the CID for 19 years [...].

In the Tschick Corpus, I explained the observed referential behavior based on the perspectival characteristics arising due to the dialogue structure. However, in AdT, dialogue is not a prominent feature. There are only a few instances of direct speech. A corpus analysis conducted by Nindl (2009a,b) on six volumes of the Simon Brenner series, which includes a quantitative analysis of narrator vs. protagonist speech, reveals a significant dominance of narrator speech over protagonist speech. Nindl (2009a,b) finds approximately five times as much narrator speech as protagonist speech. While Nindl's analysis covers a more extensive corpus than the one in this paper, it provides an indication of the likely relationship between narrator and protagonist speech in AdT. With respect to the current corpus analysis, almost all pronouns are uttered by the narrator. Only in four cases are personal pronouns used in direct speech by a protagonist, constituting a mere 1.32 % of cases in direct speech. Consequently, it can be concluded that perspective shifts occurring through direct speech have no significant influence on pronoun usage in the AdT Corpus.

6.7 Discussion

In this chapter, I presented a corpus-based analysis of the referential behavior of German d-pronouns and personal pronouns in the AdT Corpus. The AdT Corpus contains a total of 1705 referential expressions that refer to an animate referent. The focus of this dissertation is on feminine and masculine third-person singular d-pronouns compared to personal pronouns. This corpus analysis specifically examines personal pronouns and d-pronouns in subject and proto-agent positions, resulting in 78 critical d-pronouns and 223 critical personal pronouns.

The study addressed four main research questions concerning the features of previous mentions, referential distance, the impact of intervening characters, and referential persistence. For the first question about the characteristics of previous mentions for personal and d-pronouns, hypotheses were formulated, but only those for personal pronouns were confirmed. D-pronouns exhibited unexpected behavior, resembling personal pronouns in referring to highly prominent referents. The second, third and fourth question explored differences in referential chains (referential distance and persistence) and the influence of intervening expressions on pronoun choice. Surprisingly, d-pronouns behaved similarly to personal pronouns in terms of referential distance and intervening characters, contrary to prior studies suggesting distinct patterns.

Therefore, similar to the Tschick Corpus, the analysis of the AdT Corpus also reveals that d-pronouns and personal pronouns behave similarly in many ways and exhibit comparable referential patterns. The results of the AdT Corpus strongly deviate from previous assumptions, especially regarding the referential behavior of d-pronouns. In the upcoming subsections, I will delve into the distinct findings, provide explanations for them, and establish connections with the attributes of the text.

6.7.1 Information foreground function

With regard to the referential form of the previous mention, it was hypothesized that d-pronouns would avoid referring to another d-pronoun or a personal pronoun, instead exclusively referring to definite DPs and proper names (Abraham 2002: 461, Wiltschko 1998: 163). The corpus results largely align with the assumptions that d-pronouns preferentially refer to a previous mention with the referential form of a proper name (Abraham 2002). The study revealed that the largest proportions of d-pronouns (31.25 %) refer to a proper name. This supports the notion that the referent is either newly introduced or reactivated, and the d-pronoun serves to make it more prominent, consistent with the Accessibility Hierarchy (Ariel 1990) and Givenness Hierarchy (Gundel et al. 1993). However, the corpus findings also show that d-pronouns frequently refer to other d-pronouns (16.25 %) or personal pronouns (13.75 %). In this regard, the corpus results contradict Abraham's (2002) and Wiltschko's (1998) assumptions, challenging the notion that d-pronouns never refer to other d-pronouns or personal pronouns. This finding, therefore, does not confirm the initial hypothesis.

However, an examination of the functions of d-pronouns reveals that they primarily serve the information foreground function in the AdT Corpus. While previous (psycho-)linguistic studies have often neglected the role of d-pronouns in

the information foreground function, the current corpus analysis shows their frequent use in this function, which is closely linked to the (re)orientation of attention (cf. Subsection 3.2.1). Past research has primarily concentrated on the topic shift function and the associated reference to a less prominent referent as a characteristics of d-pronouns. However, the current analysis reveals that it is quite common for a d-pronoun to refer back to another d-pronoun and to a referent that is prominent. This observation aligns with findings by Ahrenholz (2007), Bethke (1990), and the corpus analysis of *Tschick*. In (61), a referential chain is illustrated that also contains d-pron–d-pron chains. All referring expressions belonging to the referential chain of Simon Brenner are marked in bold. In this passage, the narrator refers to Simon Brenner once by his full name, four times with a d-pronoun, and four times with a personal pronoun. The second referring expression in the paragraph, occurring in the apposition ‘*Kriminalinspektor oder welchen Rang der gehabt hat*’, is a d-pronoun referring to a previous mention with the referential form proper name. However, this d-pronoun fulfills the information foreground function and by that makes the referent more prominent. The referent Simon Brenner is not newly introduced by the DP ‘*der Polizist Simon Brenner*’ instead he is introduced several paragraphs before. However, the proper name reintroduces the referent and the d-pronoun assists in enhancing the prominence of the referent by orienting the attention. In line with these observations, Wiemer (1996) suggests that personal pronouns and d-pronouns can be interchangeable when there is no competing referent in the discourse. In (61), interchangeability is observed as changing between personal pronouns and d-pronouns does not lead to an unacceptable interpretation, except when transitioning from a d-pronoun to a personal pronoun, which affects expressivity, illustrating the information foreground function.

- (61) Jetzt hat es sich zufällig ergeben, daß **der Polizist Simon Brenner**, Kriminalinspektor oder welchen Rang **der** gehabt hat, bei der Polizei gekündigt hat. Jetzt muß man wissen, daß **der** 19 Jahre bei der Kripo gewesen ist, weil mit 25 hat **er** angefangen, und jetzt ist **er** 44 gewesen. Aber **er** hat es nie richtig weit gebracht bei der Kripo. Das war aber nicht der eigentliche Grund für **seine** Kündigung, weil **der** nie besonders ehrgeizig gewesen ist. Mehr so ein ruhigerer Typ, eigentlich ein netter Mensch, muß ich ehrlich sagen.

Jetzt hat **der** aber vor drei Jahren einen neuen Chef gekriegt, den Nemeč, der ja auch im Jänner hier in Zell aufgekreuzt ist. (AdT 2, 36–41)

Now it happened that the policeman Simon Brenner, criminal inspector or whatever rank he-DPRO had, resigned from the police. Now you have to know that he-DPRO

has been with the CID for 19 years, because he started at 25, and now he is 44. But he never really made it far at the CID. But that was not the real reason for his quitting, because he-DPRO was never very ambitious. He was more of a quiet guy, actually a nice person, I have to say.

But now he got a new boss three years ago, Nemec, who also showed up here in Zell in January.

The absence of ambiguous contexts further highlights the role of the information foreground function. There are the two ambiguous contexts previously discussed in (57) and (58). However, in both examples the ambiguity is immediately resolved by a disambiguating and clarifying subclause (*'also der Brenner', 'den er gemeint hat'*). Previous research has placed a primary focus on ambiguous contexts when examining the referential behavior of d-pronouns. The fact that the corpus for the most part does not contain referentially ambiguous contexts for d-pronouns shows that the d-pronoun is not primarily used to disambiguate referential conflicts. Instead, the current corpus analysis shows that the information foreground function is one of the most found functions in the AdT Corpus.

6.7.2 Backward-looking function

For the backward-looking behavior, the corpus analysis investigated the grammatical role and thematic role of the critical pronouns in the previous mention (as detailed in Subsection 6.5.1). The findings indicated that d-pronouns and personal pronouns exhibit notably similar patterns.

Concerning the grammatical role, it was hypothesized that d-pronouns preferentially refer to a previous mention with a less prominent grammatical role (Bosch et al. 2003, 2007, Patterson & Schumacher 2021). However, the observation revealed that d-pronouns, in fact, show a strong preference for subjects (57.00%). Therefore, the results do not support the hypothesis. Nevertheless, second-most often (13%), the d-pronoun refers to a direct object previous mention. In total, 40.5% of d-pronouns refer to a less prominent previous mention compared to the subject, which is considered to be the most prominent grammatical role.

Turning to the thematic role, it was hypothesized that d-pronouns favor referents with a less prominent thematic role (Schumacher et al. 2016, Patterson & Schumacher 2021). However, we observe a similar picture as for the grammatical role: Most d-pronouns refer to a proto-agent in the previous mentions (65.00%), which falsifies the hypothesis of d-pronouns. However, previous mentions with the thematic role proto-patient occur second most frequently at 20%.

The unexpected referential pattern of d-pronouns in the analyzed text can be attributed to two unique aspects that also play a role for the Tschick Corpus. Firstly, unlike previous psycholinguistic studies that used controlled items, this study examined a naturalistic text, i.e., a novel, without any linguistic manipulations. The use of self-written, isolated sentence pairs in some studies may not accurately reflect natural speech processing. Secondly, the text adopts a conversational narrative style, differing from corpus-based studies using newspaper articles with neutral language. Comparisons with previous studies should be made cautiously due to differences in media, linguistic registers, and contextual presentation. However, in the AdT Corpus there is still a substantial amount of references to a less prominent referent (for instance, 20 % of references to proto-patient). This is most likely due to the rich protagonist structure, i.e., the fact that the novel includes 17 recurring characters. The second factor explaining the referential pattern is the perspectival features of the text, allowing d-pronouns to reference locally prominent referents, which will be explored in the following subsection.

6.7.3 Perspective

As discussed above, the backward-looking behavior of d-pronouns found in the corpus, i.e., preferring a subject and proto-agent previous mention and frequently referring to a d-pronoun or personal pronoun, deviates from previous assumptions in the literature about the referential behavior of d-pronouns. The novel *Auferstehung der Toten* is unique due to its narrator. I have shown that approximately half of d-pronouns are used to express an evaluative statement about another discourse referent. Furthermore, the analysis of the perspective-holders (cf. Section 6.6) revealed that all d-pronouns are uttered by the narrator. This is, on the one hand, due to the fact that the narrator constantly shares their opinion, attitude, and thoughts about the events and the different protagonists. On the other hand, there are not many direct speech parts.

In addition, Patil et al. (2023) and Hinterwimmer (2019, 2020) proposed that the prominence scale of a d-pronoun is sensitive to perspective-taking. Therefore, a d-pronoun can only be used to refer to a referent that is not the perspectival center of the passage. Thus, a d-pronoun can be used to refer to a subject and proto-agent previous mention if a perspective-holder is available and if the referent that the d-pronoun is referring to is not the perspectival center. This use of the d-pronoun in the corpus aligns with the assumption of an avoidance of referents functioning as perspectival centers by Patil et al. (2023) and Hinterwimmer (2019, 2020). Take (61), where Brenner's thoughts or his perspective are not rendered,

nor is a particular situation described from his point of view. Rather, the narrator provides the reader with a series of information about Brenner's professional situation or makes subjective assessments of Brenner's character. It is thus the narrator functioning as the perspectival center (Patil et al. 2023, Hinterwimmer 2019, 2020). Therefore, it is not surprising that the referent Brenner is repeatedly referred to by a d-pronoun. As Hinterwimmer (2020) elaborated, the use of the personal pronoun *er* in the second and third sentences, on the other hand, does not indicate a change to Brenner's perspective, but may have purely stylistic reasons. This becomes clear from the fact that all three occurrences of *er* could also be replaced by *der* without any decisive change in the acceptability of the respective sentence, as evident in the variations of the second sentence given in (62a-c). Only the variant in (62c), which contains three consecutive occurrences of the demonstrative pronoun, is clearly less acceptable than the original sentence (though not entirely unacceptable) – this status is marked by a preceding question mark (cf. Hinterwimmer 2020).

- (62) a. Jetzt muss man wissen, dass der 19 Jahre bei der Kripo gewesen ist, weil mit 25 hat der angefangen, und jetzt ist er 44 gewesen.
Now you have to know that he-DPRO has been with the CID for 19 years, because he-DPRO started at 25, and now he is 44.
- b. Jetzt muss man wissen, dass der 19 Jahre bei der Kripo gewesen ist, weil mit 25 hat er angefangen, und jetzt ist der 44 gewesen.
Now you have to know that he-DPRO has been with the CID for 19 years, because he started at 25, and now he-DPRO is 44.
- c. ?Jetzt muss man wissen, dass der 19 Jahre bei der Kripo gewesen ist, weil mit 25 hat der angefangen, und jetzt ist der 44 gewesen.
?Now you have to know that he-DPRO has been with the CID for 19 years, because he-DPRO started at 25, and now he-DPRO is 44.

While Patil et al. (2023) argue that d-pronouns are commonly used for expressing evaluations of other referents, the current corpus data extend this claim. Because in this corpus study, only 35.9 % of cases involving d-pronouns show evaluative functions, however, 58.23 % refer to a locally prominent referent (in terms of grammatical role and thematic role). Consequently, the findings of Patil et al. (2023) have to be extended based on support from the corpus data. In the general discussion in Chapter 7, I will pick up this claim again. In the context of *AdT*, where a prominent and evaluative narrator exists, the narrator remains accessible as a discourse referent even in statements expressing a neutral viewpoint. This accessibility is due to the narrator's prominence throughout most parts of

the story (excluding FID). As a result, the narrator employs d-pronouns for various functions, not exclusively for evaluative purposes.

6.7.4 Reference development

With respect to referential chains, I assessed two research questions, focusing on referential distance measured in sentence segments and the presence of intervening characters. Both measures serve as indicators of accessibility, drawing on concepts from previous works (Givón 1983, Chiriacescu & von Heusinger 2009, Arnold 1998). The hypothesis is that a longer referential distance signifies lower accessibility, indicating referential decay, and a greater number of intervening characters indicates lower accessibility due to increased memory demands.

The analysis of referential distance, measured by segment distance between previous mention and critical pronoun, indicates that d-pronouns and personal pronouns exhibit similar distances. Initially hypothesized differences in referential distances between the two pronoun types are not confirmed by the corpus results. On average, both d-pronouns and personal pronouns show approximately the same number of segments between their previous mention and the pronoun. While there is a slight tendency for d-pronouns to have longer referential distances, this observation lacks reliability due to the small difference and the substantial disparity in the overall count of d-pronouns. Consequently, the segment distance analysis suggests that d-pronouns and personal pronouns share similar distances, contradicting the initially predicted patterns.

With respect to the intervening characters, it was hypothesized that d-pronouns show more intervening characters than personal pronouns between them and their previous mention. As d-pronouns have been attributed with a singling-out function, it is in line with that assumption that d-pronouns show more intervening characters. The corpus results revealed, however, that d-pronouns and personal pronouns show on average a similar number of intervening characters. Again d-pronouns show on average slightly more intervening characters than personal pronouns do, but again this is not a reliable difference due to the same reasons mentioned above. However, it indicates a tendency that in general would be predicted for d-pronouns. Nevertheless, the corpus results cannot confirm the hypothesis that d-pronouns show more intervening characters between them and their previous mention than personal pronouns do.

In the context of referential persistence, it has been shown that d-pronouns refer to highly persistent, specifically to the most persistent referent namely the main character Simon Brenner. These findings suggest that the use of d-pronouns

is not significantly influenced by the degree of persistence. This is in line with the approach proposed by Patil et al. (2023) and Hinterwimmer (2019, 2020). The main protagonist Simon Brenner is indeed a highly prominent discourse referent, but due to the perspectival prominence of the narrator who often comments on the protagonists, especially Simon Brenner, it is no surprise that there are many d-pronouns referring to Simon Brenner. The overview of the different functions also supports this explanation as it has been shown that most d-pronouns occur as information foregrounding devices.

6.7.5 Implications for prominence

Regarding prominence, the current findings indicate that local cues (e.g., grammatical or thematic role of the previous mention) do not have as much influence on referential behavior as predicted by previous literature. Moreover, additional measures of prominence, including referential distance, intervening characters, and referential persistence, also do not show a difference in the use of d-pronouns compared to personal pronouns. Instead, the corpus analysis suggests that perspective and the information foreground function are key factors permitting this unexpected use of d-pronouns. In the narrative of *AdT*, the omnipresent narrator appears to enhance the prevalence of d-pronouns by frequently evaluating and commenting on characters and events. Additionally, the analysis has revealed that the majority of d-pronouns serve the information foregrounding function, where they refer to locally prominent referents. When dealing with a longer narrative texts, local prominence-lending cues seem to lose their impact. Instead, attention-orienting functions and more global cues such as perspective-taking and narrative style govern the use of d-pronouns.

7 General discussion of corpus investigation

In Chapter 5 and 6, respectively, a corpus-based analysis of referring expressions was conducted for two different novel excerpts. Chapter 5 dealt with an excerpt from the novel *Tschick* (Herrndorf 2010), whereas Chapter 6 analyzed the referring expressions of an excerpt from the novel *Auferstehung der Toten* (Haas 1996). Both corpus-based analyses were specifically concerned with the referential behavior of third-person singular d-pronouns vs. personal pronouns. In this chapter, the results of the two corpus analyses will be compared and discussed.

7.1 Functions of pronouns & features of previous mention

A notable observation when comparing both corpora is the striking similarity in the results obtained from both analyses. Essentially, both corpora display comparable referential behaviors regarding d-pronouns and personal pronouns. It is interesting that the two corpus analyses revealed a similar referential behavior of d-pronouns, despite the clearly distinct narrative styles of the two novels, which result in distinct perspectival features. However, they both maintain an oral, colloquial narrative style. Consequently, the divergent perspectival features do not appear to result in different referential patterns of d-pronouns. I will elaborate on this further in Section 7.2. It seems that the fact that both novels are written in an oral narrative style might play an important factor in the observed referential behavior of d-pronouns. Furthermore, the finding that d-pronouns and personal pronouns exhibit a similar referential behavior is surprising given my initial hypothesis of differing referential behaviors between personal and d-pronouns. However, the corpus investigation reveals consistent patterns in each analysis measure pertaining to the research questions (cf. Section 5.5 and 6.5), namely features of previous mentions, referential distance, and intervening characters, where d-pronouns exhibit similar patterns to personal pronouns. Moreover, concerning the backward-looking function (grammatical and thematic roles of previous mentions), both corpus analyses lead to the conclusion that d-pronouns show similar referential behavior as personal pronouns.

The observed pattern, that d-pronouns primarily refer to the locally most prominent referent, has also been described by scholars such as [Weinert \(2011\)](#), [Ahrenholz \(2007\)](#) or [Bethke \(1990\)](#). They claim that d-pronouns are especially used in oral language, where they are used equivalent to personal pronouns. And [Weinert \(2011\)](#) also explicitly states that in informal oral conversation, d-pronouns tend to have more antecedent noun phrases serving as subjects rather than objects, which is also what the results of the current corpus investigation show. However, in this research no spoken-language corpora were investigated, instead the texts represent narratives that merely *resemble* spoken language. Nevertheless, the referring behavior observed in this research aligns with that of personal pronouns, as suggested by previous studies investigating spoken language (e.g., [Weinert 2011](#), [Bethke 1990](#)).

Additionally, the analysis of the functions carried out by d-pronouns in the two corpora also yields results consistent with the observed pattern. I divided the functions of d-pronouns into structural and pragmatic categories, emphasizing that these functions do not hold equal importance, and d-pronouns can fulfill multiple roles. Structural functions include topic shift, disambiguation, and information foreground, while semantic functions consist of contrast and evaluation. To simplify, I merged the topic shift and disambiguation functions within the structural category, as distinguishing between them is often challenging, and a d-pronoun may serve both roles. Regarding semantic functions, d-pronouns can carry out the evaluation and/or contrast function or neither, acknowledging the possibility for a d-pronoun to embody both semantic functions simultaneously. Interestingly, in both corpora, the majority of cases involve the information foreground function. This finding is unexpected, as previous research has predominantly focused on the topic shift function ([Bosch et al. 2007](#), [Schumacher et al. 2016](#)), leading to the belief that this is the main function of d-pronouns. [Weinert \(2011\)](#) addresses this as a common misconception about d-pronouns. She argues that “demonstratives do not primarily shift attention from one entity to another” ([Weinert 2011](#): 73). The corpus findings align with [Weinert \(2011\)](#), showing a prevalent occurrence of the information foreground function. In this function, the d-pronoun is used to refer to an already prominent referent, highlighting it even further and creating a relief profile ([Bethke 1990](#)). Furthermore, this finding is also consistent with the observation that d-pronouns often refer to d-pronouns or personal pronouns, thus maintaining continuity with a current referent. Consistent with this, [Weinert \(2011\)](#) suggests that d-pronouns are as commonly used as personal pronouns in maintaining the continuity of referents in pronoun chains. Additionally, demonstratives can indicate the ongoing significance of a referent and emphasize the relevance of new information related to

that entity.

Therefore, the analysis of the investigated referential behavior of d-pronouns leads to the conclusion that the d-pronoun's function cannot be attributed exclusively to the local prominence-lending cues of the previous mention. Instead, the referential structure observed for both corpora can be attributed to the information foreground function of the d-pronoun and also to global factors such as the narrative structure and the corresponding perspectival features. However, it is the case that the AdT corpus showed more instances of references of d-pronouns to less prominent referents (such as proto-patients). This can, in fact, be attributed to the richness of the protagonist structure. In *Tschick*, the entire story revolves around the two main characters, with only a few encounters with other characters. On the other hand, in *Auferstehung der Toten*, the private detective Simon Brenner is central to the events, but his investigations bring him into contact with numerous other characters, creating a more complex protagonist structure. These differences may explain the observation that in the analysis of the AdT Corpus, there are more instances of d-pronouns referring to less-prominent referents, even though this does not constitute the majority of cases. Weinert (2011) also states that in spoken language, d-pronouns are as frequent as personal pronouns. This finding is not supported by the corpus results of this research, as d-pronouns occurred significantly less frequently than personal pronouns in both corpora (accounting for only 2.76 % in the Tschick Corpus and 6.39 % in the AdT Corpus).

7.2 Perspective

With respect to the narrative structure, the novels exhibit various differences and similarities. While both feature a conversation-like and naturalistic narrative style resembling spoken language, a significant distinction lies in their narrative category of voice (*who speaks?* by Genette 1980). *Tschick* employs an autodiegetic narrator (a homodiegetic narrator who is simultaneously one of the main protagonists, actively participating in the story), and further the novel is characterized by numerous dialogues, marked by direct speech. In contrast, *Auferstehung der Toten* also employs an heterodiegetic narrator, which remains external to the plot. This narrator assumes an omnipresent role through consistent comments and evaluations. However, direct speech is infrequent in *Auferstehung der Toten*. Interestingly, this difference in perspective has no substantial influence on the referential behavior of the two pronoun types, which leads to similar results. Nevertheless, perspective in the two novels does affect the referential structure of the

7 General discussion of corpus investigation

text in distinct ways, ultimately converging on the similar result that d-pronouns exhibit a preference for referring to highly prominent referents. In *Tschick*, the dialogue structure results in d-pronouns being uttered by various protagonists (Maik, Tschick, the father). Each direct speech part shifts the perspective to the viewpoint of the respective protagonist, allowing d-pronouns to refer to highly prominent referents, given the referent is not the perspectival center (Patil et al. 2023, Hinterwimmer 2019, 2020). It is worth noting that, aside from the discussion on referential form, it would be odd to refer to the perspective-holder with a d-pronoun when the perspective-holder is the speaker of a direct speech. This is because it is unconventional to refer to oneself with a third-person pronoun. In *Auferstehung der Toten*, there is a dominant narrator who frequently evaluates and comments on characters and events. Direct speech rarely occurs in this novel. The omnipresent narrator, active in most parts of the novel (except instances of FID), utilizes d-pronouns extensively to refer to highly prominent referents. Regarding persistence, this difference in narrative style highlights that d-pronouns can indeed refer to the most persistent protagonist, as observed in *AdT*. In *Tschick*, this phenomenon was not observed, likely due to the autodiegetic narrator.

An interesting finding that emerges from both novels is that perspective is also expressed in neutral statements. In that the corpus findings deviate from assumptions put forth by Patil et al. (2023: 13) which suggest that neutral statements “do not contain perspectival centers at all.” They illustrate this with example (63) where the d-pronoun is not acceptably referring to the referent Peter.

- (63) Peter wollte einen Benz kaufen. *Der hatte kürzlich eine Gehaltserhöhung bekommen.

*Peter wanted to buy a Benz. *He-DPRO had recently gotten a pay raise.*

However, the corpus investigation reveals that even when the d-pronoun serves the information foreground function, and, therefore, not the evaluation function, it still allows for a reference to the most prominent referent. This phenomenon is consistent across both corpora. In *Tschick*, the dialogue structure facilitates this, as different protagonists delivering direct speech represent the respective perspective-holders of that segment. In *AdT*, this is possible because the narrator represents such a prominent character throughout the whole novel that they are accessible as a discourse referent even in neutral statements by them. In the case of *AdT*, it can also be argued that there is a form of dialogue with the reader and, therefore, the perspectival center is pronounced even in neutral statements. These perspectival influences can have varying effects depending on the genre and narrative structure and thus it is possible that the perspective-holder is

always present, ensuring a continuous engagement with the reader. The corpus investigation of this distinction consequently expands upon previously proposed assumptions, such as the idea put forth by Patil et al. (2023), that the narrator's perspective can be made prominent through evaluation. Based on the results of this corpus investigation, I propose that both a dialogue structure and a consistently prominent narrator (dialogical or quasi-dialogical nature) are adequate for the narrator to be accessible as a discourse referent even in neutral statements. This is exemplified in (64), where a broader evaluative context enables the use of the d-pronoun in the neutral last statement, as the narrator's perspective has been consistently emphasized throughout the paragraph.

- (64) Peter ist so knausering. Der gibt nie eine Runde in der Kneipe aus. Und wenn der mit seiner Frau essen geht, muss sie immer die Rechnung begleichen. Und das ist schon eine Frechheit, weil du glaubst nicht, was ich letztens erfahren habe: Peter wollte einen Benz kaufen. Der hat kürzlich eine Gehaltserhöhung bekommen.

Peter is so cheap. He-DPRO never buys a round in the pub. And when he-DPRO goes out to eat with his wife, she always has to pay the bill. And that's quite audacious, because you won't believe what I found out the other day: Peter wanted to buy a Benz. He-DPRO recently got a pay raise.

Considerations of perspective, as well as the influence of protagonists, have recently been linked to the concept of layers (Patil et al. 2023, Schumacher et al. 2024). For dialogues, I posit that participants that utter direct speech operate on the same dialogue layer but represent distinct worlds, implying the presence of individual discourse models. In such interactions, rapid synchronization checks become essential. Applying this to narratives such as *Tschick*, which incorporates dialogues, I propose the existence of an umbrella layer connected to the narrator. Additionally, there is a dialogue layer that encompasses different protagonist worlds for each recurring character (that is taking part in a dialogue). During direct speech segments, the narrator layer is temporarily deactivated, and the dialogue layer takes precedence, indicating the perspective of the respective speaker rather than that of the narrator. Despite being turned off during these instances, the narrator layer functions as an overarching umbrella layer since it is the narrator who renders the direct speech on the text level. In narratives like *Auferstehung der Toten*, where there are also dialogue parts, although fewer than in *Tschick*, the significance of the narrator layer is heightened. For the dialogue sections, it is expected that the procedure is similar to what has been explained for *Tschick*. However, due to the few dialogues and the omnipresence of the nar-

rator in *AdT*, the narrator layer is argued to mostly remain prominent, even when conveying a neutral statement.

7.3 Ambiguity

Another crucial factor that has to be discussed is ambiguity. Previous theoretical and psycholinguistic literature has predominantly focused on testing and discussing ambiguous items. However, in both investigated corpora, there are barely any ambiguous contexts. Moreover, when instances of ambiguous pronouns arise, the ambiguity is promptly clarified in the subsequent contexts (cf. (38), (56), (57)). A legitimate question, therefore, is which influence does ambiguity have on the referential behavior observed in both corpora? Previous studies have shown that gender congruence is in fact the most decisive factor for pronoun resolution outweighing other prominence-lending cues (Lappin & Leass 1994, Patterson & Schumacher 2021). For instance, Lappin & Leass (1994) develop an algorithm for pronoun resolution, where gender congruence represents the most highly ranked principle. Similarly, Patterson & Schumacher (2021) show for ditransitive sentences that all other prominence-lending cues become less important for reference resolution when the contexts can be disambiguated by gender information. In line with this, Song & Kaiser (2024), who explore how the competitor in transitive and intransitive sentences influences the interpretation of the English personal pronoun, demonstrate that in intransitive sentences, it is much clearer to whom the pronoun is referring than in transitive sentences. Previous literature, therefore, highlights that ambiguity or referential clarity is a substantial factor for pronoun resolution. It must be assumed that the observed referential behavior could also be related to the fact that the corpora, for the most part, do not include ambiguous pronoun instances. As previous research has based its investigations of prominence-lending cues on ambiguous items, the current findings lead to the assumption that for non-ambiguous contexts, other principles than local prominence-lending cues (which were predominantly explored in controlled studies) are responsible and influential for pronoun resolution.

7.4 Summary

In summary, the corpus investigations presented in Part II focused on two distinct novels, both characterized by a colloquial narrative style reminiscent of spoken language but differing in perspectival features (omnipresent narrator vs. dialogue structure). Initially, the aim was to examine the interplay of

prominence-lending cues in longer narratives. However, it became apparent that local prominence-lending cues are not as crucial as anticipated. The corpus results challenge previous assumptions from theoretical and psycholinguistic work (cf. Bosch et al. 2003, 2007, Schumacher et al. 2016, Abraham 2002), establishing that local prominence-lending cues are not as pivotal in narrative texts as previously suggested for short sentence pairs. Instead, the corpus investigations revealed that d-pronouns primarily are guided by global prominence-lending cues such as perspective and the information foreground function. The frequent use of the information foreground function indicates that they are often used to direct attention to an already prominent referent. Furthermore, the investigation highlights the frequent use of d-pronouns in oral communication, where they give additional emphasis to referents and draw attention to them. In line with this, a crucial finding regarding d-pronouns is their frequent use in the information foreground function. This appears to be a common function in oral speech (Bethke 1990, Weinert 2011) or in conversation like narratives. In conclusion, it is crucial to acknowledge that assumptions drawn from decades of controlled studies with two ambiguous referents may differ from those arising in the natural production and comprehension of language.

Part III

ERP investigation

The corpus investigation in Part II revealed that d-pronouns in the two novel excerpts under investigation are used differently than expected, deviating from descriptions of their referential behavior in previous literature. Additionally, previous research has explored the neural processing of personal and d-pronouns; however, existing studies are based on highly controlled two-sentence items with two potential ambiguous antecedents. Consequently, these studies do not fully capture the complexity of natural language and they are of low ecological validity.

The ERP investigation in Part III aims at exploring the neural online processing of the critical personal and d-pronouns examined in Part II. For this purpose, I utilized the audiobook versions of the corpora investigated in Part II. In the following, I present the experiments for each novel excerpt in separate chapters because as has become apparent above, the novels differ in various dimensions. Experiment 1 uses the *Tschick* excerpt (Chapter 8) as stimuli, while Experiment 2 focuses on the *Adt* excerpt (Chapter 9). These chapters are designed to be largely self-contained, consequently, some overlap between chapters is inevitable. The discussion of the individual experimental results is kept concise due to the partial overlap in ERP outcomes for both experiments. In the general discussion of this part (Chapter 10), I offer a comprehensive analysis of the results from both experiments.

The primary objective of Part III is to assess online pronoun processing in naturalistic discourse contexts, providing insights into Questions 2a and 2b:

Question 2a: How are personal and d-pronouns processed in larger naturalistic discourse contexts?

Question 2b: Can the results from previous highly controlled studies be confirmed in more naturalistic contexts?

8 Experiment 1 – Tschick

8.1 Introduction

This chapter presents an event-related potential experiment that uses an audio-book version of the previously analyzed excerpt of the novel *Tschick* as stimuli. The chapter aims to investigate the online processing of German d-pronouns in comparison to personal pronouns in naturalistic discourse contexts. By adopting a naturalistic discourse framework, the study attempts to bridge the gap between controlled laboratory experiments and real-world language usage. It seeks to provide insights into how these pronouns are comprehended within naturalistic language settings that, on the one hand, make available a more complex referential structure and, on the other hand, create an intrinsic motivation for the listener to construct a discourse representation.

Before delving into the experiment, Section 8.2 provides a general introduction to the ERP method. Section 8.3 reviews existing research on German personal and demonstrative pronouns, including research on real-time correlates of referential expressions and referential processing in naturalistic settings. Next, in Section 8.4, I present my hypotheses regarding the neural correlates of German demonstrative and personal pronouns in naturalistic stimuli. Following that, the chapter progresses with the presentation of the method (Section 8.5), data analysis (Section 8.6), results (Section 8.7), and ends with the discussion of the results (Section 8.8).

8.2 The ERP method

Our brain is constantly active and in every instance of life in order to process the vast amount of information we are faced with. The collective activity of these processes (e.g., cognitive, motor, or sensory functions) can be measured and studied through various methods. For instance, electroencephalography (EEG) and especially the EEG-based method of event-related brain potentials (ERPs) is widely used to study language processing in real-time, because this method provides a very high degree of temporal resolution. The ERP method dates back to the

German psychiatrist Hans Berger (1929), who showed that the electrical activity of a human brain can be effectively measured by electrodes that are applied to the surface of the scalp. This electrical activity is called the *spontaneous electroencephalogram*. However, in its basic form, the EEG is a rather coarse online measure of brain activity, making it challenging to capture the highly complex and specific neural processes that are of interest to cognitive neuroscience. This is because the spontaneous EEG reflects a conglomerate of hundreds of different sources of neuronal activity, and it is, therefore, difficult to identify a specific neurocognitive process (Luck 2014). Nevertheless, the EEG also contains neural responses linked to specific sensory, cognitive, or motor events, known as *event-related brain potentials* from the spontaneous EEG. ERPs are small changes in voltage ranging between 2 and 8 μV (for language-related mechanisms) that occur as the brain's response to a particular stimulus (Bornkessel-Schlesewsky & Schlewsky 2009, Bornkessel-Schlesewsky & Schumacher 2016). To extract ERPs from the ongoing spontaneous EEG, an averaging procedure is employed on the participants' EEG signals across multiple trials. The fundamental concept behind this averaging process is to filter out noise in the signal (e.g., brain potentials not induced by the stimulus) thereby enhancing the SNR. However, given that the voltage of spontaneous EEG ranges between 10 and 100 μV , which is considerably higher than that of ERPs, a relatively large number of trials is necessary to enhance the signal's quality. The assessment of ERPs demands a substantial number of stimuli, typically around 30–40 trials per condition for a sample of 20–30 subjects. This approach is crucial for achieving a high SNR and ensuring sufficient statistical power. This is due to the constancy of the signal for a given stimulus over multiple repetitions, while the noise signal, assumed to be randomly distributed, diminishes when a large number of time-locked stimuli are aggregated (Luck 2014, Schilling et al. 2021).

ERPs offer multidimensional information, which can be categorized based on specific criteria known as *ERP components*. These components represent distinctive deflections in ERPs that are attributed a particular functional relevance. ERPs can be classified using four criteria: polarity (positive or negative deflection in comparison to a control condition), latency (the time in ms from stimulus onset to the onset or peak of an effect), topography (scalp distribution, indicating electrode sites where the difference between critical and control conditions was observed), and amplitudes (measured in μV , providing insights into quantitative changes in effect size). Note, however, that amplitude is not a defining property of ERP components, unlike the other three parameters (cf. Luck 2014, Bornkessel-Schlesewsky & Schlewsky 2009, Bornkessel-Schlesewsky & Schumacher 2016). Moreover, ERPs serve as a relative measure, not an absolute one. In other words,

they can only be interpreted in relation to another condition. The major advantage of this method, aside from being noninvasive, lies in its exceptional temporal resolution, allowing the observation of online processing effects within the first hundred milliseconds. However, the ERP method is not well suited to characterize the spatial distribution, and the topographical data are only used to differentiate between distinct ERP components (Bornkessel-Schlesewsky & Schlesewsky 2009, Bornkessel-Schlesewsky & Schumacher 2016, Luck 2014). In the context of language processing, numerous ERP components have been identified to chart the dynamic unfolding of distinct functions (for an overview see Table 16.1 in Bornkessel-Schlesewsky & Schlesewsky 2009). For the online processing of referential expressions and pronouns, two key components are particularly significant: the N400, a negative deflection around 400 ms after stimulus onset, and the Late Positivity, belonging to a family of positive deflecting effects occurring around 300 ms or 600 ms after stimulus onset. Additionally, relevant studies for this dissertation observe an early positivity, termed P300. A more in-depth functional classification of the N400, P300, and Late Positivity components expected to arise in the present experiments will be provided in the following Section 8.3. Note that there are discussions about another reference-related negativity, called NRef, occurring specifically for ambiguous anaphors. I will briefly discuss this effect in relation to the N400 in Subsection 8.3.2.

8.3 ERP research review

8.3.1 ERP components

For the processing of referential expressions and for my research in particular, three main language-related ERP components are relevant: the *N400*, the *Late Positivity* and the *P300* component. I would like to demonstrate, following Schumacher and colleagues (e.g., Burkhardt 2006, 2007b, Schumacher 2012, Hirotani & Schumacher 2011), that referential processing involves two distinct operations during language comprehension: one related to the predictive abilities of the parser and the other to the updating of mental models. Resulting in a neurocognitive model of discourse processing that proceeds in two steps: predictive processing and discourse updating. Predictive capability is reflected in a negative electrophysiological potential peaking around 400 ms after stimulus presentation, known as the N400. Conversely, the second operation, involving mental model updating, is associated with a Late Positivity response. First, I will characterize the components before turning to a more elaborate discussion of previous research on reference processing in Subsection 8.3.2.

N400 The N400 is a negative deflecting signature that typically has its maximum around 300 to 500 ms after the onset of the critical stimulus with a centro-parietal distribution over the scalp (Kutas & Hillyard 1980, Bornkessel-Schlesewsky & Schlewsky 2009, Delogu, Brouwer & Crocker 2019, 2021). The N400, widely regarded as one of the most stable language-relevant effects, is a modality-independent component that responds to meaningful stimuli (e.g., Kutas & Federmeier 2011). Kutas & Hillyard (1980) were the first to observe an N400 effect in response to semantic anomalies compared to semantically well-formed sentences (*He spread the warm bread with socks/butter*). They concluded that the N400 is sensitive to the violation of semantic expectations. Subsequent studies indicate that the degree of the expectation formed by the preceding context is linked to the degree of the N400-amplitude, resulting in smaller N400 effects for unexpected continuations that are related to the anticipated continuations, compared to those that are unrelated (e.g., Federmeier & Kutas 1999). However, in addition to the lexical-semantic violations originally described, the N400 effect also occurs in non-anomalous discourse processing. For instance, N400 effects have been reported for structural manipulations of distance between anaphor and antecedent, indicating an influence of first mention and recency across multiple sentences (Streb, Hennighausen & Rosler 2004), for referential ambiguity during pronoun resolution (Nieuwland & Van Berkum 2006b), for definite expressions depending on the form of their antecedent (e.g., Swaab, Camblin & Gordon 2004, Brilmayer & Schumacher 2021), or for the degree of givenness in the context (Burkhardt 2006). Further, studies provide evidence that individuals' ability to predict upcoming words in sentences is based on their knowledge of the broader context (Van Berkum, Brown, Zwitterlood, Kooijman & Hagoort 2005, Nieuwland & Van Berkum 2006a).

These findings can be generalized by interpreting the N400 as indicating predictability of a stimulus (Heilbron et al. 2022, Rabovsky et al. 2018, Bornkessel-Schlesewsky & Schlewsky 2019, Schumacher 2012, Burkhardt 2006). Psycholinguistic studies further support this notion, suggesting that one explanation for the apparent ease, precision, and efficiency of language processing among both proficient and developing language users is their ability to anticipate forthcoming language input (DeLong, Urbach & Kutas 2005, Federmeier & Kutas 1999, Van Berkum et al. 2005, Wicha, Moreno & Kutas 2004, for an overview see Huettig 2015). Essentially, the addressee forms expectations about upcoming linguistic input, shaped by predictions based on past experiences with similar sentence continuations in specific contexts. This is done through an internal, hierarchically organized model of the world, which is regularly compared with actual sensory data. Any inconsistencies between the model and sensory input result in predic-

tion errors, prompting immediate adjustments to the internal model (Pickering & Garrod 2007, 2013, Huettig 2015, Friston 2010, Clark 2013). This perspective suggests that the magnitude of the N400 directly reflects “precision-weighted prediction error signals” (Bornkessel-Schlesewsky & Schlewsky 2019: 1) in language processing. This approach, however, is not new, Goodman (1967) for instance, underscored the significance of prediction for reading, highlighting how readers use graphic, semantic, and syntactic cues to anticipate forthcoming information in a text, suggesting that this predictive ability enhances comprehension.

With respect to discourse processing it is assumed that “[t]he difficulty of establishing a dependency relation between incoming information and information already available in the discourse model is reflected in modulations of the N400” (Hirokani & Schumacher 2011: 278). The literature on reference management suggests that during the comprehension of spoken or written discourse, predictions are made, for instance, regarding the most likely reference (which referent, and which referential form) to be mentioned next. This predictive ability can be evaluated at the lexical level using a ‘Cloze procedure’, where participants select the most suitable word to complete a context sentence. In referential processing, the N400 component can be interpreted as signaling a mismatch regarding prominence-based predictions. The prominence framework (von Heusinger & Schumacher 2019) also emphasizes the importance of prediction-based processing, suggesting that the relational aspect of prominence, and its ability to highlight a specific element within a group of equals, can be observed during real-time parsing driven by prediction. Furthermore, this perspective based on the concept by Friston (2010) posits that prediction-driven processing is a fundamental cognitive mechanism which relies on an internal mental model to anticipate forthcoming information or sensory input.

Several studies have further explored prediction-driven processes by examining activity already available preceding the critical noun. A significant study by DeLong et al. (2005) presented sentences like ‘*The day was breezy so the boy went outside to fly a/an ...*’, noting a pronounced N400 for the article *an* compared to *a*. This discrepancy emerged because only *a* was compatible with the predicted continuation kite. While DeLong et al.’s (2005) findings were once considered pivotal evidence for the predictive nature of the N400, a study by Nieuwland et al. (2018) cast doubt on these results. Despite a substantial sample size, the researchers could not replicate DeLong et al.’s (2005) findings, challenging the notion that readers pre-activate the phonological form of subsequent words. However, research conducted in languages other than English, as demonstrated by studies such as Wicha et al. (2004) for Spanish and Szewczyk & Schriefers (2013) for Polish, supports the concept that an expectation mismatch before

the triggering noun onset leads to an increased N400. This endorses the idea of expectation-based pre-activation of form properties prior to stimulus onset (Bornkessel-Schlesewsky & Schlesewsky 2019).

Late Positivity The Late Positivity is a positive-deflecting component that typically reaches its maximum between 500 and 900 ms after stimulus onset. This language-related effect is also referred to as P600 (Osterhout & Holcomb 1992), Syntactic Positive Shift (SPS) (Hagoort, Brown & Groothusen 1993) or Late Positive Complex (LPC) (Van Petten, Kutas, Kluender, Mitchiner & McIsaac 1991). In this dissertation, I will use the term Late Positivity.

Initially, the occurrence of the Late Positivity effect was observed in response to various (morpho-)syntactic violations (Hagoort et al. 1993, Hahne & Friederici 1999, Kutas & Hillyard 1980, Osterhout & Holcomb 1992, Osterhout & Mobley 1995), or syntactically complex sentences (Kaan, Harris, Gibson & Holcomb 2000, Osterhout, Holcomb & Swinney 1994), and was, therefore, considered the syntactic counterpart to the temporally earlier N400. However, the scope of the Late Positivity effect also extends beyond the reaction to (morpho)syntactic violations, garden-paths, or complex syntactic dependencies. Therefore, the Late Positivity effect cannot be solely attributed to syntactic processes. In line with this, Hoeks, Stowe & Doedens (2004) showed that Dutch sentences with a semantically anomalous order of two plausible verb arguments (*‘The javelin has thrown the athletes’*) reveal a Late Positivity instead of an N400. The authors attributed this to difficulties in processing thematic roles, arising from a conflict between grammatical structure-assigned roles (e.g., javelin as agent and athlete as patient/experiencer) and preferred role assignments (e.g., javelin as subject and athlete as agent). This phenomenon, where semantically anomalous but syntactically correct sentences lead to Late Positivity, is termed *semantic illusion* (Hoeks et al. 2004, Brouwer et al. 2012). Similar P600 effects in response to syntactically well-formed but semantically anomalous sentences are observed in studies by, for instance, Kuperberg et al. (2003), Kuperberg (2007), and Kim & Osterhout (2005) (cf. Bornkessel-Schlesewsky & Schlesewsky 2008 for a review of semantic illusion effects). Late Positivity effects have also been reported for new discourse referents, introducing new entities into discourse (Burkhardt 2006), as well as for topic-marked referents causing a shift in the ranking of discourse referents (Hung & Schumacher 2012, 2014, Wang & Schumacher 2013). Further, the Late Positivity has been associated with processing difficulty, particularly when more inferential effort is required to integrate a definite expression into the current discourse (Schumacher 2009, Delogu et al. 2019, Aurnhammer, Delogu, Schulz,

Brouwer & Crocker 2021). The updating of the discourse representation also incurs processing costs due to various pragmatic phenomena that require meaning adjustment (Schumacher 2011, 2013, Weiland-Breckle & Schumacher 2017, Schumacher, Weiland-Breckle, Reul & Brilmayer 2023, Regel, Gunter & Friederici 2011, Bambini, Bertini, Schaeken, Stella & Di Russo 2016, Coulson & Van Petten 2002, Canal et al. 2019, Coulson & Kutas 2001).

In sum, the Late Positivity is interpreted as an index of integration (Schumacher 2009, Schumacher et al. 2015, Aurnhammer et al. 2021, 2023, Brouwer et al. 2012, 2017). It becomes obvious that making changes to an established mental representation involving the exchange of information results in processing difficulties, which manifest as a Late Positivity. Information about the ongoing discourse is stored in a mental representation (van Dijk & Kintsch 1983). As discourse unfolds, adjustments are made to this mental representation to accommodate changes. van Dijk & Kintsch (1983) describe a dynamic process of comprehension, where understanding occurs gradually during the processing of input data. This may involve introducing new referents or elevating a previously less prominent referent to a more central status in the discourse. The incorporation of these changes into the mental model is termed mental model updating and it has been proposed that the Late Positivity reflects this process (e.g., Burkhardt 2007b, Schumacher 2009, Delogu et al. 2019, 2021). Crucially, the amplitude of the Late Positivity is responsive to the continuous scale of integration effort (Brouwer et al. 2012, Aurnhammer et al. 2023).

P300 Considerable discussion exists regarding whether the Late Positivity may be an instance of the P300 (Gunter, Stowe & Mulder 1997, Sassenhagen, Schlesewsky & Bornkessel-Schlesewsky 2014, Sassenhagen & Bornkessel-Schlesewsky 2015, Brilmayer, Sassenhagen, Bornkessel-Schlesewsky & Schlesewsky 2017), another well-known language-related ERP response with a typical peak latency of approximately 300 ms. The P300 is a crucial aspect of language processing and attentional focus. It manifests as a positive ERP deflection typically peaking around 300 ms after stimulus onset, however, it can also occur with considerable latency variability. Debate has centered on whether the P300 is a single unified component or comprises a family of components. Current evidence suggests at least two distinct components: the P3a and the P3b (e.g., Polich 2007). The P3a has an anterior scalp distribution and is usually elicited following novel or task-related stimuli. In language processing, the parietally-distributed P3b is particularly relevant. Initially identified in response to unexpected or uncertain events (Sutton, Braren, Zubin & John 1965), it is also

triggered by subjectively salient stimuli (Knolle, Schröger & Kotz 2013, Su et al. 2010, more on this in Subsection 8.3.4). In linguistic contexts, the P3b is observed for predictable, salient target events, such as the expected antonym in sentences like ‘*The opposite of black is white*’ (Roehm, Bornkessel-Schlesewsky, Rösler & Schlesewsky 2007). A recent physiologically plausible theory posits that the P3 arises from a systemic release of Norepinephrine by the locus coeruleus, a brainstem nucleus (Nieuwenhuis, Aston-Jones & Cohen 2005). When a distinct stimulus is deemed relevant, the locus coeruleus releases norepinephrine, enhancing the response to that stimulus. Thus, the P300 is intricately linked to attentional focus and appropriate responding. The Late Positivity reported above may be a P300 with a later onset latency as it can also be linked to attentional orientation.

8.3.2 Studies on reference

Turning to the study of reference, numerous investigations have observed N400 and Late Positivity effects, often exhibiting a biphasic pattern, during the processing of pronouns, full DPs, or proper names. ERP studies have highlighted the importance of prominence information in connecting anaphoric expressions to a referent in discourse.

Numerous studies have focused on semantic prediction (Kutas & Hillyard 1980, Federmeier & Kutas 1999, Van Berkum et al. 2005, Nieuwland & Van Berkum 2006a). Yet, there is also a significant body of research focusing on the prediction of other properties, such as form-based ones. A commonly used indicator of referent prominence is the referential form employed to refer to a specific referent. Nevertheless, structural manipulations such as parallelism or distance (Streb et al. 1999, 2004) also indicate that identifying a referent in conversation is influenced by its prominence, as evidenced by N400 effects. The form-function relationship proposed in various theories of accessibility is also demonstrated through N400 responses. For instance, there is a processing advantage for pronouns over repeated noun phrases when referring to a prominent referent, known as the *Repeated-Name Penalty* (Gordon et al. 1993, Swaab et al. 2004, Almor, Nair, Boiteau & Vendemia 2017). Almor et al. (2017) conducted a study investigating the impact of repeating a prominent referent introduced by a proper name versus a non-prominent one introduced by a conjoined noun phrase in the context. They discovered that repeating a prominent referent with the same name instead of using a pronoun incurred processing costs (‘*John went to the store. John/He wished to buy some candy*’). However, repeating a non-prominent referent with a conjoined noun phrase did not result in such penalties (‘*John and*

Mary went to the store. John/ He wished to buy some candy.). This highlights the importance of prominence information in establishing coreference.

In terms of information status, Burkhardt (2006) investigated the given-new distinction of DPs in two-sentence texts in German. She found a gradient effect of the degree of givenness on the amplitude of the N400 (new>inferred>given) and a pronounced Late Positivity for referents that require discourse updating (new/inferred>given). These findings were replicated by Hirotoni & Schumacher (2011) for Japanese. Moreover, Schumacher & Baumann (2010) and Baumann & Schumacher (2012) investigated the interplay of information status and prosody, showing biphasic N400-Late Positivity patterns for new information and supporting the existence of a lexically independent N400 reflecting discourse processes influenced by prosodic cues. Additionally, Hung & Schumacher (2012) found biphasic N400-Late Positivity effects for topic shift manipulations in Chinese, aligning with interpretations of prediction-based processing and updating mechanisms caused by the rearrangement of an existing discourse structure. From these studies, it becomes evident that the predictions concerning information status also correspond to prominence, specifically the prominence hierarchy of referents (von Heusinger & Schumacher 2019). Concerning the given-new distinction, a newly introduced entity, not yet included in this hierarchy, generates few predictions regarding its occurrence. Therefore, the introduction of a new referent into the discourse representation incurs neural costs, evident in the N400 response. Similarly, concerning topicality, the topic of a sentence is so prominent that it is highly expected to be continued as a referent. However, when this expectation is not met, an enhanced N400 effect occurs.

Subsequent studies demonstrate that not only the introduction of a new referent but also the inferred presence of an instrument and processes of establishing reference produce a Late Positivity effect (Burkhardt 2007b, Schumacher 2011). In addition, Late Positivities have been observed in response to meaning adjustments in various pragmatic phenomena, such as metaphoric (e.g., Bambini et al. 2016, Coulson & Van Petten 2002), and metonymic expressions (Schumacher 2011, 2013, Weiland-Breckle & Schumacher 2017, Schumacher et al. 2023). This suggests that enriching the core meaning towards a figurative meaning imposes processing demands due to the heightened cognitive effort involved in modifying and updating the discourse structure. However, studies reveal that not all forms of metonymy elicit this late positive response (Schumacher 2011, 2013, Weiland-Breckle & Schumacher 2017, Schumacher et al. 2023). Specifically, product-for-producer metonymies, which have a close relationship between original and intended meanings and are commonly used, do not incur additional processing costs (Schumacher 2013, Weiland, Bambini & Schumacher 2014). This indicates

that the Late Positivity effect only occurs when there is a need to update the mental model, and thus no effect is found for conventionalized metonymies. Additionally, Late Positivity effects have been observed in response to irony (Regel et al. 2011), and humor (Canal et al. 2019, Coulson & Kutas 2001), indicating discourse-related interpretative processes involved in distinguishing between ironic or funny and literal meanings of an utterance.

As this dissertation primarily focuses on the processing and referential behavior of d-pronouns compared to personal pronouns, studies that have investigated the neural processing of d-pronouns are of particular interest. Indeed, the distinct preferences between personal and d-pronouns, as discussed in Part I, are also noticeable during online processing (cf. Schumacher et al. 2017 for visual world eye-tracking data, Tomaszewicz-Özakın & Schumacher 2022 for self-paced reading data). To date, only a few ERP studies have explored the neural real-time processing of pronouns in general, and even fewer have focused on German d-pronouns. The most relevant study, conducted by Schumacher et al. (2015), compares d-pronouns to personal pronouns and serves as the basis for the current investigations. A subsequent study by Fuchs (2024) compares d-pronouns, dative-pronouns, and personal pronouns. Both studies use highly controlled experimental items consisting of two sentences: a context and a target sentence containing an ambiguous pronoun.

In their investigation, Schumacher et al. (2015) examined the backward- and forward-looking functions of d-pronouns and personal pronouns by using nominative-accusative and dative-experiencer verbs (similar to Schumacher et al. 2016 and Patterson et al. 2022) to disentangle the features grammatical role and thematic role. They looked at referential preferences of personal and d-pronouns in the context of sentences featuring two potential antecedents. In addition, they manipulated word order by testing canonical and non-canonical sentences. Their stimuli resemble the ones illustrated in (12). Time-locked to pronoun-onset, the ERPs reveal a significant distinction between d-pronouns and personal pronouns, illustrating a biphasic processing pattern for d-pronouns, namely a N400-Late Positivity effect. Similar effects have been observed by Jessen (2014) who conducted an ERP study examining time-of-day-dependent performance fluctuations in German d-pronoun processing using similar items as Bosch et al. (2007). This effect highlights that processing d-pronouns requires more cognitive resources compared to personal pronouns. The authors conclude that the difference between processing d-pronouns and personal pronouns can be attributed to expectation-based mechanisms (i.e., backward-looking) and forward-looking processes. They provide two alternative explanations for interpreting the N400. Firstly, Schumacher et al. (2015) suggest that the observed

cost could be attributed to the d-pronoun being a less expected referential form than a personal pronoun. According to this view, the d-pronoun contradicts the specific prediction for the form of an upcoming referent based on the prominence structure. However, they present a second explanation, suggesting that the costs arise due to the d-pronoun's reference to a less prominent referent. They provide additional support for the latter interpretation because [Schumacher et al. \(2015\)](#) also find evidence for online processing difficulties when different prominence-lending cues do not align to the same referent. This phenomenon is in line with the alignment-based hypothesis, as for instance, discussed in [Schumacher et al. \(2017\)](#). It demonstrates that interpretive preferences become less stable when prominence cues are not aligned. For example, in non-canonical sentences where the first-mentioned referent is the proto-patient/object, this indicates that multiple cues are involved in pronoun resolution. The Late Positivity that is observed for d-pronouns relative to personal pronouns, is interpreted as reflecting mental model updating costs that arise from the topic shift potential of d-pronouns indicating changes in the upcoming discourse structure. In that, the interpretations of the N400 and Late Positivity for d-pronouns are in line with other studies investigating referential processes.

[Schumacher et al. \(2015\)](#) also link the prediction-based explanation to the prominence account, suggesting that the N400 is influenced by the hierarchical prominence structure, which determines potential referential options. Consequently, this explanation supports the claim that coreference relationships rely on specific prominence characteristics that organize the priority of referential choices in our cognitive representation (cf. [von Heusinger & Schumacher 2019](#)). When a less prominent form is involved, as with d-pronouns, it leads to increased cognitive processing difficulties. As demonstrated in this subsection, this also applies to other negativities observed in referential processes, for instance, when introducing new referents ([Burkhardt 2006](#)) or repeating a maximally prominent referential expression ([Almor et al. 2017](#)). With respect to the Late Positivity, the study by [Schumacher et al. \(2015\)](#) showed that the d-pronoun appears to function as a trigger for attentional (re)orienting, a phenomenon also observed with accentuation ([Baumann & Schumacher 2012](#)) or inferred referents ([Hirotani & Schumacher 2011](#), [Burkhardt 2006](#)), ultimately resulting in the subsequent Late Positivity component. In terms of mental representation, this suggests that the level of prominence assigned to referents can change dynamically, and such shifts can result in additional cognitive effort and processing costs when updating the discourse (cf. [von Heusinger & Schumacher 2019](#)).

A subsequent study by [Fuchs \(2024\)](#) also examined ambiguous personal and d-pronouns, alongside diese-pronouns. Results reveal a robust N400-Late Positivity pattern for diese-pronouns, suggesting reference to the least expected referent and signaling a topic shift. It seems that the inclusion of diese-pronouns alongside d-pronouns in the same experiment posed a challenge, potentially hindering the emergence of an N400-Late Positivity effect for d-pronouns. Diese-pronouns exhibit stricter resolution preferences compared to d-pronouns, making them easier to differentiate from personal pronouns. Consequently, it is plausible that the experimental design employed by [Fuchs \(2024\)](#) contributed to the absence of the N400 and Late Positivity effect for d-pronouns.

Further ERP studies have examined the processing of pronouns using different types of Dutch personal pronouns. [Nieuwland & Van Berkum \(2006b\)](#) explored how prominence-based referential preferences, such as the first-mentioned referent, the grammatical subject of a sentence, and world knowledge plausibility, affect the resolution of referentially ambiguous pronouns. Their findings indicate that ambiguous pronouns elicit a sustained negativity compared to non-ambiguous pronouns. [Nieuwland & Van Berkum \(2006b\)](#) refer to this effect as the NRef, therefore, separating it from the N400. Following their definition, the NRef is triggered by ambiguous referential expressions like pronouns with multiple potential referents. Specifically, it is observed with pronouns when two antecedents are equally plausible, but not when one antecedent is more likely, indicating genuine ambiguity ([Nieuwland 2014](#)). Regarding the German pronouns examined by [Schumacher et al. \(2015\)](#), it is worth noting that although ambiguous pronouns were investigated, they were not genuinely ambiguous, as both types of pronouns exhibit intrinsic preferences for either a more prominent or less prominent referent ([Schumacher et al. 2016](#)). Therefore, the observed effect is not considered to be an NRef but an N400, indicating predictive processing.

Besides form-function manipulations, research has also shown that genre and world knowledge influence referential processing. Furthermore, broader contextual factors contribute to making predictions. In line with that, [Nieuwland & Van Berkum \(2006a\)](#) demonstrate that a broader pragmatic context can facilitate interpretations that are typically semantically implausible (e.g., *the peanut was in love*), resulting in a less pronounced N400 response for events that are usually improbable, when the context supports such an interpretation, as opposed to when the (cartoon-like) context does not favor such an interpretation. This study highlights how knowledge about genres also leads to predictions, as also observed in prosodic expectations during the silent reading of poems ([Chen et al. 2016](#)) or the processing of newspaper headlines with article omission ([Schumacher & Avrutin 2011](#)). Predictions stemming from mutual knowledge can also influence

the N400, as demonstrated by studies conducted by Federmeier & Kutas (1999) and Hagoort, Hald, Bastiaansen & Petersson (2004). Encountering a violation of world knowledge, such as a white Dutch train (which are typically yellow), elicits an N400 response similar to encountering a lexically unexpected word like ‘sour’ (Hagoort et al. 2004). However, contextual information can temporarily alleviate this effect by establishing common ground (Hald, Steenbeek-Planting & Hagoort 2007). Nonetheless, long-term memory suggests that world knowledge still carries more weight, making the processing of a contextually supported continuation more cognitively demanding than that of an expected one.

8.3.3 Naturalistic stimuli

Many experimental designs in neurolinguistics – including the one’s reviewed above – still rely on traditional lab experiments, which come with several drawbacks. For instance, numerous studies employ contrived and isolated items that are challenging to relate to real-life speech processing. Examples include oddball designs or stimuli consisting of just two sentences. While these stimuli are often derived from real-world sources, it is uncommon in everyday life to encounter a sentence devoid of context. Uncontextualized sentences may also diminish participants’ intrinsic motivation to comprehend or process the sentences (Hamilton & Huth 2020). Nevertheless, when using naturalistic stimuli, one has to be aware of the fact that ecological validity (‘naturalness’) and experimental control represent two extremes on a continuum. Gaining one aspect often means sacrificing the other (Brilmayer & Schumacher 2021).

As already argued in Section 4.2 narrative texts are well suited stimuli for naturalistic approaches to language processing, as they fulfill the three criteria postulated by Hamilton & Huth (2020). Nevertheless, in the domain of psycho- and neurolinguistics, the utilization of naturalistic stimuli remains relatively nascent. Notably, highly natural approaches have already been used in studies that investigate neuronal processes during natural reading (Kliegl, Dambacher, Dimigen, Jacobs & Sommer 2012). However, when it comes to investigating real-time language comprehension within the brain, the integration of naturalistic stimuli has found only limited use so far. Presently, within the field of psycho- and neurolinguistics, a small group of researchers are integrating naturalistic stimuli, but the popularity is steadily increasing. However, due to the considerable variance in the phenomena under investigation, direct comparisons between these studies often prove challenging. For instance, within the scope of psycho- and neurolinguistic exploration, investigations employing naturalistic stimuli in the form of narratives in MEG and EEG studies have covered a wide

array of themes. These encompass, among others, predictive sentence comprehension among individuals with autism spectrum disorder (Brennan, Lajiness-O’Neill, Bowyer, Kovelman & Hale 2019), the construction of syntactic structures (Brennan & Pyllkänen 2012, Brennan, Stabler, Van Wagenen, Luh & Hale 2016), the examination of pronouns and linguistic person (Brilmayer, Werner, Primus, Bornkessel-Schlesewsky & Schlesewsky 2019), and the differentiation between content and function words (Schilling et al. 2021).

A unique study that combines three distinct topics – naturalistic stimuli, perspective change, and pronoun processing – is the research conducted by Brilmayer et al. (2019). This study stands out because investigations into German pronoun resolution using naturalistic stimuli are scarce. To the best of my knowledge, there are no other studies that explore the neural processing of d-pronouns using naturalistic stimuli. In their research, Brilmayer et al. (2019) and Brilmayer & Schumacher (2021) delved into referential behavior, particularly concerning German personal pronouns, within a series of studies using the German audiobook adaptation of the novel *The Little Prince*. One of these studies specifically focused on German first-person personal pronouns in contrast to second- and third-person personal pronouns. The findings by Brilmayer et al. (2019) reveal a P300 effect for first-person pronouns, aligning with prior research on self-relevance (e.g., Knolle et al. 2013). They conclude that the marking of first-person pronouns represents an attentional aspect of self-relevance, integral to the comprehension of narratives. Additionally, their research identifies an effect related to pronouns referring to the main protagonist as opposed to those referring to other protagonists. This effect manifests as a frontal positivity emerging within the timeframe of 200 to 500 ms. Furthermore, Brilmayer & Schumacher (2021) explored the interplay between the form of a referential expression (pronoun vs. noun) and the form of its antecedent (pronoun vs. noun), revealing the influence of the antecedent expression’s form on the N400 amplitude time-locked to an anaphor.

When using naturalistic texts as stimuli, various features additionally come into play, including issues such as perspective and emotion (cf. Section 4.3). In the following subsection, I will introduce ERP research that examines perspective, self- and emotion – features that can play a role in the processing of narrative texts and have the potential of adding new aspects to reference resolution. However, research on online processes that directly addresses perspective or emotion relies largely on controlled experimental designs. There is research that examines engagement with narrative texts and, therefore, uses highly naturalistic stimuli; however, these studies often use post-experimental questionnaires or, when conducted online, typically do not use ERP designs.

8.3.4 Perspective shift, self-relevance & emotion

In studies exploring socio-emotional aspects such as perspective-taking, self-relevance and emotion, positive going ERP waves have been observed. Often-times, these three concepts overlap. For example, when shifting the perspective from others to *the self*, not only is there a change in perspective, but the relevance to the self also increases. Alternatively, one could argue that emotional stimuli are more relevant to the self than neutral stimuli, leading to an overlap between self-relevance and emotional processing. Thus, it is not surprising that similar ERP effects have been observed at certain points in these studies.

Significant implications for neural processing have been described for perspective shifts since altering the current perspective leads to cognitive costs. It is important to note that perspective is not limited to linguistic cues that convey a particular perspective, rather perspectival shifts often happen in social interaction as well, without the explicit use of linguistic cues. A popular way to investigate perspective shifts in social interaction is to utilize a version of the referential communication game, also known as the *director's task* (Krauss & Glucksberg 1977). In this game, participants and experimenters are positioned on opposite sides of a grid, with some objects hidden from the experimenter. To follow the instructions correctly, the participant must consider the objects that both the experimenter and they can see. Eye-tracking studies show that the shift from an egocentric perspective to one representing common ground requires effort (Keysar, Barr, Balin & Brauner 2000, Hanna, Tanenhaus & Trueswell 2003). Richter, Paul, Höhle & Wartenburger (2020) used a computer-based version of the referential communication game in an EEG- and eye-tracking study. The results indicate longer response times and real-time consequences (in the form of a Late Positivity) when the perspectives of the narrator and addressee differed. This indicates higher costs of integrating common ground while suppressing the unique knowledge about hidden objects.

Other studies investigating theory of mind, which refers to the capacity to calculate and assign mental states to both oneself and others, also find positive-going ERP effects. Meinhardt, Sodian, Thoermer, Döhnell & Sommer (2011) examined false- and true-believe reasoning in experiments based on the Sally-Anne-task (Baron-Cohen, Leslie & Frith 1985) and observed a Late Positivity for the false belief condition relative to the true belief condition. Sabbagh & Taylor (2000) investigated theory of mind via short stories that created either a mental representation based on the belief of a protagonist or a non-mental representation. The results reveal an enhanced positivity for the belief condition where participants have to take the perspective of a protagonist in order to answer the

control question. Bradford, Jentsch & Gomez (2015, 2018, 2019) explored theory of mind perspective-shifts between the self and other, revealing a noteworthy impact of perspective-shifting on behavioral responses, with shifts from self-to-other showing slower and more error-prone outcomes compared to shifts from other-to-self. This effect has been reproduced in cross-cultural comparisons between Western and Chinese participants, highlighting its universality (Bradford et al. 2018). In terms of ERP results, Bradford et al. (2019) confirmed these findings, identifying an early positivity around 250 ms (across right parieto/occipitotemporal areas) and a later positivity around 500 ms (across frontal-central areas) associated with perspective shifts. In line with previous studies (e.g., Vogeley et al. 2001, 2004), Bradford et al. (2015, 2018, 2019) suggest that an understanding of the self's perspective may serve as a foundational basis for comprehending the perspectives of others. In general, research indicates that the human brain responds differently to stimuli with personal significance. For instance, early positivities have been observed for self-initiated sounds (Knolle et al. 2013), viewing one's own body parts (Ninomiya, Onitsuka, Chen, Sato & Tashiro 1998, Gunji, Inagaki, Inoue, Takeshima & Kaga 2009, 2013, Su et al. 2010), or hearing one's own name (Berlad & Pratt 1995, van der Stelt & van Boxtel 2008), providing compelling evidence for the brain's prioritization of processing self-related information.

Also, with respect to pronouns, self-relevance evokes early positivity effects relative to non-self-directed perspective-taking (Shi, Zhou, Liu, Zhang & Han 2011, Zhou et al. 2010, Brilmayer et al. 2019). Zhou et al. (2010) conducted a study to explore how Chinese possessive pronouns like *wo de* ('my'/'mine') and *ta de* ('his') are processed, using an oddball design. The findings reveal that the self-relevant possessive pronoun *wo de* triggered a notably larger P300 brain response compared to the non-self-relevant *ta de* pronoun. These findings are also supported by a subsequent study by Shi et al. (2011). Other studies from the field of neurobiology of language also relate the processing of narratives to brain regions that are active during self-related processes (Seger, Stone & Keenan 2004, Parvizi, Van Hoesen, Buckwalter & Damasio 2006, Summerfield, Hassabis & Maguire 2009, Araujo, Kaplan, Damasio & Damasio 2015, Feng, Yan, Huang, Han & Ma 2018). Self-other distinctions have also been investigated with respect to engagement with a narrative. For instance, Hartung, Burke, Hagoort & Willems (2016) observed variations in electrodermal activity based on narrative perspective (first-person vs. third-person). Electrodermal activity changes are associated with the orienting response and strongly connected to attention (Boucsein 2012). The study found a correlation between electrodermal activity and immersion ratings, leading the researchers to propose a link between overall alertness, vigilance, and narrative perspective. Additionally, a study conducted

by Dmochowski, Sajda, Dias & Parra (2012) employed EEG measurements during a movie presentation and identified increased neuronal activity during exciting and suspenseful segments of the film. This study highlights the significant and highly time-correlated impact of attention and emotion on neural activity.

Numerous studies have further connected positive going amplitudes to the processing of emotional stimuli, especially those of a negative nature (e.g., Schäfer, Scharmüller, Leutgeb, Köchel & Schienle 2010, Surguy & Bond 2006, Citron 2012, Citron, Weekes & Ferstl 2013, Herbert, Junghofer & Kissler 2008, Donahoo & Lai 2020). Emotional language is commonly characterized by valence and arousal (Citron 2012, Citron et al. 2013). Valence measures the perceived value, with higher scores indicating positive words and lower values indicating negative words. Arousal measures the level of excitement, with highly arousing words eliciting feelings of stimulation or excitement, and low arousal words evoking feelings of relaxation or calmness (Scott, O'Donnell & Sereno 2014). Reaction time studies have shown that emotional words are processed more quickly than neutral words (Knickerbocker, Johnson & Altarriba 2015). In general, a processing advantage for negative words has been proposed, reflecting the evolutionary significance of survival, often associated with the need to escape from negative situations (Knickerbocker et al. 2015). Regardless of valence direction, emotional stimuli in general capture attention due to their motivational significance (Lang, Bradley & Cuthbert 1998). Processing emotional words in the written modality is associated with later positive amplitudes between 500 and 750 ms (Citron 2012, Citron et al. 2013, Herbert et al. 2008, Donahoo & Lai 2020).

Additionally, research beyond reading, such as the investigation of emotional images, specifically affective pictures, reveals positive-going waves, often occurring in an earlier time window. For instance, Schäfer et al. (2010) demonstrated that viewing images from affectively relevant categories, such as disgust, blood-injection-injury, and fear, induced early positivities (P200, P300) over posterior regions compared to neutral stimuli. Similarly, Buodo, Sarlo, Codispoti & Palomba (2006) conducted a study with blood phobics and healthy controls, presenting them with threat-relevant, emotional threat-irrelevant, and neutral pictures. The results reveal that, irrespective of group, P300 amplitude was highest for erotica and blood stimuli compared to threat-irrelevant and neutral pictures. Carretié, Hinojosa, Martín-Loeches, Mercado & Tapia (2004) utilized an oddball study involving picture presentations to explore automatic attention effects for negative, positive, and neutral deviants. Their findings show early positivities (P200) for negative and positive pictures but not for neutral ones. Furthermore, in a modified oddball study, Surguy & Bond (2006) illustrated that early positivities (P300) differed between groups with high and low aggression levels. In

this experiment, participants were instructed to respond only to rare food-related words (targets) randomly presented among neutral words. Aggressive words also appeared randomly, with the same frequency as the target words. The results indicate no significant differences in the neural responses of the two groups to the target words. However, participants with higher aggression scores exhibited reduced early positivities to the aggressive words. The findings suggest that the cognitive processing of aggressive stimuli was less efficient in individuals reporting higher levels of aggression.

8.3.5 Interim discussion

The studies discussed in this section show that the processing of referential expressions often leads to N400 and Late Positivity effects. Additionally, (early) positive deflections occur during the processing of self-relevant and notably emotional stimuli.

I have demonstrated that the N400 and other language-related negativities reflect prediction errors at different levels of linguistic representation, while positivities, such as the P300/P600, are related to attentional reorientation. Specifically, the N400 and Late Positivity effects associated with referential processing can be explained by predictive processing and mental model updating respectively (Bornkessel-Schlesewsky & Schlesewsky 2019, Aurnhammer et al. 2023, Schumacher et al. 2015). Concerning the N400, the theory suggests that the brain generates predictions about upcoming linguistic input. With respect to referential processes, I assume that these predictions are based on a prominence hierarchy regarding referents and events represented in the mental model (von Heusinger & Schumacher 2019). This hierarchy is regularly compared with real sensory information, and any disparities lead to prediction errors, causing immediate adjustments to the internal model, as reflected in the N400. On the other hand, the Late Positivity, serves as an indicator of mental model updating difficulties, reflecting the challenges in modifying established mental representations during language processing (often caused by initial prediction errors).

Specifically for the neural processing of German d-pronouns in comparison to personal pronouns, one can conclude that they elicit a biphasic N400-Late Positivity effect. This effect is associated with expectation-based processing and mental model updating. However, regarding the N400 effect of d-pronouns, previous studies have yet to determine the specific type of prediction error causing this effect. Due to the highly controlled experimental designs utilizing ambiguous pronouns, it remains challenging to definitively identify which prediction error contributes to the N400 effect. Is it the unexpected referential form of the

d-pronoun in comparison to the personal pronoun, or is it the fact that the d-pronoun tends to preferentially pick up the less predicted, less prominent discourse referent, as opposed to the personal pronoun, which continues with the most prominent and, thus, more predicted referent? While this distinction has not been conclusively addressed in previous research, I aim to address this issue in the upcoming ERP study. In the subsequent section, I will refer to this unresolved aspect when formulating my hypotheses.

8.4 Research Question and Hypotheses

The aim of this ERP study is to investigate the processing of personal pronouns and d-pronouns within longer and more naturalistic discourse contexts. In Part I, I outlined how the referential behavior of d-pronouns and personal pronouns is described in the research literature. However, the corpus investigation in Part II revealed differing referential behaviors for d-pronouns in the two corpora under investigation compared to previous studies. This suggests that the characteristics of longer discourse contexts play a role in shaping how d-pronouns are utilized. Consequently, the question arises whether longer discourse contexts also influence how d-pronouns are *processed*? The current study tries to answer this question and, therefore, addresses a significant limitation of previous research, as many experimental designs in psycho- and neurolinguistics rely on traditional techniques that may not fully capture the complexities of naturalistic speech and language stimulations (Alday et al. 2017, Hamilton & Huth 2020). Notably, existing studies on the neural processing of d-pronouns have predominantly been conducted in highly controlled laboratory settings, examining two-sentence items with two potential antecedents (Schumacher et al. 2015, Fuchs 2024). This limitation has fostered the perception that demonstratives mainly occur in ambiguous contexts for disambiguation. However, the corpus analysis in Chapters 5 and 6 demonstrates that d-pronouns in the current corpora only marginally serve the disambiguation function. Moreover, the emphasis on controlled two-sentence items has resulted in limited attention to the naturalistic ‘real-life’ use of d-pronouns. As mentioned in Section 8.3 regarding neurophysiological processes, previous studies with highly controlled experimental items have reported a biphasic N400-Late Positivity for d-pronouns compared to personal pronouns (Schumacher et al. 2015). The current study addresses the fifth research question of this dissertation by investigating naturalistic stimuli to overcome the limitations of prior studies.

RQ (v) The present experiment aims to investigate the processing of d-pronouns and personal pronouns in larger, more naturalistic discourse contexts. It also seeks to address whether the findings from highly controlled studies (Schumacher et al. 2015) can be replicated in naturalistic settings. Following Schumacher et al. (2015), the prediction is that processing the personal pronoun *she/er* is relatively effortless, while processing the d-pronoun *she/her* is more costly. In terms of electrophysiological components, it is assumed that referential expectations are derived from the prominence structure of the preceding discourse (backward-looking function), and any deviations will be reflected in a more pronounced N400 component. Following the prominence account (von Heusinger & Schumacher 2019), Schumacher et al. (2015) and Fuchs (2024) explain the observed N400 effect for d-pronouns by assuming that participants predict references to the most prominent referent. Since they tested ambiguous pronouns, they argue that the N400 of demonstratives (d-pronouns in the case of Schumacher et al. 2015, *diese*-pronouns in the case of Fuchs 2024) indicates that the addressee interpreted the pronouns as coreferent with the unpredicted, less prominent referent. However, as demonstrated in the corpus analysis in Subsection 5.7.1, the *Tschick* excerpt does not contain many ambiguous d-pronouns. Moreover, the vast majority of d-pronouns refers to the locally most prominent referent and can be interpreted unambiguously. Therefore, an enhanced N400 for d-pronouns in this current experiment would not indicate a prediction error due to an unpredicted referent being selected, as in most instances, the locally most prominent, and thus a highly predictable referent is indeed selected. Instead, it is hypothesized that the d-pronoun will elicit a distinct negative deflection around 400 ms relative to the personal pronoun because it is the more marked pronoun type, and its usage is more unexpected compared to the personal pronoun, which represents the default pronoun type. This hypothesis still follows the common practice to relate the N400 to prediction, however, it no longer relates it to the prediction of an upcoming referent but to the prediction of a referential form.

Additionally, there is the assumption that the d-pronoun signals attentional reorientation, and this forward-looking function is reflected in the Late Positivity. Specifically, it is predicted that the d-pronoun will exhibit a distinct positive deflection starting around 600 ms relative to personal pronouns. This positive deflection is seen as a reflection of the updating of the mental discourse representation triggered by attentional (re)orienting. Following von Heusinger & Schumacher (2019), it is assumed that prominence relations between discourse referents are integrated into the mental discourse representation. Previous research has often linked d-pronouns to the indication that a previously less prominent

referent will become more central in upcoming discourse (Schumacher et al. 2015, Fuchs 2024). Consequently, when a d-pronoun is interpreted as signaling such a shift, the mental discourse representation requires updating which surfaces as the Late Positivity. However, as the *Tschick* excerpt predominantly contains d-pronouns referring to the locally most prominent referent which do not alter the discourse topic, this explanation does not hold for the current experiment. Furthermore, d-pronouns frequently occur in d-pro-d-pro chains in this novel excerpt. Therefore, I expect that the d-pronoun serves as a trigger for attentional (re)orienting. I interpret the Late Positivity as an anticipation of changes in the subsequent referential structure and the associated costs as indicating mental model updating. The attention-orienting function of the d-pronoun leads to a relief profile where the referent of the d-pronoun becomes even more prominent. The updating of the mental model, therefore, does not involve boosting the topic of a previously less prominent referent; rather, it is done to further highlight the current (already prominent) referent in the discourse model, placing it in the information foreground.

The hypotheses and the experiment's design have been preregistered at as.predicted.com.

8.5 Method

8.5.1 Participants

Forty-one participants (30 female, 11 male, 0 diverse) took part in the experiment. One participant was excluded due to a technical error during recording. The remaining participants' ages ranged from 20 to 33 years (mean age 25.12 years, $SD = 3.18$), and all were monolingual native speakers of German. Thirty-five participants reported not having read the novel or seen the movie *Tschick*. All participants provided written informed consent and received either monetary compensation or course credits. Ethics approval for the study protocol was obtained from the ethics committee of the German Linguistic Society.

8.5.2 Material

Audiobook Nine chapters (chapters 28–46, excluding chapter 32–41) of the official German audiobook version (Clarén 2018) of the novel *Tschick* served as experimental stimuli. The nine chapters combined add up to 57:58 minutes of auditory stimulus. The recording was segmented using automatic speech segmentation provided by the Munich Automatic Segmentation (MAUS) Web interface

(Kisler et al. 2016, Schiel 1999), combined with manual corrections at the onsets of the critical pronouns. The analysis focuses solely on the critical personal and d-pronouns analyzed in Part II (third-person singular, subject, proto-agent) because they constitute the majority of pronouns in the sample, ensuring comparable referring expressions. This results in a total of 143¹⁴ personal pronouns and 34 d-pronouns.

Prosody analysis Research has shown that intonation and accentuation are influential prominence-lending cues (e.g., Baumann & Grice 2006, Baumann 2006, Baumann, Röhr & Grice 2015, Röhr & Baumann 2010). Concerning German d-pronouns, studies have indicated that d-pronouns as well as personal pronouns are more likely to be interpreted as referring to a less prominent referent when they are accented than when they are unaccented (Özden 2022). Furthermore, while accented personal pronouns in English are argued to favor the less preferred referent (Balogh 2003), no such evidence exists to date for German. However, Özden’s (2022) results demonstrate that the preference of personal pronouns for the most prominent referent decreases slightly when accented. Essentially, three parameters – intensity (loudness), duration, and fundamental frequency (F0, perceived as pitch) – contribute to the perception of accentuation (Ladd 2008, Uhmman 1991). Given that I use an existing audiobook, the accentuation of d-pronouns and personal pronouns in the speech material is not controlled. Therefore, it is worth considering that different accentuation of the two pronoun types could potentially influence the neural processing of these pronouns. Therefore, I conducted an analysis of the speech material of the audiobook focusing on duration and pitch differences (difference between the minimum and maximum F0) to examine the prosodic features of the critical pronouns, which are subsequently analyzed in the EEG, and ensure that they do not differ with respect to accentuation.

The critical pronouns in the audiobook were manually annotated in Praat (version 6.1.26; Boersma & Weenink 2024). Using oscillograms and wide-band spectrograms displayed in Praat, segment boundaries were identified. The F0 trajectories for all critical pronouns were obtained, manually adjusted, and smoothed using a modified version of the Praat script *mausmooth* (Cangemi 2015). Subsequently, the smoothed contours were used to automatically identify the maximum and minimum F0 values within the pronouns. Initially, the analysis involved assessing the variation in pitch (F0) by examining the difference between

¹⁴The Tschick corpus contains 144 critical personal pronouns, but in the audiobook version one pronoun was realized as an *es* (it) instead of a *sie*: ‘Neben ihm saß eine Frau und surfte die ganze Zeit im Internet, jedenfalls sah sie (original text) / es (audio realization) so aus.’ (T 46, 8)

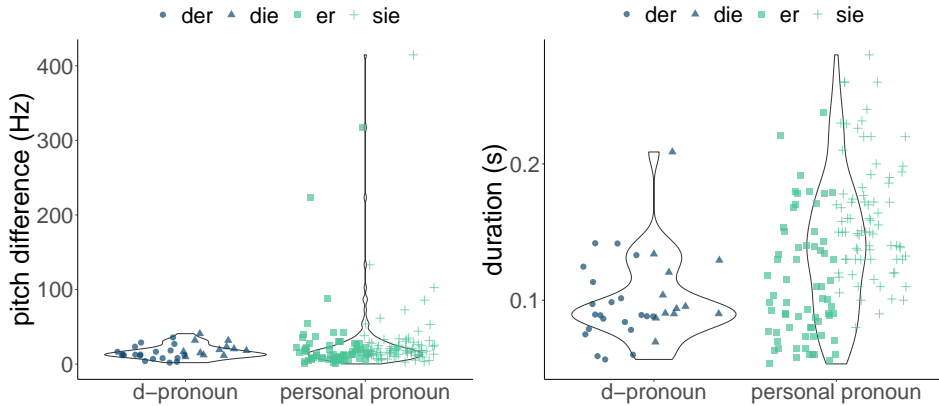


Figure 8.1: Distribution of prosodic features among all critical personal pronouns (N=143) and d-pronouns (N=33). Pitch difference (Hz) is depicted on the left side, duration (s) is depicted on the right side.

the minimum and maximum F0 for each pronoun, as depicted on the left side of Figure 8.1. To further investigate whether critical pronouns were unaccented, the duration of the pronouns was examined, considering that longer durations can also influence the perception of prosodic accentuation, as illustrated on the right side of Figure 8.1.

In order to statistically test the difference between critical personal and d-pronouns with respect to their pitch difference and duration, linear models are performed using the `LMTEST` package (Zeileis & Hothorn 2002) in RStudio (RStudio Team 2021). The models include duration or pitch difference as dependent variable and the fixed effect `PRONOUN` (personal pronoun, d-pronoun)¹⁵.

The results indicate that there is no significant difference between personal and d-pronouns in terms of pitch difference (Estimate = 10.267, t-value = 1.199, $p = 0.232$). However, the analysis of duration reveals a significantly longer duration for personal pronouns relative to d-pronouns (Estimate = 0.038, t-value = 4.102, $p < 0.0001$). The difference in duration can be explained by the prevalence of feminine personal pronouns (*sie*), which appear to have a longer duration than masculine personal pronouns or d-pronouns. This extended duration in comparison to masculine personal pronouns can be ascribed to the additional phoneme that the feminine personal pronoun carries, while the masculine personal pronoun is typically realized as a single phoneme Schwa. Furthermore, the longer duration

¹⁵`mod_pitch` <- `lm(PitchDifference ~ pronounType, data = crit-prons)`,
`mod_duration` <- `lm(Duration ~ pronounType, data = crit-prons)`

of feminine personal pronouns compared to d-pronouns can be attributed to the word-initial fricative in the former, as highlighted by Alwan, Jiang & Chen (2011: 205), who notes that “fricatives have longer duration [than] plosives.” More important for the current investigation, there is no significant distinction between the two pronoun types in terms of pitch difference, suggesting that they are intonationally realized in a similar manner. It has been claimed that the relevance of the parameters for the perception of accentuation varies, with more importance attributed to pitch (Uhmann 1991, Fry 1958, Isačenko & Schädlich 1966, Mo 2008). As demonstrated by Fry (1958) for English and Isačenko & Schädlich (1966) for German, duration (and also intensity) changes are considered secondary for the perception of accentuation. Instead, they show that once F0 changes are introduced, they become the decisive parameter for the perception of accentuation. This claim leads me to conclude that, overall, the d-pronouns in the current sample are most likely perceived as having similar accentuation, as they do not vary in pitch difference.

8.5.3 Procedure

The experiment took place at the XLinC Lab of the Institute for German Language and Literature I at the University of Cologne. Prior to participation, subjects read a trigger warning and provided written informed consent to take part in the study. The trigger warning informed subjects about the presence of racist, homophobic, bullying, and sexual content in the presented audiobook, which might be hurtful and retraumatizing. All participants chose to participate in the experiment voluntarily and on their own responsibility. Participants were seated in a soundproof booth in a comfortable chair. Before the experiment started, they received verbal instructions and read written instructions displayed on the computer screen. They were directed to remain still in the chair and focus on a fixation cross on the computer screen. Additionally, they were instructed to answer two questions after each chapter, which were presented on the screen and responded to using a controller.

The experiment was presented with the software *Presentation*® (Version 23.0, Neurobehavioral Systems, Inc., Berkeley, CA, www.neurobs.com). The auditory stimulus was presented through BOSE speakers (Companion 2) with the volume set consistently for each participant at approximately 75 dB. During the presentation of the auditory stimulus, a light grey fixation circle (Hex-Code: #FAFAFA) was displayed on a black background (Hex-Code: #000000) on a 24-inch computer screen. Participants used a controller (Logitech Gamepad F310) to answer

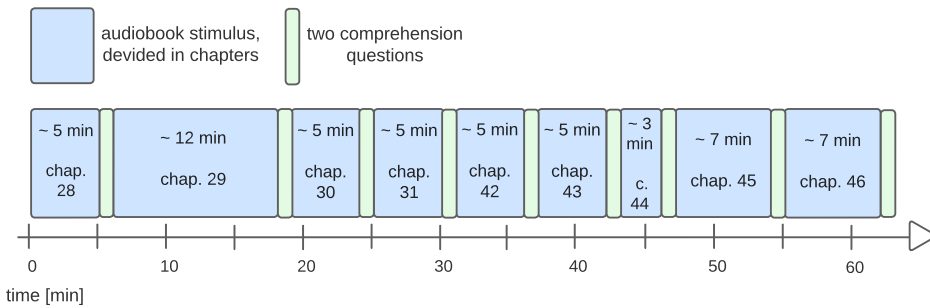


Figure 8.2: Presentation scheme. The total duration of the protocol was ~1 h. The audiobook was presented in 9 consecutive parts corresponding to the chosen chapters. After each chapter, two comprehension questions were presented.

comprehension questions after each chapter. They pressed the left or right button on the controller with their forefinger to indicate their chosen answer corresponding to the options displayed on the left and right sides of the screen. Comprehension questions were included to keep participants engaged during the experiment, and they were not used to exclude trials or participants. However, the average accuracy of the comprehension questions was 98,06 %. Each experimental run consisted of nine chapters, corresponding to nine blocks. After each block, two comprehension questions were presented. Participants were allowed to move or stretch during the comprehension question phase. The mean block length was 6:26 minutes, with individual block lengths as detailed in Figure 8.2. In total, 57:58 minutes of auditory stimulus were presented in one experimental run, lasting about an hour. The overall duration could vary slightly among participants, as there was no fixed time frame for answering the comprehension questions. Participants could take as much time as they needed. Figure 8.2 schematically depicts the audio presentation.

8.5.4 EEG recording and analysis

EEG was recorded continuously as participants listened to the official audiobook version of the previously annotated excerpt of the novel *Tschick*. The EEG was captured using 64 Ag/AgCl scalp electrodes positioned according to the international 10-20 system (Jasper 1958) on a flexible EEG cap (EasyCap, EasyCap GmbH, Herrsching, Germany). To ensure proper electrical contact between the scalp and electrodes, a conductive electrolyte gel was applied. The ground electrode was placed at the AFz position. Electrodes behind the left and right ear on

the mastoid served for referencing (left) and re-referencing of the EEG channels (right). Re-referencing was conducted offline after the experiment's completion. To monitor eye movement artifacts, the electrooculogram (EOG) was recorded using additional eye electrodes. These electrodes were placed on the left and right side of each eye at the level of the external canthus, as well as on the supra- and infra-orbital foramina of the left and right eye. The electrode impedances were maintained below 5 k Ω . All EEG and EOG channels were amplified with a Brain Products amplifier and recorded with a digitization rate of 500 Hz. Data analysis was performed using the MATLAB toolboxes EEGLAB (version 2021.0; [Delorme & Makeig 2004](#)) and ERPLAB (version 8.10; [Lopez-Calderon & Luck 2014](#)). Initially, independent component analysis (ICA) was conducted for artifact correction. To enhance ICA decomposition, the EEG data underwent a 1 Hz high-pass filter and a 100 Hz low-pass filter to eliminate line noise. The data were then re-referenced to linked mastoids and filtered with a 0.3 Hz high-pass filter and a 30 Hz low-pass filter, omitting baseline correction ([Friederici, Wang, Herrmann, Maess & Oertel 2000](#), [Maess, Schröger & Widmann 2016a,b](#), [Widmann, Schröger & Maess 2015](#), [Wolff, Schlesewsky, Hirotsu & Bornkessel-Schlesewsky 2008](#)). Subsequently, artifact components computed by ICA were selected and removed from the filtered EEG. Muscle and eye components above 80 %, and heart components above 90 %, were eliminated. ERPs were computed for a time window of 1600 ms, starting 200 ms before the onset of the critical stimulus and lasting until 1400 ms after stimulus onset.

8.6 Data analysis

Linear mixed-effects models were computed using the `lmerTest` package ([Kuznetsova, Brockhoff & Christensen 2017](#)) in RStudio (version 1.4.110; [Team 2021](#)), with amplitude as the dependent variable. The models included the fixed effect PRONOUN (personal pronoun, d-pronoun) and two continuous topographic fixed effects, SAGGITALITY and LATERALITY, which are derived from the coordinates of the standard BESA coordinate system, along with all interactions between them. Model calculations were performed for a time window spanning 0 to 1400 ms after pronoun onset, with steps of 100 ms. The model was fitted using a backward approach, starting with maximally specified random effects and subsequently minimizing the model until it would converge (e.g., [Barr, Levy, Scheepers & Tily 2013](#)). The maximal model that converged in every time window was determined. For each time window the model included a by-participant intercept and by-participant random slopes for each fixed factor

without interactions as well as by-item varying intercepts. A more complex model adding random slopes for item would not converge in every time window. The model calculated for each time window is illustrated in (65).

$$(65) \text{ lmer}(uV \sim \text{saggitality} * \text{laterality} * \text{pronoun} + (1 + \text{saggitality} + \text{laterality} + \text{pronoun} | \text{subject}) + (1 | \text{item}))$$

8.7 Results

The results of the ERP experiment are illustrated in Figure 8.3 which shows the mean amplitudes of ERPs over time, categorized by condition and region-of-interest (ROI, i.e., laterality and saggitality), and time locked to pronoun onset. Visual inspection reveals a biphasic pattern for the d-pronoun compared to the personal pronoun, particularly evident at posterior electrodes. Looking at the time course, the data show an enhanced negative deflection starting around 500

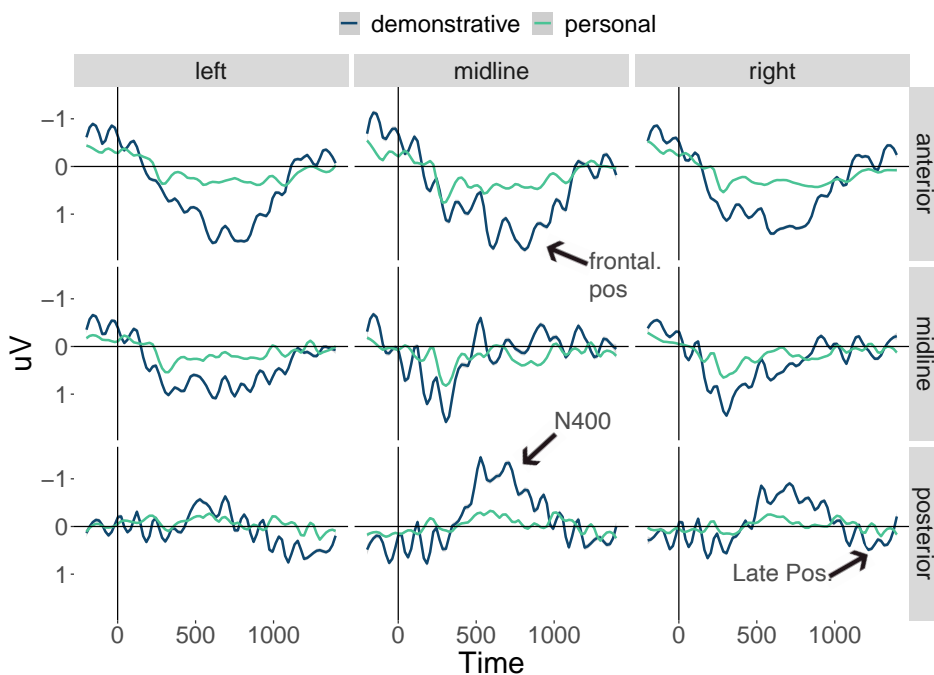


Figure 8.3: Grand-average ERPs for d-pronouns and personal pronouns averaged for nine regions of interest. The vertical line indicates the onset of the pronouns. Negativity is plotted up.

larger time window	100 ms time window	effect	estimate	t	p
	300 – 400 ms	sagittality * pronoun	-0.162	-5.859	4.67×10^{-9} ***
	400 – 500 ms	sagittality * pronoun	-0.302	-10.733	$< 2 \times 10^{-16}$ ***
	500 – 600 ms	sagittality * pronoun	-0.484	-17.366	$< 2 \times 10^{-16}$ ***
300 – 1000 ms	600 – 700 ms	sagittality * pronoun	-0.588	-21.866	$< 2 \times 10^{-16}$ ***
	700 – 800 ms	sagittality * pronoun	-0.594	-20.405	$< 2 \times 10^{-16}$ ***
	800 – 900 ms	sagittality * pronoun	-0.452	-13.456	$< 2 \times 10^{-16}$ ***
	900 – 1000 ms	sagittality * pronoun	-0.231	-7.379	1.60×10^{-13} ***
	500 – 600 ms	laterality * pronoun	0.054	2.035	4.18×10^{-2} *
	600 – 700 ms	laterality * pronoun	0.073	2.876	4.03×10^{-3} **
	700 – 800 ms	laterality * pronoun	0.179	6.535	6.36×10^{-11} ***
500 – 1200 ms	800 – 900 ms	laterality * pronoun	0.222	7.013	2.34×10^{-12} ***
	900 – 1000 ms	laterality * pronoun	0.209	7.063	1.63×10^{-12} ***
	1000 – 1100 ms	laterality * pronoun	0.085	3.189	1.43×10^{-3} **
	1100 – 1200 ms	laterality * pronoun	0.065	2.379	1.73×10^{-2} *
	1000 – 1100 ms	sagittality * pronoun	0.1	3.546	3.91×10^{-4} ***
1000 – 1400 ms	1100 – 1200 ms	sagittality * pronoun	0.224	7.710	1.27×10^{-14} ***
	1200 – 1300 ms	sagittality * pronoun	0.217	7.283	3.27×10^{-13} ***
	1300 – 1400 ms	sagittality * pronoun	0.261	8.882	$< 2 \times 10^{-16}$ ***

Table 8.1: Summary of significant interactions in the main time windows. Significance coding: ‘****’ < 0.001, ‘***’ < 0.01, ‘**’ < 0.05

ms, followed by a more pronounced positivity from 1000 to 1400 ms. In addition to the biphasic processing pattern with its posterior distribution, the data reveal a pronounced positivity at anterior (and left lateral) electrodes for the d-pronoun relative to the personal pronoun between 300 and 1000 ms. This effect overlaps with the negativity over posterior sites.

Based on the preregistered 100 ms time window analysis, larger time windows were identified, encompassing effects of PRONOUN, spanning at least two successive windows, and categorized based on their interaction with the topographical factors SAGGITALITY or LATERALITY. Since the large frontal positivity and the N400 effect overlap, I had to consider visual inspection as well for grouping the effects into larger time windows. This analysis identified three significant larger time windows: 300–1000 ms (based on a saggitality*pronoun interaction), 500 – 1200 ms (involving a laterality*pronoun interaction), and 1000–1400 ms (based on a saggitality*pronoun interaction). In the 300–1000 ms time window, the statistical analysis revealed the significant two-way interaction saggitality*pronoun, combined with visual inspection this time window can be related to the large positivity which is only occurring frontally. For the 500–1200 ms time window, the significant two-way interaction laterality*pronoun points to the right lateral distribution of the negative deflection for the d-pronoun. The interaction of saggitality*pronoun between 1000–1400 ms combined with visual inspection indicates the the posterior distribution of the later positivity. Estimates, t-values and p-values of the 100 ms time window analyses in the larger time windows are provided in Table 8.1. The full summary of the results is provided in Appendix C.1.

8.8 Discussion

8.8.1 Discussion of overall results

In this study, I investigated the real-time resolution of personal and d-pronouns in a more naturalistic setting. Participants were presented with nine chapters of the audiobook *Tschick*, while their EEG was recorded continuously. I hypothesized to see more demanding processing costs for the d-pronoun in comparison to the personal pronoun. I predicted that the d-pronoun would exhibit an enhanced N400 because it represents an unexpected referential form compared to the default personal pronoun. Additionally, I anticipated an enhanced Late Positivity for the d-pronoun, serving as a trigger for attentional (re)orienting and causing the mental model to integrate attentionally highlighted information about a ref-

erent. And indeed, the results show enhanced processing costs for d-pronouns in the form a biphasic N400-Late Positivity pattern.

Examining the the 500–1200 ms time window, the d-pronoun exhibits an amplified negativity compared to the personal pronoun at right lateral (posterior) electrodes. This negativity can be described as an N400 effect, which varies depending on the degree of probability and expectation levels (e.g., [Kutas & Hillyard 1983](#), [Schumacher et al. 2015](#)). Moving to the 1000–1400 ms time window, the results show a positive deflection for d-pronouns over personal pronouns at posterior electrodes. This positivity is taken to be a Late Positivity, which is indicative of increased processing costs caused by attentional (re)orienting and the updating of the mental discourse model ([Burkhardt 2005](#), [Schumacher et al. 2015](#)). Overall, the findings indicate a biphasic N400-Late Positivity pattern at posterior electrodes for the d-pronoun relative to the personal pronoun, aligning with previous controlled stimuli research ([Schumacher et al. 2015](#)). Crucially, the data help to further narrow down the functional interpretation of both the N400 and Late Positivity effects.

I interpret the observed N400 for the d-pronoun as an indication of more demanding processing costs, arising from the relative unexpectedness of this referential expression and its markedness. The observed N400, however, does not support the general assumption that a demonstrative pronoun violates the previously generated prediction about which referent is most likely to be mentioned next to a higher degree than a personal pronoun ([Schumacher et al. 2015](#), [Fuchs 2024](#)), as in the vast majority of cases investigated here, the d-pronoun was referring to the most prominent referent. Instead, I interpret the observed N400 as an indication that the d-pronoun was not the predicted referential form compared to a personal pronoun, which functions as the default referential form and is, therefore, highly predicted.

The Late Positivity is taken to reflect the consequences of attentional reorientation causing updating of the discourse structure. The observed Late Positivity likely does not indicate mental model updating due to a topic shift ([Schumacher et al. 2015](#)), as in the majority of cases, the d-pronoun refers to a locally prominent referent, maintaining topic continuity. Instead, I interpret the observed Late Positivity as a marker of a mental model update triggered by the attentional (re)orienting function of the d-pronoun. This attentional (re)orienting function creates a relief profile, intensifying the prominence of its referent. Consequently, the mental model is updated with the aim of emphasizing the existing (already prominent) referent in the discourse model, positioning it prominently in the information foreground.

In addition to the biphasic pattern, the data reveal an enhanced positivity in the 300–1000 ms time window at anterior electrode sites for the d-pronoun compared to the personal pronoun. I interpret this frontal positivity as an additional attention-based signal triggered by the d-pronoun, specifically linked to perspective-taking. In the novel *Tschick*, the use of the d-pronoun is frequently connected to the evaluation by the perspective-holder (e.g., the character uttering the direct speech). To gain deeper insights into the nature of the frontal positivity, a post-hoc analysis was conducted, incorporating the additional factor perspectival center. In Subsection 8.8.2, I present this analysis. I also explored whether evaluation has an influence on this frontal positivity; however, the analysis did not yield any interpretable results. In the general discussion in Chapter 10, I will elaborate on this observation in comparison to the AdT Experiment.

8.8.2 Post-hoc analysis of perspective-holders

The intricate interplay between language, perspective, and cognition has been a subject of several studies. Previous studies have consistently highlighted the link between positive-going effects and the processing of perspective, underscoring the role of attentional mechanisms in the process of perspective-taking (e.g., Richter et al. 2020, Bradford et al. 2019, Shi et al. 2011, Zhou et al. 2010). Building upon this existing literature, I posit that the frontal positivity detected in the Tschick Experiment functions as an additional attentional cue prompted by d-pronouns.

Data analysis

To assess the potential connection between the observed frontal positivity for d-pronouns and changes in perspective between the narrator (Maik) and other prominent perspective-holders (Tschick or Maik’s father), a post-hoc analysis involving perspective-takers was performed for the d-pronouns. First, the instances of the critical d-pronouns were categorized into three groups of perspective-holders: Maik/Narrator (n=11), Tschick (n=12), and father (n=10). When a d-pronoun occurred in direct speech, it was assigned to the perspective-holder or speaker of that speech act. D-pronouns in parts narrated by the narrator were assigned to the narrator’s perspective (i.e., Maik). Additionally, two instances were identified where a d-pronoun was uttered in the protagonist Maik’s direct speech. Since Maik is the narrator of the novel, all d-pronouns occurring in neutrally narrated parts and those in direct speech parts by Maik/the narrator were collapsed.

8 Experiment 1 – Tschick

Subsequently, I computed a mixed-effect model for the time window of the frontal positivity (300–1000 ms). Instead of the fixed effect pronoun, the fixed effect PERSPECTIVE (Maik, Tschick, father) was employed, and only the continuous topographic fixed effect SAGITTALITY was utilized. This is because the effect of interest appears only at frontal electrodes and shows a SAGITTALITY*PRONOUN interaction in the overall statistical analysis. The analysis included by-participant intercepts and by-participant random slopes for each fixed factor without interactions, along with by-item varying intercepts. The reported data are based on the model presented in (66). The factor Maik, i.e., d-pronouns in the stance of Maik, serves as the baseline of of model. Treatment coding was used for this model to show the contrasts between the three-levels of the factor PERSPECTIVE.

(66) $\text{lmer}(\text{uV} \sim \text{saggitality} * \text{perspective} + (1 + \text{saggitality} * \text{perspective} | \text{subject}) + (1 | \text{item}))$

Results

The post-hoc analysis of perspective-holders revealed distinct processing differences between the three perspectival centers Tschick, Maik and the father. Visual inspection of the ERPs at anterior electrodes show a gradation between the categories, especially obvious between 500 and 1000 ms. Additionally, visual inspection reveals that d-pronouns that express the stance of the protagonist Tschick elicit the most pronounced positivity, followed by d-pronouns that express the stance of the narrator Maik. The most reduced positivity is observed for d-pronouns that express the stance of the narrator’s father. These findings are visualized in Figure 8.4, which depicts the mean amplitudes of the ERPs of d-pronouns over time by perspective-holders and regions of interest.

Table 8.2 shows the significant interactions of perspective and saggitality, indicative of the anterior effect. The time window reveals two significant interactions of saggitality*PERSPECTIVE when comparing Tschick to the baseline, and

Time window	effect	estimate	t	p
300–1000 ms	saggitality*perspective [Tschick]	0.405	4.794	1.64×10^{-6} ***
	saggitality*perspective [Father]	-0.680	-7.696	1.42×10^{-14} ***

Table 8.2: Overview of significant interactions with the factor perspective. Significance coding: ‘****’ < 0.001, ‘***’ < 0.01, ‘*’ < 0.05

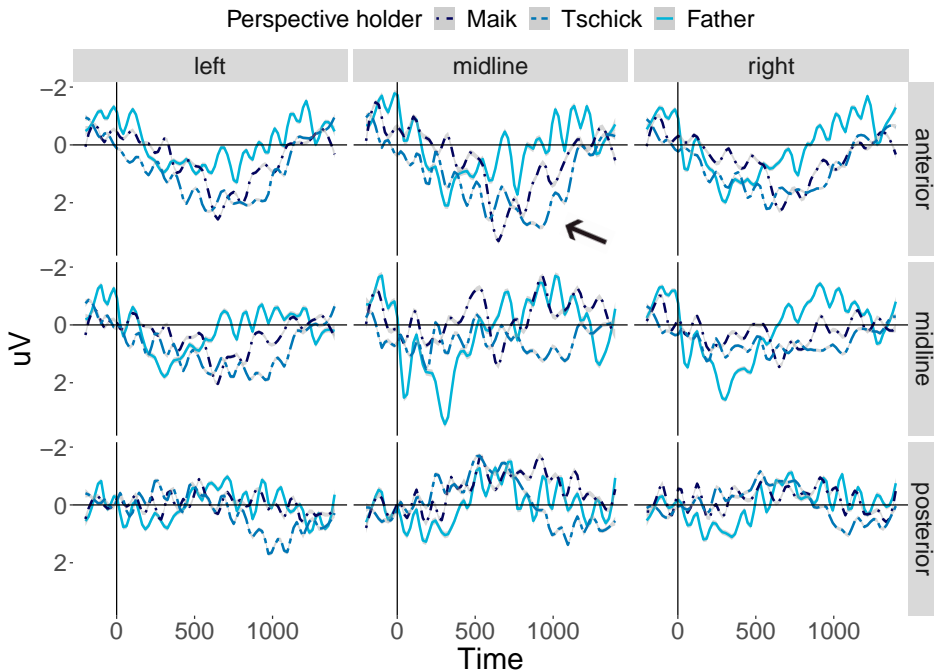


Figure 8.4: Grand-average ERPs of d-pronouns comparing three perspective-takers: Maik/narrator (dark blue), Tschick (blue), and father (light blue). The vertical line indicates stimulus onset.

when comparing the father to the baseline. The full summary of the results can be found in Appendix C.2. According to the statistical analysis, it is evident that the use of d-pronouns in Maik's perspective significantly differs from those in the father's perspective, and from those in Tschick's perspective as well. Visual inspection indicates a gradient, with the ERPs of the father showing the least positive-going signal, followed by those of Maik and Tschick. In the statistical findings presented in Table 8.2, Maik serves as the baseline. It is important to note that the statistics compare Maik with the other two characters respectively. However, because Maik's ERPs fall between those of the other two characters, a significant difference between Maik and the father or Tschick implies a significant difference between Tschick and the father as well. Thus, a gradation between the three factors is also evident from the statistical analysis.

Discussion of post-hoc results

The post-hoc analysis of perspective-holders for the d-pronouns as well as visual inspection reveals a graded frontal positive effect among the three perspectival centers presented in the novel excerpt (Maik, Tschick, father). Visual inspection reveals that d-pronouns expressing Tschick's perspective exhibited the most pronounced positivity, followed by those in Maik's stance, and finally by those anchored by the father. This observation is further supported by statistical analysis, which indicates significant differences between d-pronouns uttered by the three characters in the 300–1000 ms time window. Interestingly, the ERPs of d-pronouns uttered by the two main protagonists display distinctly stronger positivities than those uttered by the father. The two main protagonists in the youth novel can be characterized as brave, cool, rebellious, free, and spontaneous, making them very likable and identifiable. Conversely, the father is portrayed as mean, unfair, uncaring, and dishonest, serving as the antagonist to the main characters. Therefore, it is likely to assume that listeners of the audiobook engage less with the perspective of the father than with the perspective of the two main protagonists. The pronounced frontal positivity for d-pronouns uttered in the stances of Tschick and Maik is thus interpreted as reflecting enhanced identification with these two characters. This aligns with the findings of [Brilmayer et al. \(2019\)](#), suggesting that main protagonists elicit stronger effects due to a higher level of engagement with these characters. However, it is important to note that while the study by [Brilmayer et al. \(2019\)](#) compared which referent the pronoun was referring to (main protagonist vs. other protagonist), the current analysis examines from which perspective (main protagonist vs. other protagonist) the d-pronoun is rendered.

From research on perspective-taking, it seems that the shift in perspective is not the sole factor causing the observed pattern. According to [Harris \(2021\)](#) the default perspective-holder should be the narrator, and a shift from this perspective should elicit enhanced processing costs. This claim has also been supported in empirical investigations ([Meinhardt et al. 2011](#), [Richter et al. 2020](#), [Sabbagh & Taylor 2000](#)). Following this account, the perspectives of the characters Tschick and the father should exhibit more enhanced positive (frontal) amplitudes, as the novel is written from Maik's first-person perspective. Contrary to this, the perspective of Maik would elicit a reduced positivity, as it is the default perspective that does not require a shift. However, in [Figure 8.4](#), the tendency can be observed that d-pronouns rendering the narrator's perspective cause comparatively high processing costs in the form of a frontal positivity. In contrast, d-pronouns rendering the perspective of the father show a relatively reduced

frontal positivity. Hence, it is assumed that the factor of main protagonists vs. other protagonists has more influence on the processing costs of d-pronouns due to the listener's willingness to engage with the perspective of the protagonist(s). However, from this post-hoc analysis the question arises, why personal pronouns do not exhibit an enhanced frontal positivity even though they are also used by differing perspective-holders. I propose that the use of d-pronouns enhances perspective shifts by directing attention. Thus, the observed frontal positivity for d-pronouns is closely linked to their attention (re)orientation function, which personal pronouns do not carry. Therefore, personal pronouns do not show an enhanced frontal positivity.

In Figure 8.4, from visual inspection, an early positivity for d-pronouns uttered by the father is evident across midline and right midline electrodes during the 300–500 ms time window. Given that this effect occurs across midline and right midline electrodes, it is likely that the statistical analysis does not capture this effect comprehensively, as it only accounts for sagittal differences. However, visual inspection suggests a lateral distribution. I attribute this effect to self-relevance, which I will discuss in more detail in the general discussion (Section 10.4) where I also take the AdT results into account.

9 Experiment 2 – Auferstehung der Toten

9.1 Introduction

In this chapter, I present another ERP experiment, utilizing the audio recording of the novel excerpt from *Auferstehung der Toten* as stimuli. The chapter's structure mirrors the preceding one on the Tschick Experiment, aiming to explore the real-time processing of German d-pronouns in comparison to personal pronouns within naturalistic discourse contexts. Given the structural resemblance and certain shared results with the Tschick Experiment, the sections on analyses and discussion of results will be succinct, with references to the Tschick Experiment analysis at different junctures. As indicated by the corpus analysis, *Auferstehung der Toten* differs from the novel *Tschick* in various aspects, such as narrative structure, perspective, number of protagonists, and language due to the plot being set in Austria. These differences make it possible to not only examine pronoun resolution on the basis of another naturalistic text but to further assess the contribution of narrative style and perspective-taking (here a heterodiegetic narrator who addresses the listener directly). These properties will also be incorporated into the hypotheses and analyses. Consequently, it is valuable to examine this novel in an ERP study to test hypotheses on a different text, providing another naturalistic comparison to controlled studies.

9.2 Research Question and Hypotheses

The overarching objective of this ERP experiment, similar to the Tschick Experiment, is to examine how personal pronouns and d-pronouns are processed in longer narrative texts. Since this text has a different narrative structure than *Tschick*, an additional question arises regarding the influence of the heterodiegetic narrator on the processing of the two types of pronouns. The narrator in *Auferstehung der Toten* is also unique because they address the listener (or reader) directly, and these particularities offer an interesting framework

to examine their effects on pronoun processing. Furthermore, while *Tschick* contains a lot of dialogue but few characters, *AdT* features significantly more characters but less direct speech. On top of that, the analysis of the Tschick Experiment has shown that perspectival features have a significant influence on referential processing, particularly on the d-pronoun. The differences in narrative structure may influence results, thereby allowing for the examination of another narrative text. It is plausible that the unique narrative style of *AdT*, characterized by its prominent narrator, could lead to different implications for the ERP signal compared to those observed in the Tschick Experiment. To be more precise, a positive-going effect resulting from the unique narrative style and perspectival features is expected, particularly for d-pronouns. However, due to the differing narrative style, particularly the lower amount of dialogue, it is anticipated that this effect differs in its form (latency, topography, amplitude intensity) from the perspective effect observed in the Tschick Experiment. This chapter also investigates the same general hypotheses regarding the neurophysiological processes of personal and d-pronouns, focusing on the N400-Late Positivity pattern, as outlined in the previous chapter (Section 8.4), but now considering the different narrative structure of *AdT*. This approach ensures the comparability of results regarding the neural processing of d-pronouns compared to personal pronouns, as well as facilitating a comparison between the experiments.

9.3 Method

The method overlaps to a large extent with the Tschick Experiment, so I will only report the aspects that differ between the two experiments.

9.3.1 Participants

Thirty-two participants (27 female, 5 male, 0 diverse) participated in the experiment. Two participants were excluded due to a technical error during recording. The remaining participants' ages ranged from 18 to 32 years (mean age 23.38 years, $SD = 3.67$), and all were monolingual native speakers of German. All participants confirmed that they had not read the novel *Auferstehung der Toten*. Additionally, all participants provided written informed consent and received either monetary compensation or course credits. Ethics approval for the study protocol was obtained from the ethics committee of the German Linguistic Society.

9.3.2 Material

Audio material The first four chapters of the novel *Auferstehung der Toten* were recorded by a trained actor and served as experimental stimuli. The speaker of the recordings is originally from Bavaria, and therefore, his speech has a southern German accent. Since the novel *Auferstehung der Toten* is set in Austria and features a very colloquial narrative style, the use of a southern German voice complements it well. However, I aimed for the speaker to use standard German to minimize dialectal effects, especially considering that the recording was presented to students at the University of Cologne, who may have little contact with southern German dialects. The four chapters combined add up to 69:58 minutes of auditory material.

Similar to Subsection 8.5.2, the recording underwent automatic speech segmentation using MAUS (Kisler et al. 2016, Schiel 1999), supplemented with manual corrections at the critical pronoun onsets. The analysis concentrates on the critical personal and d-pronouns examined in Part II (third-person singular, subject, proto-agent), comprising the majority of pronouns in the sample for comparable referring expressions. This yields a total of 223 personal pronouns and 74¹⁶ d-pronouns.

Prosody analysis In aiming to preserve the natural quality of the stimulus material while recording the chapters, I opted not to provide specific intonation and accentuation instructions to the speaker. Consequently, the accentuation of critical pronouns in the recordings is uncontrolled. Nevertheless, drawing on previous literature investigating accentuation as a prominence-lending cues (e.g., Baumann & Grice 2006, Baumann 2006, Baumann et al. 2015, Röhr & Baumann 2010) and studies on accented personal and d-pronouns (Özden 2022), it is worth considering that distinct accentuation of the two pronoun types might potentially impact the neural processing of these pronouns. Building on the approach outlined in Subsection 8.5.2, for examining the prosodic features of the produced pronouns, which are subsequently analyzed in the EEG, I conducted an analysis that specifically focused on duration and pitch differences. Figure 9.1 shows the distribution of pitch difference (left side) and duration (right side) for personal and d-pronouns.

The method of extracting the maximum and minimum F0 values and durations of the critical pronouns mirrors the one described in Subsection 8.5.2. To statistically assess the distinction between critical personal and d-pronouns concerning

¹⁶The AdT Corpus contains 78 critical d-pronouns, but in the auditory version four d-pronouns (AdT 2, 207, AdT 3, 43, AdT 3, 130, and AdT 3, 147) were realized as personal pronouns.

9 Experiment 2 – Auferstehung der Toten

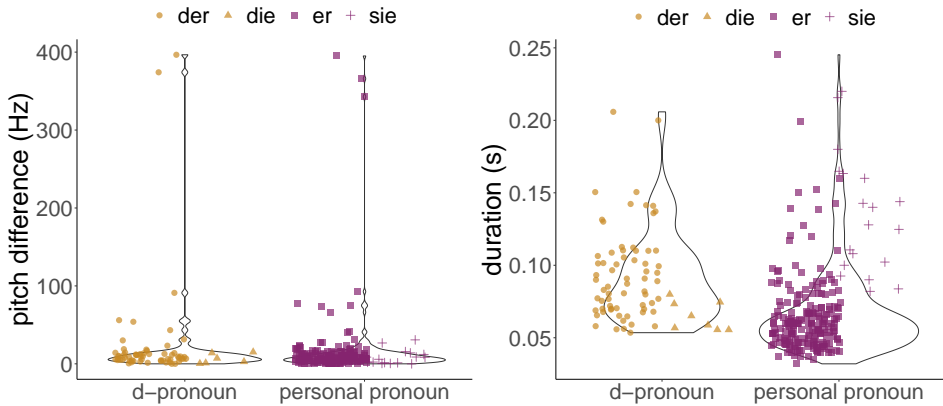


Figure 9.1: Distribution of prosodic features among all critical personal pronouns (N=223) and d-pronouns (N=79). Pitch difference (Hz) is depicted on the left side, duration (s) is depicted on the right side.

their pitch difference and duration, I employed the same linear models as those utilized in Subsection 8.5.2¹⁷.

The results indicate that there is no significant difference between personal and d-pronouns in terms of pitch difference (Estimate = -6.914, t-value = -0.915, $p = 0.361$). The analysis of duration reveals a significantly shorter duration for personal pronouns compared to d-pronouns (Estimate = -0.021, t-value = -4.096, $p < 0.0001$). The difference in duration between d-pronouns and (masculine) personal pronouns can be explained by the additional phoneme carried by d-pronouns compared to masculine personal pronouns, which are typically realized as a single phoneme Schwa. In Figure 9.1, the violin plot illustrating personal pronoun duration (on the right side) indicates that feminine personal pronouns (*sie*) have longer durations compared to masculine personal pronouns (*er*) and d-pronouns in general. This phenomenon can be linked to the word-initial fricative of feminine personal pronouns, as fricatives exhibit longer durations than plosives (Alwan et al. 2011). It is essential to note that this result contrasts with the pattern observed in the Tschick Experiment, where the effect was in the opposite direction (personal pronouns exhibiting longer durations than d-pronouns in general). However, this discrepancy can be attributed, firstly, to the limited presence of feminine personal pronouns in the *AdT* excerpt, which exhibit longer durations than d-pronouns. Secondly, it underscores that duration is not a consistent

¹⁷`modpitch <- lm(PitchDifference ~ pronounType, data = crit-prons),`
`modduration <- lm(Duration ~ pronounType, data = crit-prons)`

measure for the critical pronouns, indicating its lesser influence on accentuation. Crucially, concerning pitch difference, there is no notable distinction between the two pronoun categories, suggesting similar intonational realization. It has also been proposed that the significance of the parameters in the perception of accentuation varies, with pitch being the most important one (Uhmman 1991, Fry 1958, Isačenko & Schädlich 1966, Mo 2008).

9.3.3 Procedure

This experiment was conducted in the same way as the Tschick Experiment, described in Subsection 8.5.3. Each experiment run comprised four chapters, corresponding to four blocks. After each block, two comprehension questions were presented, followed by a break period. Comprehension questions were included to keep participants engaged during the experiment, and they were not used to exclude trials or participants. The average accuracy of the comprehension questions was 95 %. The break was added to the AdT Experiment based on feedback from participants of the Tschick Experiment who suggested that a specific break period would be beneficial. During the break phase, participants had the freedom to move or stretch and could decide when to proceed with the experiment by pressing a button. The mean block length was 17:29 minutes, with individual block lengths indicated in Figure 9.2. In total, 69:58 minutes of auditory stimulus were presented in one experimental run. The duration could vary among participants, as there was no fixed time frame for answering the comprehension questions and for taking the break; participants could take as much time as they needed. Figure 9.2 schematically depicts the experiment procedure.

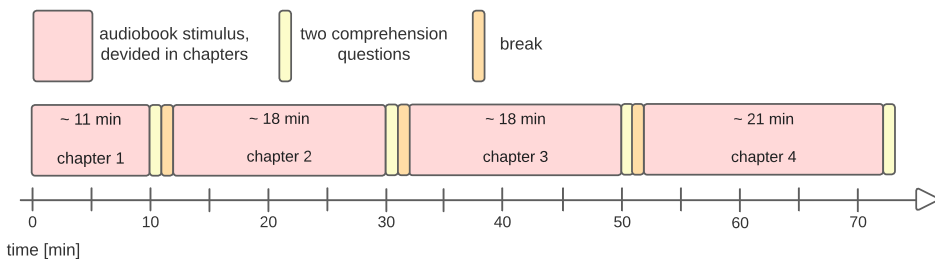


Figure 9.2: Presentation scheme. The total duration of the protocol was ~1 h. The audio material was presented in 4 consecutive parts with an average duration of 17:29 min per chapter. After each chapter, two comprehension questions were presented.

9.3.4 EEG recording and analysis

The EEG recording and analysis of this experiment was the same as for the Tschick Experiment, described in Subsection 8.5.4.

9.4 Data analysis

The data analysis for this experiment followed the same procedure as the Tschick Experiment, as described in Section 8.6. The linear mixed-effects model utilized for each time window is outlined in (65). However, for the time window (0–100 ms) a model without a by-item varying intercept was calculated because a more complex model would not converge.

9.5 Results

The findings from the ERP experiment are presented in Figure 9.3, showcasing the average ERP amplitudes across time, categorized by condition and ROI, and time-locked to the onset of the pronoun. Upon visual examination, a two-phase processing pattern is evident for the d-pronoun in contrast to the personal pronoun, particularly noticeable at electrodes situated in the right midline and anterior regions. Concerning the temporal progression, the data reveal an intensified negative deflection starting around 700 ms, succeeded by a more pronounced positivity spanning from 1100 to 1400 ms. These findings corroborate the biphasic pattern noted in prior controlled studies and the Tschick Experiment. However, there is a notable shift in the topography towards more frontal electrodes, and the time course, especially evident in the negative deflection, differs in comparison to the Tschick Experiment. Moreover, beyond the biphasic pattern, the results reveal an early positivity for d-pronouns relative to personal pronouns in between 0 and 300 ms.

Similar to Chapter 8, I conducted an analysis on 100 ms time windows, leading to the identification of larger time windows capturing PRONOUN effects spanning at least two successive windows. These were then categorized based on their interaction with the topographical factors SAGGITALITY and LATERALITY. Three noteworthy time windows were identified based on this data-driven analysis: 0–300 ms (involving especially a laterality*pronoun interaction but also saggitality*pronoun), 700–1100 ms (based especially on a saggitality*pronoun interaction), and 1100–1400 ms (based on a saggitality*pronoun interaction). In the 0–300 ms time window, the statistical analysis reveals a significant two-way

interaction laterality*pronoun in all three 100 ms time windows. Additionally, there are two 100 ms time windows with a significant two-way interaction sag-gitality*pronoun. For the 700–1100 ms time window, the significant two-way interaction sag-gitality*pronoun points to the frontal distribution of the negative deflection for the d-pronoun. Additionally, there is a laterality*pronoun interaction indicating the right lateral distribution of the effect. The interaction of sag-gitality*pronoun between 1100–1400 ms strengthens the frontal maximum of the later positivity for d-pronouns in comparison to personal pronouns. Estimates, t-values, and p-values of the 100 ms time window analyses in the larger time windows are provided in Table 9.1. The full summary of the results is provided in Appendix C.3.

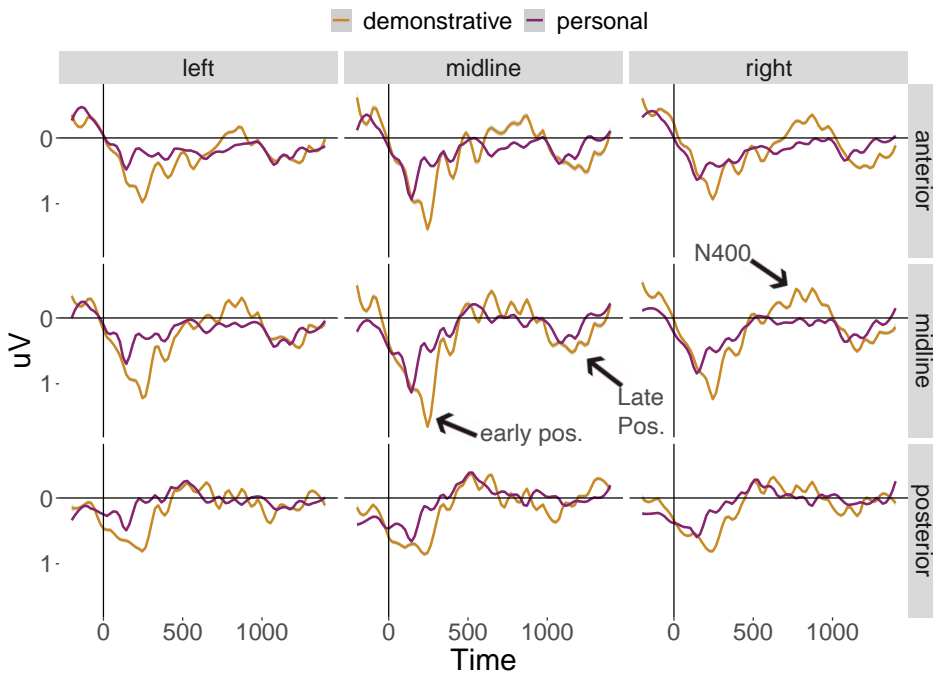


Figure 9.3: Grand-average ERPs for d-pronouns and personal pronouns averaged for nine regions of interest. The vertical line indicates the onset of the pronouns. Negativity is plotted up.

larger time window	100 ms time window	effect	estimate	t	p
0 – 300 ms	0 – 100 ms	saggitality * pronoun	0.081	4.017	5.90×10^{-5} ***
		laterality * pronoun	0.078	4.099	4.15×10^{-5} ***
	100 – 200 ms	saggitality * pronoun	0.044	2.263	2.36×10^{-2} *
		laterality * pronoun	0.101	5.467	4.59×10^{-8} ***
700 – 1100 ms	200–300 ms	laterality * pronoun	0.084	4.505	6.64×10^{-6} ***
	700 – 800 ms	saggitality * pronoun	0.087	3.670	2.43×10^{-4} ***
		saggitality * pronoun	0.053	2.549	1.08×10^{-2} *
	800 – 900 ms	laterality * pronoun	0.039	2.015	4.39×10^{-2} *
		saggitality * pronoun	0.064	3.084	2.05×10^{-3} **
	900 – 1000 ms	laterality * pronoun	0.043	2.221	2.63×10^{-2} *
1100 – 1400 ms	1000 – 1100 ms	saggitality * pronoun	0.117	5.571	2.53×10^{-8} ***
	1100 – 1200 ms	saggitality * pronoun	-0.042	-2.036	4.17×10^{-2} *
	1200 – 1300 ms	saggitality * pronoun	-0.105	-5.108	3.25×10^{-7} ***
	1300 – 1400 ms	saggitality * pronoun	-0.088	-4.280	1.87×10^{-5} ***

Table 9.1: Summary of significant interactions in the main time windows. Significance coding: ‘****’ < 0.001, ‘***’ < 0.01, ‘**’ < 0.05

9.6 Discussion

In this experiment, I examined the real-time comprehension of personal and d-pronouns in an excerpt of the novel *Auferstehung der Toten*. Participants listened to the audio material of the first four chapters of the novel while their EEG activity was continuously recorded. Building on the general hypotheses formulated for the processing of personal and d-pronouns, I predicted higher processing demands for d-pronouns compared to personal pronouns. I hypothesized that the d-pronoun would display an amplified N400 response, given its status as an unexpected referential form compared to the standard personal pronoun. Furthermore, I expected an increased Late Positivity associated with the d-pronoun, prompting the mental model to incorporate attentionally highlighted information about a referent triggered by the attentional (re)orientation and information foregrounding function of the d-pronoun. The results of the experiment confirm these predictions and previous findings, revealing a biphasic N400-Late Positivity pattern for d-pronouns relative to personal pronouns.

In the time window of 700–1100 ms, the d-pronoun exhibits a heightened negative response compared to the personal pronoun, resembling an N400 effect. The intensity of this negativity is influenced by levels of probability and expectation, as discussed in several previous studies (e.g. [Kutas & Hillyard 1983](#), [Schumacher et al. 2015](#)). In the time window of 1100–1400 ms, the findings reveal a positive shift for d-pronouns in contrast to personal pronouns. This positive deflection is interpreted as a Late Positivity, indicating elevated processing demands attributed to attentional focus and the updating of the mental discourse model (e.g. [Burkhardt 2005](#), [Schumacher et al. 2015](#)). Overall, the findings indicate a biphasic N400-Late Positivity pattern at right midline and anterior electrodes for the d-pronoun relative to the personal pronoun, aligning with previous controlled stimuli research ([Schumacher et al. 2015](#)). Furthermore, this biphasic processing pattern is in line with the findings from the Tschick Experiment (cf. Chapter 8).

Similar to the Tschick Experiment, the N400 observed for the d-pronoun suggests increased processing costs due to its unexpectedness and markedness. Contrary to the assumption that a d-pronoun violates predictions about which referent is more likely to be mentioned next, the N400 seems to indicate that the d-pronoun was not the predicted referential form compared to the highly predicted personal pronoun. This conclusion is drawn from the majority of instances where the d-pronoun referred to the most prominent referent. Note, however, that the observed N400 in the AdT Experiment occurs 200 ms later than the one observed in the Tschick Experiment and lasts 100 ms shorter. Nevertheless, the two effects

observed in the Tschick and AdT Experiment are interpreted as instances of the same component.

Similarly for the Late Positivity, which occurs in the AdT Experiment 100 ms after the one in the Tschick experiment. However, I interpret the observed Late Positivity as a consequence of attentional reorientation, prompting the updating of discourse structure. In contrast to the notion that it signifies mental model updating due to a topic shift, most instances involving the d-pronoun maintain topic continuity by referring to a locally prominent referent. Therefore, the observed Late Positivity is interpreted as a signal of mental model updating triggered by the attentional (re)orienting function of the d-pronoun, which intensifies the prominence of its referent. Consequently, the mental model is updated to emphasize the already prominent referent in the discourse model by positioning it in the information foreground.

In addition to the biphasic pattern, the data revealed an early positivity for d-pronouns relative to personal pronouns, reflecting an early attentional (re)orienting response triggered by the pointing function of the d-pronouns. In the novel *Auferstehung der Toten*, the narrator frequently addresses the listener (or reader) directly by using second-person pronouns. This narrative style not only enhances the resemblance to spoken language but also increases the listener's attention. The listener's attention is heightened because this narration feature is uncommon in literature, and, more importantly, being directly addressed enhances self-relevance to the listener, thereby increasing attention. This phenomenon is supported by several empirical studies. For instance, previous studies have shown that possessive pronouns (Shi et al. 2011, Zhou et al. 2010) or first-person pronouns Brilmayer et al. (2019) elicit early positive ERP responses relative to non-self-relevant stimuli. (Brilmayer, Repp & Schumacher 2023) further find evidence that second-person pronouns, when potentially self-relevant to the addressee, also elicit early positive ERP effects relative to non-self-relevant second-person pronouns (referring to characters in a story). Therefore, the early positivity observed in the AdT Experiment excerpt is interpreted as an indication of attention attraction caused by the narrator frequently addressing the listener directly.

10 General discussion of ERP investigation

In this part, I used auditory naturalistic stimuli from two novel excerpts to examine the processing of d-pronouns compared to personal pronouns. My main aim was to investigate pronoun resolution in a more ecologically valid scenario by recording ERPs while participants listened to an audiobook. This was motivated by a general desire to overcome potential limitations of highly controlled lab experiments, but also by caveats concerning the likelihood of encountering a d-pronoun in certain contexts, since d-pronouns have been associated with informal and oral communication (cf. [Patil et al. 2020](#), [Weinert 2011](#)). Therefore, I chose to investigate the youth novel *Tschick* and the crime novel *Auferstehung der Toten* because both feature a narrative style resembling spoken language. The novel *Tschick* includes colloquial dialogues mainly between two teenagers and in the novel *Auferstehung der Toten* there is an omnipresent narrator who creates an impression of a dialogue between themselves and the listener (or reader). The prevalent resemblance to spoken language in both novels allowed me to investigate referential processing in a dynamic language situation that licensed the use of the d-pronoun and also made available the perspectival center as a prominence-lending cue. Another aim of this research was to determine whether findings from controlled experiments could be replicated using naturalistic stimuli. The prediction was that processing the personal pronoun is relatively effortless, while processing the d-pronoun is more cognitively demanding ([Schumacher et al. 2015](#)). Both experiments successfully replicated the biphasic N400-Late Positivity processing pattern for d-pronouns that was observed in highly controlled experiments. Moreover, additional positive effects were observed that can be attributed to the particular narrative style and perspective-taking, i.e., self-relevance in *AdT* and engagement with the protagonists in *Tschick*. In the following sections, I will in details discuss the different effects observed in both experiments.

10.1 Predictive processing: N400 effect

Concerning the N400, I hypothesized that d-pronouns would exhibit a distinct N400 compared to personal pronouns, indicating the unexpectedness of the referential form. The results of both ERP experiments conducted for this dissertation reveal an enhanced N400 for d-pronouns relative to personal pronouns and thus confirm my hypothesis. In the Tschick Experiment, an N400 in the time window of 500–1200 ms, and in the AdT Experiment, an N400 in the time window of 700–1100 ms is observed. Differences in latency might be due to speaker-specific aspects and are not pursued any further. Further, it is important to note that the novel *Auferstehung der Toten* is not only set in Austria; it also incorporates colloquial, region-specific Austrian language, revealing dialectal influences. Despite instructing the audio material speaker to read in standard German rather than in dialect, the text itself contains dialectal constructions. These constructions may have appeared unfamiliar or odd to participants from the University of Cologne, who may not be accustomed to that particular dialect. Consequently, the N400 observed in the AdT Experiment could be attributed to the unexpected use of d-pronouns, a characteristic feature of southern German dialects (Patel-Grosz & Grosz 2017). However, the fact that the *Tschick* excerpt, which is not written in a dialectal language, also elicited a N400 effect, leads me to argue that the observed negative amplitude in both experiments likely represents the same underlying linguistic effect.

Previous research suggests that referential predictions arise from the prominence structure of the preceding discourse (Tomaszewicz-Özakin & Schumacher 2022, von Heusinger & Schumacher 2019). Any deviations from this structure are expected to be reflected in a more pronounced N400 component. Previous highly controlled studies (Schumacher et al. 2015, Fuchs 2024) have associated their observed N400 effect with a prediction error linked to the prominence hierarchy of referents. Following the prominence framework (von Heusinger & Schumacher 2019), the referent with the highest prominence is considered the most likely to be mentioned next. According to Schumacher et al. (2015: 8), “coreference relations depend on certain prominence features that govern the ranked set of referential candidates in the mental representation. Coreference with a less prominent referent (assumed for d-pronouns) results in processing costs.” In accordance with this perspective, it has been argued that the N400 effect suggests that the addressee interpreted the demonstrative pronoun as coreferent with the unpredicted, less prominent referent (cf. Schumacher et al. 2015, Fuchs 2024). Strictly speaking, however, it remains unclear in these earlier studies whether the observed N400 stems from the reference to a less prominent referent or whether it is actually re-

lated to the less predicted referent form. For comparison, the personal pronoun is assumed to be the default pronoun type in German, thus it is the most predicted referential form.

In both novel excerpts examined in this dissertation, the majority of d-pronouns actually refer to the locally most prominent referent. Moreover, the corpora barely include any ambiguous contexts for d-pronouns. Therefore, the observed enhanced N400 for d-pronouns in both experiments cannot be attributed to a prediction error arising from the selection of an unpredicted referent. I instead attribute the observed N400 for d-pronouns to the fact that it is a more marked pronoun type, and its usage is more unexpected compared to the personal pronoun, which represents the default pronoun type. This aligns with the common practice of associating the N400 with prediction (e.g., Bornkessel-Schlesewsky & Schumacher 2016, Bornkessel-Schlesewsky & Schlewsky 2019), although it no longer pertains to the prediction of an upcoming referent but rather to the prediction of a referential form (e.g., Kehler et al. 2008, Kehler & Rohde 2013, Brilmayer & Schumacher 2021). Following this, Brilmayer & Schumacher (2021) also discover evidence supporting preferences in the form-to-function mapping of anaphors, as modulated by the N400.

Thus, the current research has provided an answer to the question of which prediction error (unexpected discourse referent or unexpected referential form) the N400 observed for d-pronouns – specifically in the two studies of this dissertation – is attributed to. I showed that the N400 observed for d-pronouns results from prediction errors related to the referential form. I have thus provided evidence that referential form is also predicted in referential processing. Regarding my hypothesis, the findings support the assumption that the predictions stem from the prominence hierarchy. However, the predictive process surfacing in the N400 observed is not associated with discourse prominence, as previously discussed in several accounts (e.g., von Heusinger & Schumacher 2019, Jasinskaja et al. 2015). Instead, it represents a specific form of prominence associated with each referential form, which has been referred to as the production bias (Rohde & Kehler 2014). Based on the observed N400 effect in the current research for d-pronouns relative to personal pronouns and in consideration of models that postulate a form-function correlation, I propose the inclusion of an additional code prominence scale, which I refer to as *form hierarchy*, that is closely connected to the prominence hierarchy of referring expressions. This form hierarchy reflects expectations about the upcoming referential form, and thus corresponds to the production bias proposed by Rohde & Kehler (2014). Similarly, Givón (1983) introduces a *topicality scale* for different referring expressions, which suggest that different referential forms exhibit varying degrees of prominence. Givón (1983)

places zero anaphors and unstressed personal pronouns at the top of his scale. Since this hierarchy but also other hierarchies that relate referential form to the cognitive status of a referent (Ariel 1990, Gundel et al. 1993) are based on English, a question arises about the placement of German pronouns on the scale, given that German possesses a more extensive pronoun system. German d-pronouns are considered to occupy a lower position on these hierarchies than personal pronouns, implying that d-pronouns represent a less prominent referential form (or refer to a less prominent referent), as supported by expanded hierarchies (Ellert 2010, Ahrenholz 2007). With respect to the discourse representation, I assume that in a narrative centered around a particular character for a prolonged period, this character is positioned prominently on the hierarchy of discourse referents. This prominence arises from the character being the discourse topic, and likely possessing other cues of prominence such as being the proto-agent and subject. Given their high ranking in the discourse referent hierarchy, it follows that a referent of such prominence is typically referred to by a highly prominent referential form – namely, in German, the personal pronoun (or a zero pronoun when applicable).

Previous research has demonstrated that the N400 effect can be associated with various computationally demanding anaphor-antecedent relations. Therefore, attributing the entire N400 component solely to the referential form is not appropriate. However, the ERP results presented in this dissertation challenge the explanation favored by Schumacher et al. (2015), suggesting that the N400 indicates predictions regarding the choice of referent. This claim is countered by the fact that an N400 is observed in the current experiments, although the majority of references point to the locally most prominent referent. This implies that the effect in Schumacher et al. (2015) may also be correlated with referential form predictions. However, definitive proof is elusive, as Schumacher et al. (2015) employed ambiguous contexts, making it unclear to which referent the pronoun referred. While it cannot be conclusively refuted that the N400 in Schumacher et al.'s (2015) data indicates reference to a less prominent referent, this explanation can be weakened as a favored interpretation based on the results of this research.

10.2 Discourse updating: Late Positivity effect

Concerning the Late Positivity, it was hypothesized that the d-pronoun would exhibit a distinct positive deflection starting around 600 ms relative to personal pronouns. This positive deflection is considered a reflection of the updating of the mental discourse representation triggered by attentional (re)orienting. Both experiments reveal a Late Positivity and, therefore, support previous findings. For

the Tschick Experiment, this effect occurs between 1000–1400 ms, and for the AdT experiment, it occurs between 1100–1400 ms. The time course of the Late Positivity in both experiments is somewhat delayed compared to previously reported updating effects (e.g., Schumacher et al. 2015, Aurnhammer et al. 2021), which I attribute to the particular nature of the audiobook stimuli. During the processing of an entire audiobook plot, a complex mental model (involving numerous individuals, events, time points and relations between these entities) has to be constructed and maintained continuously for the unfolding story, i.e., the cognitive load associated with discourse management and updating is higher than in two-sentence scenarios that have typically been used in previous lab experiments.

Following von Heusinger & Schumacher (2019), it is assumed that prominence relations between discourse referents are integrated into the mental discourse representation. Previous research has linked the Late Positivity with costs associated with the organization of discourse referents and the maintenance of the mental representation, as demonstrated for various information structural phenomena (Hirota & Schumacher 2011, Wang & Schumacher 2013, Hung & Schumacher 2014). This implies that any reorganization, such as a change in the prominence relations within the mental model, prompts an update, resulting in an enhanced Late Positivity. Regarding d-pronouns, research has linked the Late Positivity to the concept that when d-pronouns refer to a previously less prominent referent, that referent becomes more central in the upcoming discourse. Consequently, when a d-pronoun is interpreted as signaling such a shift, the mental discourse representation requires updating, and this updating is reflected in the Late Positivity (Schumacher et al. 2015).

However, in both novel excerpts, the d-pronoun, in the majority of cases, refers to a locally prominent referent. Consequently, there is no topic shift occurring when the d-pronoun is used to refer to that locally prominent (topical) referent. Thus, the updating of the discourse representation seems redundant. Instead, I attribute the observed Late Positivity effect to the attention-orienting function of the d-pronoun. This function leads to the creation of a relief profile, where the referent of the d-pronoun becomes even more conspicuous. Based on the results of the two EEG experiments I propose, that the purpose of updating the mental model is to accentuate the current (already prominent) referent in the discourse model, placing it prominently in information foreground. The speaker or writer consistently emphasizes that the referent is presently important and will continue to be significant in the upcoming discourse. During the creation of a relief profile, the language producer consistently signals to the listener or reader that the respective referent remains crucial by reinforcing it. This does not entail a

narrow sense of discourse updating, involving a change in the prominence hierarchy. Instead, it entails a reinforcement by intervening in an attention-orienting manner. Regarding my hypothesis, the findings support the claim that the d-pronoun elicits a Late Positivity effect triggered by the attentional (re)orienting that the d-pronouns indicate. I interpret the Late Positivity as indicating reinforcement of the referential structure and the associated costs of updating discourse representation. Recent research also emphasizes this interpretation, suggesting that the Late Positivity indicates integration (Aurnhammer et al. 2021, 2023, Brouwer et al. 2012, 2017). Thus, the current results functionally refine the updating views of the mental model: It has been shown that the updating does not merely refer to the reorganization of discourse referent in the mental model. Instead, mental model updating also occurs when a certain already prominent referent is foregrounded by additional attention orientation towards this referent.

10.3 Perspective: Frontal positivity

The post-hoc analysis in Subsection 8.8.2 has revealed that the frontal positivity observed in the Tschick Experiment is associated with perspective-taking or more specifically engagement and identification with the protagonist(s). This result suggests that the cognitive effort required when changing perspective due to dialogic requirements is reflected in this frontal positivity. This perspective effect also underscores the substantial influence that perspective can have over the processing of d-pronouns. I propose that this effect is closely intertwined with attentional reorientation. The fact that d-pronouns (re)orient attention as part of their core functions seems to reinforce perspective shifts, as shown by the pronounced frontal positivity for d-pronouns but not for personal pronouns. While personal pronouns are also uttered by various perspective-holders, there is no additional positivity observed. This suggests that the attention-orienting function of d-pronouns strongly correlates with perspective-taking, highlighting the directing function of a perspectival shift, which becomes evident in enhanced processing costs. Furthermore, it has been demonstrated that d-pronouns in the perspective of Maik differ significantly from those in the perspective of the father and Tschick. Visual inspection further revealed that d-pronouns in the perspective of the main character, Tschick, elicit the most pronounced positive amplitude, followed by d-pronouns uttered by Maik, and with d-pronouns uttered by the father showing the least pronounced positivity. In other words, d-pronouns uttered in the stances of the two main protagonists exhibit more pronounced positivity than d-pronouns uttered by the father. Participants do not exert as much

(cognitive) effort to shift towards the perspective of the father, as evidenced by the attenuated amplitude of the frontal positivity.

This gradation among different perspective-holders, with Maik's (the narrator's) perspective showing the second-largest amplitude, indicates that the observed pattern is not solely caused by a shift in perspective. Harris (2021) argues that the narrator inherently holds the default perspective, and any deviation from this norm should result in increased processing costs. This proposition is supported by empirical studies, such as those conducted by Meinhardt et al. (2011), Richter et al. (2020), and Sabbagh & Taylor (2000). However, Harris's (2021) claim holds true regarding extradiegetic narrated texts, i.e., those without dialogue or embedded narration. But in the current *Tschick* excerpt, there are numerous dialogues present. Following reasoning by Harris (2021), the characters Tschick and the father, presented through Maik's first-person perspective, are expected to exhibit heightened positive (frontal) amplitudes. Conversely, Maik's perspective, being the default and requiring no shift, should elicit a reduced positivity. However, the results of the post-hoc perspective analysis do not align with these expectations. Instead, the results illustrate a trend where d-pronouns reflecting the narrator's perspective yield higher processing costs in form of a frontal positivity, while those indicating the father's perspective exhibit relatively reduced frontal positivity. Thus, I assume that the main protagonists vs. other protagonists factor is deemed to exert a greater influence on the processing costs of d-pronouns due to listeners' inclination to engage with the protagonist's perspective.

A crucial aspect of the current research is the investigation of longer narrative texts. Therefore, perspective also tightly correlates with other narration-specific features such as the character model and the story world model (Busselle & Bilandzic 2008). In previous empirical research supporting Harris' (2021) claim, different types of perspective shifts have been investigated, as in the current research. The studies by Meinhardt et al. (2011), Richter et al. (2020), and Sabbagh & Taylor (2000) focus on perspective shifts caused by theory of mind manipulations, where considering another person's perspective is crucial to view a certain scenario from the 'right' angle. In the current research, theory of mind does not play a decisive role for the perspective shift. Instead, a deictic shift is needed to interpret the pronouns used in the direct speech part correctly. However, the perspective, meaning the viewpoint of a certain character, does not necessarily have to be considered in the same way as for theory of mind. There is, however, research related to engagement indicating that listeners or readers of a narrative perform an act of immersion or transportation (Green & Brock 2000), where readers or listeners take on the protagonist's goals and plans.

The father represents a mean, unfair, uncaring, and dishonest character who is, on top of that, violent towards his son, whereas the two main protagonists represent brave, cool, and rebellious characters that are easy to identify with (at least for university student participants of the study). I therefore suggest that the perspective shift towards the main character's perspective is more engaging than a shift towards an antagonist's perspective. I propose that the larger positivity observed for d-pronouns uttered by the main protagonists indicates a stronger identification with these characters. However, in assuming this, I interpret the terms identification and engagement as indicating a stronger willingness to perform a perspectival shift, which differs from common use of psychologists referring to a general process during reading a narrative (Green & Brock 2000, Busselle & Bilandzic 2008). My assumption also corresponds with Brilmayer et al.'s (2019) findings, which propose that main protagonists generate more pronounced effects because of a higher level of engagement with these characters. Brilmayer et al. (2019) identified a distinct P300 effect for pronouns referring to the main character (the little prince) compared to pronouns referring to other characters. They speculate that this distinction arises because information related to the little prince may be considered more informative for study participants, given his role as the main protagonist. However, a direct comparison between the Tschick Experiment and the study by Brilmayer et al. (2019) is difficult, since perspective analysis of the current research examined which character utters the d-pronoun, while Brilmayer et al. (2019) examine which character the pronoun refers to.

The explanation that the frontal positivity observed in the Tschick Experiment signals a shift between perspective-holders is further supported by the AdT Experiment, where no such frontal positivity is observed. In the *Adt* excerpt, all d-pronouns are uttered by the narrator, aligning perfectly with the conclusion that the observed effect in the Tschick Experiment indicates a change in perspective-holders.

10.4 Self-relevance: Early positivity

The research in this dissertation has also stressed the effect of self-relevant stimuli. In the AdT Experiment the results reveal an enhanced early positivity for d-pronouns relative to personal pronouns. Also for the Tschick Experiment visual inspection has revealed an early positivity. This early positivity especially becomes evident when differentiating between the perspective-holders of d-pronouns. Then a strong enhanced early positivity is evident for d-pronouns that are uttered by the father.

In the *AdT* excerpt the narrator often addresses the listener or reader directly by using second person pronouns, creating a unique narrative style. This approach heightens the listener's or reader's attention because being directly addressed enhances their sense of personal relevance. There are numerous empirical studies supporting this claim (e.g., Knolle et al. 2013, Ninomiya et al. 1998, Shi et al. 2011, Su et al. 2010). For instance, there are studies demonstrating that one's own or familiar body parts (Ninomiya et al. 1998, Su et al. 2010, Gunji et al. 2009, 2013), or hearing one's own name (Berlad & Pratt 1995, van der Stelt & van Boxtel 2008), lead to enhanced P300 responses due to self-relevance. Similar effects have also been observed for self-relevant pronouns, such as possessive pronouns vs. personal pronouns (Zhou et al. 2010, Shi et al. 2011), or first-person pronouns vs. second- and third-person pronouns (Brilmayer et al. 2019).

In the study by Brilmayer et al. (2019), an early (150-250ms) positive ERP response was observed for first-person pronouns in narratives. However, it is important to note that all pronouns in this study referred to referents mentioned in the story. Consequently, the study only allows for conclusions about the processing of pronouns that may be relevant to others, i.e., referring to other selves. Therefore, the study is not informative regarding pronouns that specifically refer to the participant, as is the case in the *AdT* excerpt. In a subsequent study building upon the research in this dissertation, Brilmayer, Repp & Schumacher (2023) analyzed both EEG experiments from the current dissertation concerning second-person pronouns. The narrative characteristics of the two stories are special because in the *Tschick* excerpt, all occurrences of second-person singular pronouns refer to characters in the story, whereas in *AdT*, the listener (i.e., the participant) is the most likely referent (approximately 30 %) of these pronouns because the heterodiegetic narrator frequently addresses the listener directly. This allows for a comparison of the ERP response of second-person singular pronouns that potentially refer to the listener (*AdT*) with second-person singular pronouns that do not (*Tschick*). In their analysis, Brilmayer et al. (2023) investigated whether the positive ERP effect of self-relevance is independent of a specific linguistic person (or linguistic token) and extends from the first to the second person. Additionally, they explored whether the effect is independent of the referent of the pronoun (listener/story character). The results reveal that the ERPs to second-person pronouns in *AdT* show a positive effect relative to *Tschick*, with a peak amplitude around ~200 ms. This provides evidence that the positive ERP effect found for first-person pronouns generalizes to second-person pronouns, especially when they are potentially self-relevant to the listener (when addressed by the narrator). The authors suggest that the observed positivity reflects attentional processes leading to increased sensitivity of the cortex to the self-other distinction.

Interestingly, an early positivity has also been observed for the *Tschick* excerpt. However, this early positivity for d-pronouns becomes evident only from the perspective of the father (cf. Figure 8.4). This observation may be linked to the emotional weight carried by the paragraph where the father utters a lot of d-pronouns (cf. (34)). In this paragraph, the father is speaking negatively about Tschick and in the narration before the paragraph he hits Maik. Therefore, in this sequence, the listener (or reader) is likely to be highly emotionally affected by the content. I assume that the observed early positivity for d-pronouns uttered by the father indicates a form of self-relevance prompted by the emotional context. This interpretation is supported by other studies that have found enhanced early positivities in response to negative stimuli (Schäfer et al. 2010, Surguy & Bond 2006, Buodo et al. 2006).

Brilmayer et al. (2019: 18) aptly summarize “that the human brain seems to be specifically ‘designed’ to detect self-relevant information in the self and other – even when only listening to a narrative without any of the speakers being physically present.” From the current research, I have demonstrated that the d-pronoun further reinforces the self-relevance effect, as I have observed self-relevance effects in both EEG experiments. However, the self-relevance effect observed in the AdT Experiment differs from the one observed in the Tschick Experiment. In AdT, the self-relevance effect is connected to the narrative style, which includes numerous direct references to the listener (or reader) through second-person pronouns, thereby enhancing attention and self-relevance (Brilmayer et al. 2023). However, the self-relevance effect in AdT is not limited to second-person pronouns (Brilmayer et al. 2023) but also extends to third-person d-pronouns. For the *Tschick* excerpt the self-relevance effect only occurs for d-pronouns uttered by the father, suggesting that self-relevance effect is an immediate cognitive response to negative emotional stimuli. The self-relevance effects observed for d-pronouns in both novel excerpts lead to the conclusion that d-pronouns reinforce the effect of self-relevance due to their attentional (re)orienting function, as evident by the absence of a self-relevance effect for the personal pronoun. Thus, self-relevance appears to behave similarly to perspectival influences in being governed by attention-orienting processes and, consequently, only surfacing for the d-pronoun.

10.5 Influence of evaluation

In the preceding subsection, I have provided explanations for the additional positivities observed for d-pronouns in the two EEG experiments – specifically, the

frontal positivity in the Tschick Experiment and the early positivity occurring in the AdT and Tschick (only for d-pronouns in the stance of the father) Experiment. I argued that the frontal positivity observed in the Tschick Experiment is linked to perspective shifts that occur during the transition between perspective-holders. Additionally, I highlighted that a willingness to adopt a protagonist's perspective is evident in this ERP effect. Furthermore, I connected the early positivity to the processing of self-relevant stimuli, specifically the d-pronoun's reinforcement of self-relevance in the story due to its attention-orienting function.

However, several investigations have additionally linked positive amplitudes to the processing of evaluative and expressive stimuli, particularly those with negative connotations (e.g., [Donahoo & Lai 2020](#), [Citron et al. 2013](#), [Schäfer et al. 2010](#), [Buodo et al. 2006](#)). Furthermore, d-pronouns have been associated with the evaluative function, wherein they are utilized by the perspective-holder to assess a person or an event ([Patil et al. 2023](#), [Hinterwimmer et al. 2020](#)). Therefore, I also explored whether evaluation could account for the additional positive responses, specifically the early positivity in the AdT Experiment and the frontal one in the Tschick Experiment, observed in the ERP. In Subsection 5.4.4 and 6.4.4, I demonstrated that for both novel excerpts in approximately 50 % of cases, a d-pronoun carries the evaluation function. Recent research has underscored the importance of evaluation in the use of d-pronouns. Consequently, I aimed to test whether the factor of evaluation influences the ERP of d-pronouns. I conducted separate post-hoc ERP analyses for the two novel excerpts, applying the same decisive criteria as introduced in Subsection 5.4.4 and 6.4.4. This post-hoc analysis focused on the evaluation function of d-pronouns, utilizing the categories evaluative and non-evaluative. The post-hoc analysis of the AdT Experiment reveals, upon visual inspection, that non-evaluative d-pronouns elicit a more pronounced early positivity relative to evaluative d-pronouns. This finding contrasts with previous results, as it was anticipated that evaluative d-pronouns would evoke a stronger positivity. Conversely, in the post-hoc analysis of the Tschick Experiment, it was observed that evaluative d-pronouns exhibited a more pronounced frontal positivity compared to non-evaluative d-pronouns. However, the divergent results between the post-hoc analyses of the ERPs of Tschick and AdT lead me to conclude that the factor of evaluation may not be the cause of the observed positivities. In Appendix D, I provide the ERP plots from this post-hoc analysis for further reference.

10.6 Extension of discourse representation model

Based on the results of the two empirical investigations performed in this dissertation (Part II and III), I propose a revised discourse representation model for processing discourse referents in narrative texts, building on the model presented by von Heusinger & Schumacher (2019) and informed by the findings of ERP experiments. In essence, the revised discourse representation model posits firstly the existence of a form hierarchy within language comprehension. This hierarchy represents the production bias and thus generates predictions of the upcoming referential form, as evidenced by N400 modulations. Secondly, the model suggests that the highlighting of specific referents, e.g., driven by the attention-orienting function of d-pronouns, causes mental model updating, as demonstrated by the Late Positivity effect, even when discourse structure remains unchanged. Moreover, in addition to the perspective layer which incorporates the perspectival center (Patil et al. 2023), I propose the existence of a dialogue layer. This layer is activated during direct speech and incorporates the different character viewpoints within the overarching narrator perspective.

von Heusinger & Schumacher (2019) emphasize the significance of prominence in shaping and sustaining the discourse representation, proposing a dynamic structure of ranked discourse units that continuously evolves with incoming information (cf. Subsection 2.3.4 for more details). The observed N400 effect for d-pronouns compared to personal pronouns, attributed to the unexpectedness of the referential form, however, suggests the construction of a form hierarchy during language comprehension. This hierarchy reflects expectations about upcoming referential forms and is connected to the prominence hierarchy of referring expressions. The form hierarchy, similar as the topicality scale by Givón (1983) or other hierarchies formulated for German (Ellert 2010, Ahrenholz 2007), places zero anaphors and unstressed personal pronouns at the top. In the context of discourse representation in longer narratives, I propose that a character focused on in a narrative would be ranked highly in the discourse referent hierarchy, predicting the use of a highly prominent referential form, such as personal pronouns in German. However, a lower-ranked referent on the discourse referent hierarchy would predict a different referential form, and a newly introduced, not yet established referent would, for instance, correspond to predictions of the lowest referential form, which is a full indefinite DP. These considerations align with assumptions made by Kehler and colleagues (Kehler et al. 2008, Kehler & Rohde 2013) regarding the production bias within the Bayesian framework, which states the probability of the speaker or writer choosing to use a pronoun to refer to an intended referent (cf. Bader et al. 2022). While von Heusinger & Schumacher

(2019) suggest that the discourse referent hierarchy can be dynamically updated, the form hierarchy is not dynamically updated, and thus, the most prominent referential form always involves reduced forms such as zero anaphors or personal pronouns.

Moreover, based on the observed Late Positivity for d-pronouns compared to personal pronouns, attributed to the attention-orienting function of d-pronouns contributing to a relief profile when referring to a locally prominent referent, I propose that the discourse representation, specifically the prominence hierarchy of discourse referents, also incorporates the highlighting of specific referents caused by the attention boost directed towards the respective referent. This is evident in both ERP experiments, where a Late Positivity occurs even though the discourse structure, i.e., the discourse topic, remains unchanged, and instead an already prominent referent is highlighted. This necessitates the incorporation of this highlighting effect into the discourse representation. Supporting evidence stems from prosody manipulations, which also show that highlighted information causes a mental model update and must be incorporated into the discourse representation. Late positive ERP amplitudes have been observed for prominent accents (L+H*) and exciting contexts (Röhr et al. 2021), interpreted as indicating that prominent information has a highlighting effect.

Regarding the influence of perspective, as discussed earlier, according to Patil et al. (2023), there exists a prominence layer that integrates the perspectival center, which represents a competing referent alongside those presented on the discourse layer. Furthermore, I suggest that perspectival aspects of a narrative not only impact the referential usage of d-pronouns but also influence neural processing. As observed for d-pronouns in the Tschick Experiment, perspective shifts manifest in large frontal positivities. As outlined in Chapter 7, I also propose an additional dialogue layer containing a discourse referent for each recurring protagonist with direct speech parts. During direct speech segments, the narrator layer becomes inactive, with the dialogue layer taking precedence, reflecting the speaker's viewpoint rather than the narrator's. Participants must keep track of the current speaker (character) to understand the referential expressions used in direct speech, thereby performing several deictic shifts. I propose, that the shift from the perspective layer to the dialogue layer and the shift from one referent on the dialogue layer to another one causes cognitive costs that are evident in frontal positivities. These cognitive costs are further related to the willingness to adopt the perspective of the respective character and are linked to engagement. However, despite the narrator layer's inactivity in dialogue parts, it serves as an overarching framework since the narrator presents the direct speech on the textual level.

However, to account for the fact that the processed stimuli in my experiments were narrative texts, it is important to note that the discourse representation described above only accounts for the stories (or narrative types) investigated. I propose that when listening or reading a narrative, an additional mental model of the story's content has to be constructed. I suggest that the above-mentioned aspects of the discourse representation are embedded in a specific model specifically constructed for a story (e.g., [Altshuler & Maier 2020](#), [Maier & Semeijn 2021](#), [Semeijn 2021](#)). By building a specific mental model for a certain story, the necessary deictic shift, which is required to understand the narrative in the first place, is enabled.

Interestingly, my results have also shown that a mere model for discourse referents is not sufficient when dealing with longer narrative texts. Instead, I have also observed socio-emotional effects in both experiments (in the form of early or frontal positivities). These effects, which I relate to self-relevance and the processing of emotional content, show that engagement with a narrative should also be included in a model for discourse processing as the emotional component has a significant influence on how longer narratives are processed. It is interesting that these socio-emotional effects are only visible in the d-pronoun. I attribute this to the attention-orienting function of the d-pronouns.

10.7 Summary

In this chapter, I have discussed the findings from two EEG experiments using auditory naturalistic stimuli from novel excerpts to investigate the processing of d-pronouns compared to personal pronouns. The main aim was to examine pronoun resolution in a more ecologically valid setting and overcome limitations of highly controlled lab experiments. The results confirm the hypothesis that processing d-pronouns involves enhanced N400 effects compared to personal pronouns, suggesting increased cognitive demands. The N400 effects were consistent across both experiments, indicating a prediction error related to the unexpected referential form rather than an unpredicted referent. Thus, I propose the additional concept of a *form hierarchy*, suggesting expectations about upcoming referential forms based on their referents' prominence in the discourse (cf. [Brilmayer & Schumacher 2021](#)). Regarding the Late Positivity, the results support the hypothesis that the effect reflects mental model updating caused by attentional (re)orientation. Building on this claim, I proposed a refined updating view that no longer focuses solely on a shift of the discourse prominence hierarchy but also incorporates the foregrounding of a referent through additional attention orientation. I therefore, functionally refine both the N400 and the Late Positivity effect.

Further, the findings highlight the multifaceted nature of d-pronoun processing, involving not only attention-orienting functions, but also perspective shifts, and self-relevance effects. In both experiments socio-emotional effects surfacing in early positive ERP responses were observed. Additionally, I have demonstrated that perspective shifts are linked to engagement and the willingness to undergo a perspectival shift, depending on the likability or identification with a certain character. Moreover, it can be argued that the observed positivities for perspective shifts, self-relevance, and emotions represent similar underlying processes. All three phenomena are intertwined with attention mechanisms: perspective shifts involve redirecting attention toward different narrative perspectives, self-relevance influences the allocation of attention toward personally significant information, and emotions capture attention due to their salience. Components of the P3 family have been linked to a fundamental system responsible for cortical reorientation, wherein a release of noradrenaline enhances cortical excitability, disrupting the current network state and facilitating effective reorientation in response to attention-grabbing stimuli (Nieuwenhuis et al. 2005). Therefore, I categorize these processes as part of the broader P3-family of ERP components (e.g, Sassenhagen et al. 2014), which are associated with attentional cognitive processes. All in all, the ERP experiments performed in this dissertation indicate the importance of engagement during referential processing in longer narrative discourses and also lead to a functionally refined view of the N400 and the Late Positivity components.

11 Conclusion

In this empirically based dissertation, I presented two corpus studies as well as two ERP experiments. The overarching goal was to investigate both the use and processing of d-pronouns in larger narrative texts. To address these inquiries, the corpus and ERP investigations focused on two extended excerpts from the novels *Tschick* and *Auferstehung der Toten*. Part II delved into the corpus investigation, with Chapters 5 and 6 presenting distinct corpus analyses for each novel excerpt, followed by a comprehensive discussion of the corpus findings in Chapter 7. Part III centered around the ERP investigation, with Chapters 8 and 9 presenting the ERP experiments for the respective novel excerpts. This was followed by a general discussion of the ERP findings in Chapter 10.

Corpus conclusions The corpus investigation aimed to answer the question *How are d-pronouns used in larger narrative texts?* The prevailing notion is that d-pronouns tend to prefer less prominent referents, favoring antecedents such as the object/proto-patient/last-mentioned/non-sentence-topic. In contrast, personal pronouns typically lean towards the most prominent referent, such as the subject/proto-agent/first-mentioned/sentence-topic. However, my analysis challenges this widely accepted view of the d-pronoun's referential behavior and the complementarity of d- and personal pronouns. In both corpora, the majority of d-pronouns referred to the locally most prominent referent (subject/proto-agent) – just as personal pronouns. This suggests that the referential behavior of d-pronouns is not primarily guided by the local prominence-lending cues of their previous mention. Prior research has often emphasized the importance of prominence-lending cues in pronoun resolution. The surprising finding of this dissertation's corpus investigation is that both personal and d-pronouns seem to behave in the same way when it comes to their referential behavior. Initially, I had different expectations for the data. I had planned to investigate the interplay of prominence-lending cues, but this was not possible as the features of d-pronouns mirrored those of personal pronouns. Therefore, the question arises: why does the referential behavior observed in this research differ significantly from that of previous studies?

11 Conclusion

One key aspect of the novel excerpts used in this study, in addition to their naturalistic and uncontrolled nature, is their colloquial narrative style, which resembles spoken language. Previous research has indicated that d-pronouns are preferentially used in spoken (Weinert 2007, Ahrenholz 2007, Bethke 1990) and informal contexts (Patil et al. 2020). By using two novel excerpts that resemble spoken language, I take this preference for d-pronouns into account. As both novel excerpts use a narrative style resembling spoken language, both novel excerpts force the reader to pivot into oral language use. The similarity to spoken language may be the primary reason for the observed use of d-pronouns in both corpora. Due to this resemblance of spoken language, the reader is compelled to shift into the use of oral language, much like when reading a poem, indicating a different genre (Blohm et al. 2017, Zwaan 1994). Nevertheless, it is important to note that my investigation focused on written texts created by an author, rather than spoken language. Although I refer to the stimuli as naturalistic, it should be acknowledged that the author may have chosen each referring expression for a specific reason unknown to us. Therefore, the naturalness of the stimuli is definitely debatable, and it is possible that the production of the pronouns during the writing process may not have been as spontaneous as in everyday spoken language production.

Additionally, both corpora indicate that d-pronouns primarily serve the (structural) information foreground function and thus reinforce their referent. This observation can also be linked to the fact that d-pronouns in both corpora typically refer to the locally most prominent referent and do not frequently change the current discourse topic. Previous psycholinguistic research has often emphasized the role of d-pronouns in topic shifting (e.g., Bosch et al. 2007, Schumacher et al. 2015), leading to the misconception that this is their primary function. However, the current findings challenges this belief, showing that d-pronouns primarily serve to highlight already prominent referents, rather than shifting attention – at least in nonambiguous and oral(-like) contexts). This notion is supported by other studies observing this pattern (e.g., Weinert 2011).

Furthermore, my investigation has uncovered evidence supporting the importance of perspectival features in the use of d-pronouns. Both novels exhibit distinct perspectival features; the *Tschick* excerpt comprises a dialogue structure, while *Auferstehung der Toten* features a prominent omnipresent narrator. As proposed by Hinterwimmer (2019), d-pronouns never refer to the perspectively most prominent discourse referent. In Patil et al. (2023), they expanded the prominence hierarchy for discourse referents by introducing a perspective layer that includes the perspective-holder as a competing maximally prominent referent.

This leads to the understanding that the perspectival center is the most prominent referent. Therefore, d-pronouns avoid referring to *this* most prominent referent. Besides demonstrating that perspective is conveyed through various means (dialogue, prominent narrator), my corpus results show that d-pronouns avoid perspectival centers even in neutral statements. This is indicated by the fact that the majority of d-pronouns in both corpora refer to the locally most prominent referent, even though approximately half of the d-pronouns carry an evaluative function in both corpora. I attribute this observation to the fact that, due to the dialogue or dialogue-like nature, the speaker is prominently placed as the perspective-holder even when neutral statements are uttered. This means that in direct speech parts, which often occur in *Tschick*, the person uttering the direct speech is the perspectival center, even if the statement is neutral. Similarly, in *AdT*, where the narrator is the perspectival center expressing their attitudes and evaluations, even when they express a neutral statement, the narrator is considered the perspective-holder. Thus, I propose the introduction of a dialogue layer within narratives such as *Tschick* (containing direct speech), complementing the existing perspective layer. This dialogue layer contains discourse referents for each recurring protagonist engaging in direct speech. During direct speech segments, the narrator layer (aka the perspective layer proposed by Patil et al. 2023) becomes inactive, allowing the dialogue layer to take precedence. This shift enables the perspective of the respective speaker to be conveyed rather than that of the narrator. It is then this referent on the dialogue layer (the one who is uttering direct speech) that competes and exceeds the highly prominent referent on the discourse layer. As for d-pronouns, famously described as disliking reference to the most prominent referent, they avoid referring to the perspectival center, which is represented on the dialogue layer in direct speech cases. As *Tschick* is narrated by an autodiegetic narrator, who also engages in intradiegetic direct speech, I propose following Genette (1980) that the narrator is represented and available as a discourse referent on both the perspective layer and the dialogue layer.

ERP conclusions Turning to the ERP investigation, which aimed to answer the question *How are d-pronouns processed in naturalistic contexts?* The results show that both experiments replicated the N400-Late Positivity pattern previously observed in highly controlled studies. However, in interpreting the observed effects, I functionally refine both the N400 and the Late Positivity effect. Previous studies investigating ambiguous d-pronouns following transitive context sentences associated the observed N400 with the d-pronoun referring to the less expected, less prominent discourse referent (Schumacher et al. 2015). Since, in both novel

11 Conclusion

excerpts, d-pronouns in the majority of cases refer to the locally most prominent referent, this explanation cannot account for the observed N400 in this research. Instead, I argue to interpret the N400 as reflecting expectation errors caused by the less predicted referential form that the d-pronoun represents compared to the default personal pronoun.

Concerning the Late Positivity, previous studies have linked the effect to discourse updating caused by the forward-looking function of d-pronouns, as they, due to their topic-shift function, change the discourse structure. However, in the current research, d-pronouns, in the majority of cases, continue the current discourse topic and emphasize it (attentional boost). Thus, the observed Late Positivity in this research is attributed to a mental model updating process caused by building a relief profile, i.e., highlighting a currently locally prominent referent with attention.

In addition, I have observed early positivities in both ERP experiments that I relate to socio-emotional processes, such as self-relevance and the processing of emotional content. These effects show that engagement with a narrative also has a significant influence on the processing of specific referring expressions. Interestingly, these socio-emotional effects are only evident for the d-pronoun, highlighting its attention-orienting function, on the one hand, but also its additional function of indicating emotional and evaluative content.

Moreover, I propose a revised discourse representation model based on the results of my ERP experiments. The presence of the N400 effect for d-pronouns indicates the inclusion of an additional form hierarchy in the mental model. This hierarchy reflects expectations regarding referential form and is closely linked to the prominence hierarchy of discourse referents. The Late Positivity observed for d-pronouns suggests functions related to attention-orienting and information foregrounding, impacting discourse representation by emphasizing an already prominent referent. Additionally, I provide support for the assumption that the mental model incorporates a perspective layer (Schumacher et al. 2024), which guides perspective shifts as supported by the large positivity elicited during such shifts. I expand this assumptions by the introduction of an additional dialogue layer which is motivated by the fact that in direct speech the character uttering the speech is the perspectival center. This dialogue layer is subordinated to the perspective layer because in a narrative even direct speech is voiced by a narrator. Based on the findings regarding the perspective-holder (Tschick Experiment), I suggest that changing between these layers, or between different worlds represented by distinct referents on the dialogue layer, incurs costs that manifest as frontal positivities. The proposed model accounts for narrative texts, underscoring the necessity of a specific mental model for storytelling. Furthermore,

it emphasizes the importance of considering socio-emotional effects induced by narrative engagement on discourse processing.

Limitations On a final note, I would like to address some limitations of the empirical investigations discussed in this dissertation. The current research did not use immersion questionnaires or similar measures to evaluate participant engagement or perspective-taking. While my assumptions about the socio-emotional effects of self-relevance and emotion are grounded in the observed ERP effects and previous literature, it is crucial to note that aligning the ERP interpretation with the results of an engagement questionnaire is an important step in advancing the systematic investigation of referring expressions in narrative texts. Therefore, for future experiments involving larger narrative texts, I recommend to incorporate post-experiment engagement questionnaires that assess immersion and/or perspective-taking. This aligns with common empirical practices in psychological studies exploring the psychological effects of narrative exposure (e.g., [Green & Brock 2000](#), [Jacobs 2015](#), [Appel et al. 2019](#)).

Moreover, the utilization of narratives extracted from novels carries the drawback that authors may have intentionally employed the referential expressions under investigation as stylistic devices. Conversely, voice recordings present the limitation of often featuring shorter stories. Analyzing novels necessitates the development of a comprehensive discourse model; therefore, I opted to use narratives. However, my findings indicate a connection between the referential behavior of d-pronouns and the perspectivization observed in dialogues. This assertion should certainly be validated using oral language data.

Summary All in all, my research marks a significant advancement in reference and pronoun research. Specifically, I have expanded the scope from self-written short two-sentence items to longer narrative texts, thus employing more naturalistic stimuli. This approach has yielded fundamental and substantial findings. Firstly, I have demonstrated that d-pronouns in naturalistic contexts, resembling spoken language, primarily serve the information foreground function. This challenges the notion that d-pronouns are inherently associated with topic shift or reference to a locally less prominent referent. Additionally, my research provides further validation for the perspective approach proposed by [Hinterwimmer](#) and colleagues. I have illustrated that d-pronouns tend to avoid referring the maximally prominent referent, known as the perspective-holder represented on the perspective layer. Moreover, I have expanded upon [Hinterwimmer](#) and colleagues' approach ([Hinterwimmer 2019, 2020](#), [Patil et al. 2023](#)) by revealing that

11 Conclusion

even in neutral statements d-pronouns still do not refer to the perspectival center, instead they refer to the locally most prominent referent. Thereby, I demonstrate that even in neutral statements a perspectival center can be present as a discourse referent. This extension of the perspective approach suggests that in scenarios involving a dialogue (or that are dialogue-like), the narrative instance itself (which could also be a protagonist uttering direct speech) becomes so prominent that it even exists in neutral statements, therefore, the d-pronoun still disprefers the perspectival center.

Furthermore, concerning the neural processing of d-pronouns, I have demonstrated that the ERP components observed in controlled studies can be replicated using naturalistic stimuli. Additionally, I have refined the functional understanding of the N400 and Late Positivity components. I propose that the N400 associated with d-pronouns signifies the unexpected choice of referential form, rather than referring to a locally less prominent referent as previously suggested. Regarding the Late Positivity, I suggest that it indicates an attentional boost and a relief profile of an already prominent referent. This highlighting of a referent must be included in the mental model and thus requires an updating process, although the d-pronoun refers to an established prominent referent. Moreover, I have underscored the significance of socio-emotional factors in the processing of narrative texts. Effects such as self-relevance triggered by directly addressing the listener (or reader) or emotional reactions are also evident in early positivities when d-pronouns are used in narrative contexts.

Overall, through the utilization of naturalistic stimuli, I have enhanced our current understanding of the referential behavior exhibited by German d-pronouns, while also refining interpretations related to the two key ERP components pertinent to referential processing. Thus, delving into naturalistic language stimuli, such as narrative texts, has allowed for the exploration of inherent features unique to these texts – such as the influence of perspective, protagonists, and emotional resonance – that cannot be adequately captured in short, self-written stimuli. Additionally, I have demonstrated that these features do indeed impact the referential behavior and processing of d-pronouns.

Appendix A: Annotation Scheme

The following section provides a detailed explanation of the annotation scheme. It outlines the applied annotation layers and tagsets in separate sections. First, in Section A.1, the segmentation scheme is described, followed by the selection scheme of referential expressions in Section A.2. In Section A.3, the annotated features including referential form, grammatical, and thematic role are presented. Lastly, Section A.4 delves into the description of referential chains. The sequence of descriptions follows the chronological order of annotations. This annotation method applies to both corpora, hence examples from both novel excerpts, *Tschick* and *Auferstehung der Toten*, are provided in this section.

A.1 Intra-sentential segmentation

I conducted an annotation of intra-sentential segmentation to ensure sentence comparability, treating clausal elements as segments except for restrictive relative clauses. Commas were primarily employed to identify segment boundaries. The following structural features prompted annotation as separate segments: Coordinated main clauses (cf. (67)) were divided into two segments. However, if only two or more verbs were coordinated and no verb had a complement or if the verbs shared the same complement, they were not separated (cf. (68)). Additionally, complement clauses dependent on the main clause's verb were treated as independent clausal elements (cf. (69)). Exclamations and interjections were also annotated as separate segments (cf. (70), (71)). Fragments were likewise annotated as distinct segments (cf. (72)). Moreover, complex enumerations, such as those in the fragments in (73), were segmented separately. However, simple enumerations that merely coordinated DPs were annotated as a single segment (cf. (74)). In the examples, segment boundaries are marked by square brackets.

- (67) [Tschick steuerte hinten an den Diesel-Zapfsäulen vorbei] [und parkte zwischen zwei großen Lastwagen mit Anhängern] ... (T 28, 16)
[Tschick steered past the diesel pumps in the back] [and parked between two large trucks with trailers] ...

A Annotation Scheme

- (68) [... und hockten uns dann nach einer scharfen Biegung in ein Gebüsch und warteten.] (T 30, 42)
[... and then crouched down in a bush after a sharp curve and waited.]
- (69) [Und plötzlich fiel mir ein,] [wie wir an Benzin kommen konnten.] (T 28, 42)
[And suddenly it occurred to me] [how we could get gasoline.]
- (70) [Josef,] [lass doch] (T 45, 24)
[Joseph,] [let it be]
- (71) [Zack,] [scheuerte er mir eine.] (T 45, 23)
[Zack,] [he smacked me.]
- (72) [Ein Buch, wo einem die ganze Welt erklärt wird,] [ein Buch für Sechsjährige.] (T 28, 47)
[A book where the whole world is explained to you,] [a book for six-year-olds.]
- (73) [Dazu dann noch der Brombeergeschmack in meinem eigenen Mund] [und die orangerote Dämmerung über den Baumkronen] [und im Hintergrund immer das Rauschen der Autobahn –] [mir wurde ganz seltsam zumute.] (T 30, 31)
[Add to that the taste of blackberries in my own mouth] [and the orange-red twilight above the treetops] [and in the background always the roar of the highway-] [I felt really strange.]
- (74) [Wir fanden Radkappen, Plastikplanen, Pfandflaschen, Unmengen Bierdosen und am Ende sogar einen Fünf-Liter-Kanister ohne Verschluss,] [aber irgendwas Schlauchähnliches fanden wir nicht.] (T 29, 3)
[We found hubcaps, plastic tarps, deposit bottles, tons of beer cans, and in the end even a five-liter can without a cap,] [but we did not find anything resembling a hose.]

The following cases were not annotated as separate segments: restrictive relative clauses (cf. (75)), interjections (cf. (76)), repetitions (cf. (77)), constituents that appear in the pre-pre-field of the *topological Feldermodell* due to left dislocation or topicalization (cf. (78)), also clefts were treated as one segment together with the copula (cf. (79)).

- (75) [Die einzigen Verbrecher, die in diesem Wald rumliefen, waren garantiert wir.] (T 30, 62)
[The only criminals running around in this forest were definitely us.]
- (76) [Ja, da guckst du.] (T 45, 62)
[Yeah, you're looking.]

- (77) [Oh god, oh god.] (T 45, 98)
[and then crouched down in a bush after a sharp curve and waited.]
- (78) [Der Nemeč, der hat das schon am ersten Tag erkannt.] (AdT 3, 16)
[The Nemeč, he-DPRO realized this on the first day.]
- (79) [Was den Richter hauptsächlich interessierte, war,] ... (T 46, 22)
[What mainly interested the judge was] ...

A.2 Referring expressions that refer to animate referents

This section introduces the annotation scheme for referring expressions. Note that only those referring expressions that refer to animate discourse referents were annotated. However, the annotation of referring expressions required consideration of certain special cases, which will be explained in the following paragraphs.

Coordinated constructions For coordinated constructions, both the entire coordinated construction and the individual coordinated components were annotated. To enable these annotations, the overlap function of the ‘coreference layer’ in WebAnno was used. An additional rationale for annotating both components was to indicate coreference relations of subsequent referring expressions to the entire construction and its individual referents. Since both the entire coordinated construction and its individual coordinated referents were annotated as overlapping, the individual constituents as well as the entire coordinated construction are treated as separate referring expressions. Consequently, the coordinated construction marked in example (80) results in 5 different referring expressions. Throughout the entire Tschick corpus, there are five coordinated constructions similar in structure to the referring expression ‘*Vater, Mutter, Sohn und Hund*’ in (80).

- (80) Ich [...] sammelte zwei Fotoalben ein, die ich Tschick zeigen wollte. In dem einen war eine Familie, lauter Aufnahmen von [[Vater]₂, [Mutter]₃, [Sohn]₄ und [Hund]₅]₁, und auf jedem Bild strahlten [sie]₁ alle, sogar [der Hund]₅. (T 29, 31)
I collected two photo albums to show to Tschick. In one of them there was a family, full of pictures of [[father]₂, [mother]₃, [son]₄ and [dog]₅]₁, and in every picture [they]₁ were all smiling, even [the dog]₅.

Partitives Partitives were annotated as indefinite pronouns. In this case, the entire partitive expression was annotated (cf. (81)). However, if the expression is split, only a partial expression (the part of the set) is annotated (cf. (82)). Annotating a referential chain involving partitives is not feasible because it is impossible to determine with certainty which referent the referring expression refers to.

- (81) «Was mich mal interessieren würde, [wer von euch beiden] genau hat die Idee zu dieser Reise gehabt?» (T 46, 43)
What I'd like to know is, [which one of you two] exactly came up with the idea for this trip?
- (82) Normalerweise fällt von denen natürlich nie [einer] aus dem Lift ... (AdT 1, 14)
Normally, of course, [they] never fall out of the lift ...

Reflexives Only referential reflexives (cf. (83)) have been annotated. These forms are also commonly referred to as non-inherent reflexives in the literature (Teomiro 2011, Bouma & Spenader 2011). Reflexive forms of inherently referential predicates (cf. (84)) were not included in the annotation process because my annotations focused solely on referring expressions that refer to animate referents. To distinguish between referential and inherently reflexive forms, three distinct tests were employed. These tests are applicable exclusively to referential reflexives, as inherently reflexive forms result in ungrammatical readings (Kaufmann 2003 for German, Everaert 1986 for Dutch): First, the contrast test creates a contrast between the reflexive and another referent ((83a) vs. (84a)). Second, the pre-field test involves moving the reflexive into the pre-field ((83b) Third, the substitution test replaces the reflexive with another referring expression ((83c) vs. (84c)). An example of an inherently reflexive case is illustrated in (85).

- (83) Anna sah sich im Spiegel.
Anna saw herself in the mirror.
- a. Anna sah sich und ihre Mutter im Spiegel.
Anna saw herself and her mother in the mirror.
- b. Sich sah Anna im Spiegel.
Herself saw Anna in the mirror.
- c. Anna sah Frida im Spiegel.
Anna saw Frida in the mirror.
- (84) Er war sich keiner Schuld bewusst.
He was not aware of any guilt.

A.2 Referring expressions that refer to animate referents

- a. * Er war sich und seiner Mutter keiner Schuld bewusst.
He was himself and his mother not aware of any guilt.
 - b. * Sich war er keiner Schuld bewusst.
Himself was he not aware of any guilt.
 - c. * Er war Frida keiner Schuld bewusst.
He was Frida not aware of any guilt.
- (85) Die Frauen waren wahrscheinlich auch irritiert und haben sich gefragt,
... (T 42, 41)
The women were probably also irritated and asked themselves, ...

Predicative constructions In predicative constructions, the predicative noun is excluded from annotation as a referring expression due to its inability to be referred back to, for example, with a pronoun (Erben 1980). Consequently, the predicative noun remains unannotated in copula constructions (cf. (86)), comparative constructions (cf. (87)), as well as constructions with verbs such as *nennen* ('to name', cf. (88)), *werden* ('will be', cf. (89)), or *als* ('as', cf. (90)). This omission stems from the assertion that predicative constructions lack referential properties. Examples (86) to (90) are not taken from the corpora but are provided by the author. The referring expression that would be annotated is highlighted in bold.

- (86) **Leo** ist Lehrer.
Leo is teacher.
- (87) **Leo** verdient so viel wie ein Lehrer.
Leo earns as much as a teacher.
- (88) **Der Lehrer** nennt sich Leo.
The teacher calls himself Leo.
- (89) **Leo** wird Lehrer.
Leo becomes a teacher.
- (90) **Leo** arbeitet als Lehrer.
Leo works as a teacher.

Vocatives Both corpora include numerous vocatives that directly address speakers actively engaged in the situation (cf. (91)), rendering them highly prominent. Consequently, these vocatives are not annotated as referring expressions; instead, segment boundaries are annotated for them. Again, referring expression that were actually annotated are highlighted in bold.

- (91) «Du hast mich gehört, Schwachkopf!» (T, 29, 59)
“You heard me, moron!”

A.3 Referring expressions and their features

Referential form To assign the appropriate referential form to each annotated referring expression, a selection was made from the following list: personal pronoun (e.g., *sie, er, es*), d-pronoun (e.g., *die, der, das*), demonstrative pronoun (e.g., *diese, dieser, dieses, jene, jener, jenes*), proper name (e.g., *Maik Klingenberg*), definite DP (combinations of determiners and nouns are designated as DPs, accompanied by a specific determiner definition; e.g., *die Tänzerin*), indefinite DP (e.g., *eine Tänzerin*), coordinated DP (e.g., *die Tänzerin und die Pianistin*), relative pronoun (e.g., *die, der, das, welche, welcher, welches*), resumptive d-pronoun (cf. (93)), resumptive personal pronoun, indefinite pronoun (e.g., *beide*), possessive pronoun (e.g., *mein, dein*), possessive proper name (e.g., *Maiks*), quantifier (e.g., *keiner, jeder, alle*), reflexive (e.g., *sich*), and zero pronoun.

Grammatical & thematic role For each annotated referring expression, the grammatical role and the thematic role is identified (cf. (92)). Concerning the grammatical role, it was annotated whether the expression functioned as the subject (nominative), the direct object (accusative), or the indirect object (dative) of the sentence. These annotations were always made relative to the predicate. All other forms were categorized as carrying the oblique grammatical role.

Regarding the thematic role, not only the verb semantics but also the broader (pragmatic) context were taken into account. It was indicated whether the marked referring expression served as the proto-agent, proto-patient, or proto-recipient of the sentence (Primus 1999). If none of these thematic roles fit, no thematic function was annotated in order to streamline annotation efforts.

In some exceptional cases, grammatical and thematic roles were not annotated. For instance, **possessive expressions** were exempted from being assigned grammatical and thematic roles. However, when possessives occurred alongside another referring expression, the entire constituent (possessive determiner + DP) was assigned the respective grammatical and thematic role, as demonstrated in (92), where ‘*my father*’ was marked as the direct object (accusative) and proto-patient.

- (92) Ich hatte meinem Vater schon oft zugesehen. (T 28, 27)
SUBJECT DIRECT OBJECT

PROTO-AGENT PROTO-PATIENT

I had watched my father many times.

Furthermore, in sentences featuring a **left dislocation** (cf. (93)), the referring expression in the pre-pre-field is not assigned a grammatical and thematic role. Only the subsequent resumptive pronoun is assigned such roles because it exclusively carries the referential properties.

- (93) Der Nemeč [Ø], der [SUBJ + PROTO-AGENS] hat das schon am ersten Tag erkannt. (AdT 3, 16)

Nemeč, who recognized this on the very first day.

In the AdT corpus, we often find so-called **dative-possessive-constructions**. These are colloquial, often dialectal forms of a possessive constructions. The annotation conventions for dative-possessive constructions were as follows: The dative referring expression was marked with the grammatical role oblique and the corresponding referential form. The possessive was labeled with the referential form possessive determiner, with no thematic role assigned (cf. (94)). If the dative-possessive construction includes a second animate DP, the entire expression (dative-possessive construction + animate DP) is annotated with a grammatical and thematic role (cf. (95)). However, if the possessive pronoun is not followed by an animate entity, no grammatical and thematic role is assigned (cf. (96)).

- (94) Dabei ist dem [DAT] sein [POSS] Großvater in Puntigam Schreiner gewesen. (AdT 3, 24)

His grandfather has been a carpenter in Puntigam.

- (95) Das ist überhaupt nicht dem [DAT] seine [POSS] Stärke gewesen. (AdT 3, 15)

This has not been his strength at all.

- (96) «Kein Stein darf auf dem anderen bleiben», ist am Anfang dem Nemeč [DAT proper name] sein [POSS] Spruch gewesen. (AdT 3, 107)

“No stone should be left unturned” was Nemeč’s motto at the beginning.

Non-3rd-person-singular-flag The following referential expressions were identified for exclusion from the analysis. The German personal and d-pronoun system contains pronouns that are homonymous. To ensure the assignment of person and number to all pronouns during post-processing in RStudio, an additional layer was introduced to flag all pronouns homonymous with

A Annotation Scheme

one of the third-person singular personal or d-pronouns. This encompassed marking personal pronouns in the third-person plural (*sie*), as well as the formal personal pronoun (*Sie*), both in nominative and accusative cases. Additionally, the plural demonstrative pronoun (*die*) in both nominative and accusative cases was flagged. Furthermore, zero pronouns were identified when they referred to a first- or second-person referent or to a plural referent. All other forms of pronouns that were neither third-person singular nor homonymous were filtered out during the post-processing of the WebAnno output in RStudio.

A.4 Referential chains

In the final annotation step of the process, coreference relations between individual referring expressions were established. Referring expressions that referred to the same real-world entity were grouped into referential chains using a drag-and-drop method in WebAnno. This process was conducted on a chapter-by-chapter basis, and referential chains did not extend beyond chapter boundaries. Referring expressions that appeared only once or lacked clear coreference relationships were not annotated with a coreference chain. Figure A.1 displays a screenshot of the annotation pane in WebAnno.

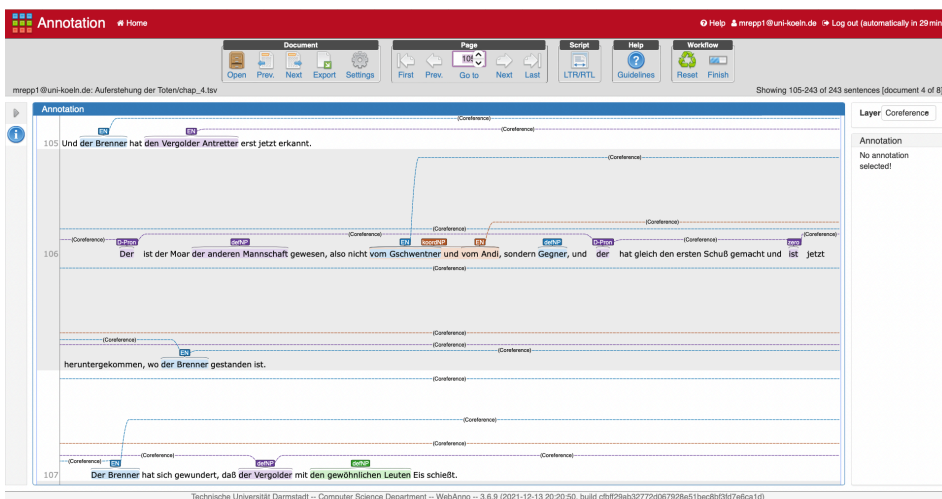


Figure A.1: Screenshot from WebAnno interface. Visualization of coreference relation between referring expressions.

Appendix B: Functions of d-pronouns

B.1 Auferstehung der Toten excerpt

Novel	Chapter	sent_token_num	Text example	Structural functions		Semantic functions	
				Information foreground / disambiguate	evaluation	contrast	
AdT	2	4-1	Der Detektiv gehört aber eigentlich nicht zu Zell. Der ist natürlich nur wegen der Liftgeschichte dagewesen.	information foreground			
AdT	2	29-6	Und Anfang März taucht der Brenner auf einmal wieder auf. Aber nicht als Polizist, sondern als Privatdetektiv.	information foreground		contr.	
AdT	2	30-10	Es war nämlich eine Versicherungsgeschichte. Die Toten sind ja die amerikanischen Schwiegereltern vom Vergolder Antretter gewesen. Dazu mußt du wissen, daß sie steinreich gewesen sind. Beide über achtzig und steinreich. Ist ja schon der Vergolder selber steinreich, bestimmt der reichste Mann in Zell, weit vor dem Eder, weit vor dem Bürgermeister und meilenweit vor dem Fürstauer. Aber gegen seine Schwiegereltern ist der (29-6) immer noch ein armer Schlucker gewesen. Natürlich haben sich die Zeller darüber gewundert, daß der (30-10) zuerst als Polizist verschwindet, also der Brenner, und dann taucht er drei Wochen später als Privatdetektiv wieder auf.	information foreground			
AdT	2	36-18	Die haben dann einen Vertrag mit einem Wiener Detektivbüro gemacht, Detektivbüro Meierling hat das geheißen.	information foreground			
AdT	2	37-7	Jetzt hat es sich zufällig ergeben, daß der Polizist Simon Brenner, Kriminalinspektor oder welchen Rang der (36-18) gehabt hat, bei der Polizei gekündigt hat. Jetzt muß man wissen, daß der (37-7) 19 Jahre bei der Kripo gewesen ist, weil mit 25 hat er angefangen, und jetzt ist er 44 gewesen.	information foreground			

B Functions of *d*-pronouns

AdT	2	39-13	Aber er hat es nie richtig weit gebracht bei der Kripo. Das war aber nicht der eigentliche Grund	information foreground	eval.	
AdT	2	41-3	für seine Kündigung, weil der (39-13) nie besonders ehrgeizig gewesen ist. Mehr so ein	information foreground		
AdT	2	44-2	ruhigerer Typ, eigentlich ein netter Mensch, muß ich ehrlich sagen. Jetzt hat der (41-3) aber vor drei Jahren einen neuen Chef gekriegt, den Nemeč, der ja auch im Jänner hier in Zell aufgekreuzt ist. Und den hätte ich auch nicht unbedingt als Chef haben müssen. Ich persönlich habe überhaupt nichts gegen die Wiener, sind auch nette darunter, und überall gibt es solche und solche. Aber der (44-2) ist so ein richtiger typischer Wiener gewesen.	information foreground	eval.	
AdT	2	51-32	Dann hat es sich der Brenner überlegt und hat seinen Job hingeschmissen. Wenn du heute 44 bist und seit 19 Jahren bei der Polizei, dann überlegst du dir so was, und da muß ich ehrlich sagen, Hut ab, weil der hat in dem Moment überhaupt keine Aussicht auf was anderes gehabt.	information foreground	eval.	
AdT	2	59-2	Damit die Versicherung später sagen kann, schaut her, wir haben alles getan, uns kann keiner was vorwerfen, wir haben sogar noch unseren eigenen Mann hingeschickt, wie die Polizei den Fall schon längst aufgegeben hat. Daß der den Fall dann wirklich löst, das hat ja zu dem Zeitpunkt überhaupt kein Mensch wissen können.	information foreground		contr.
AdT	2	61-19	Und heute muß ich wirklich sagen, Hut ab vor dem Brenner, weil einem anderen wäre das nicht so leicht gelungen. So einer wie der Nemeč ist viel schneller mit dem Kopf, und bei einem anderen Fall ist der vielleicht wieder der Bessere.	information foreground		contr.
AdT	2	66-18	Da ist der Brenner wieder der Richtige gewesen. Wenn man den so gesehen hat in Zell, wäre man	information foreground		
AdT	2	67-3	nicht leicht darauf gekommen, daß der (66-18) ein Privatdetektiv war. Obwohl - der (67-3) war kein Geheimdetektiv.	information foreground		
AdT	2	73-14	Nicht groß und nicht klein und einen richtigen Kantschädel mit zwei senkrechten Falten in den Wangen. Und so eine rote, narbige Haut wie der Fußballspieler , wie hat der jetzt schnell geheißen, wo es zwei Brüder gegeben hat.	information foreground		contr.
AdT	2	84-1	Und das war es auch, wieso der Nemeč ihn nicht gemocht hat, diese Ausstrahlung, daß er nicht richtig dazugehört. Der hat sich darüber in aller Öffentlichkeit lustig gemacht:	disambiguate		

B.1 Auferstehung der Toten excerpt

			«Schaun's nicht so mit Ihren Tschechenaugen, Brenner!»			
AdT	2	86-13	Gleich ein paar Tage nachdem der Nemeč die Abteilung übernommen hat, war das. Und noch dazu in Anwesenheit von Brenners Kollegen Tunzinger und Schmeller , der ist dann ein halbes Jahr später bei dem Banküberfall in, in, in, wo war das jetzt, erschossen worden.	disambiguate		
AdT	2	112-18	Und genau seit der Zeit hat er mindestens zweimal im Monat einen Migräneanfall, daß er kaum mehr aus seinen Tschechenaugen herauschauen kann. Jetzt hat er natürlich wieder nicht gewußt, kommt es vom Rauchen aufhören, praktisch Entzug, weil der hat 40 am Tag geraucht.	information foreground	eval.	
AdT	2	145-11	Obwohl das mit dem Bericht überhaupt nicht eilig gewesen ist. Ganz im Gegenteil. Der Meierling, also der Chef von dem Detektivbüro (der heißt ja nicht Meierling, sondern Brugger), hat den Brenner schon mehrmals ermahnt, daß er nicht so elendig lange Berichte schreiben soll.	information foreground		
AdT	2	162-6	Der Mandl hat wirklich so geredet. Ich muß ehrlich sagen, der war gar nicht so ungut, wie alle immer getan haben.	information foreground	eval.	
AdT	2	170-19	«Haben wir einen Leser?» fragt der Mandl und grinst wie für die Zahnarztreklame, weil der hat zwei ganz neue Jacketkronen im Mund gehabt seit seinem Bericht über das Geheimbordell in der Brucker Bundesstraße.	information foreground	eval.	
AdT	2	182-1	Der Mandl hat keinem was in den Weg gelegt. Der hat halt geglaubt, daß er die ganze Welt niederreißen muß vor lauter wichtig.	information foreground	eval.	
AdT	2	192-1	Du mußt wissen, daß ein paar Wochen lang eine Angestellte von der amerikanischen Versicherung in Zell gewesen ist. Die (192-1) hat natürlich in	information foreground		
AdT	2	192-15	erster Linie mit dem Brenner zu tun gehabt, weil der (192-15) ja praktisch auch bei der Versicherung angestellt ist.	disambiguate		
AdT	2	206-1	Aber die Betty ist nur von der Versicherung gewesen. Die (206-1) hat so eine Art Lokalauschein für die Versicherung gemacht,	information foreground		
AdT	2	207-1	und vom Brenner hat sie eben alles über den ganzen Fall wissen wollen. Der (207-1) hat ihr aber nicht viel bieten können.	disambiguate		

B Functions of d-pronouns

AdT	3	14-18	Und so einen Eindruck hat man vom Brenner gehabt, wenn man ihn wo gehen oder stehen gesehen hat oder sitzen von mir aus. Rein äußerlich. Und da hat man ihn schon gut kennen müssen, daß man gewußt hat, wie nervös der die ganze Zeit gewesen ist.	information foreground		
AdT	3	23-1	Aber dem Brenner, dem ist so was egal gewesen. Der hat seit einem halben Jahr da Woche für Woche seinen Bericht getippt.	information foreground		
AdT	3	38-1	Zuerst hat er ihn gar nicht erkannt, weil Glatze und zwanzig Jahre nicht gesehen, aber sein Schulkollege Schwaighofer hat ihn sofort erkannt. Der war der Büroleiter dort und für die Vergabe der Wohnungen zuständig.	disambiguate		
AdT	3	43-16	Und der Schwaighofer auch nie ein besonderer Dings. Jetzt ist dem Brenner das aber nicht lange unangenehm gewesen, weil als Junggeselle hätte der eine Wartezeit gehabt, die haben da Wartezeiten, frage nicht, Jahre!	information foreground		
AdT	3	50-1	Aber dem Brenner ist es auch nicht anders gegangen. Der sitzt in seinem heißen Zimmer und soll über seine Arbeit nachdenken, aber statt dessen denkt er über seine Wohnung nach.	information foreground		
AdT	3	72-50	Und vielleicht ist ja auch wirklich nichts gewesen, oder womöglich ist was gewesen, aber beide haben sich nicht daran erinnert, aber egal, mich hat es nicht zu interessieren, weil es hat nichts damit zu tun, wer den Ted Parson und seine Frau, die hat Suzanne geheißen, wer denn diese alten Leute auf den Sessellift gesetzt hat.	information foreground		
AdT	3	87-4	Und statt daß er seinen Bericht schreibt, starrt er den furnierten Tisch an und denkt an die Nußholzschränke von seinem Großvater. Seine nervösen blauen Augen wandern jetzt überhaupt nicht nervös herum. Aber nicht, weil sie den Tisch fixieren, weil den Tisch fixieren sie ja in Wirklichkeit auch nicht. In Wirklichkeit schaut der ja durch den Tisch durch.	information foreground		
AdT	3	99-20	Und noch etwas ist kein Zufall gewesen. Daß ausgerechnet der Brenner, der praktisch auch sonst nicht so ein konzentrierter Typ gewesen ist, daß ausgerechnet der für so einen Fall wieder der Richtige gewesen ist.	information foreground	eval.	contr.

B.1 Auferstehung der Toten excerpt

AdT	3	102-21	Da kommst du mit einer anderen Gangart besser vorwärts als wie zum Beispiel auf einer Asphaltstraße. Und da ist einer, der , sagen wir, auf der Asphaltstraße viel zu umständlich und langsam ist, der ist da womöglich wieder im Vorteil.	information foreground	eval.	contr.
AdT	3	103-29	Und da ist einer, der , sagen wir, auf der Asphaltstraße viel zu umständlich und langsam ist, der ist da womöglich wieder im Vorteil. Und einer, der auf dem Asphalt eine gute Figur macht, sagen wir, wie der Nemec, der drauflosmarschiert, daß es eine Freude ist, der ist natürlich hier sofort auf die Nase gefallen, daß es eine Freude gewesen ist.	information foreground	eval.	contr.
AdT	3	117-15	Obwohl er dünn ist, nur Haut und Knochen. Aber mehr so magengeschwürdünn. Nein, auch wieder nicht, mehr so wie ein Student, eigentlich hat der ein richtiges Milchgesicht.	information foreground	eval.	
AdT	3	120-3	Über 40, das weiß ich, aber wenn du den auf der Straße siehst, kannst du ihn auch für 30 halten, ein Student mit einer Nickelbrille. Und vielleicht ist es einem gerade wegen dem Milchgesicht so aufgefallen. Weil wenn der sich geärgert hat, ist ihm eine, ob du es glaubst oder nicht, fingerdicke blaue Ader auf der Stirn herausgekommen.	information foreground		
AdT	3	123-19	Daß man geglaubt hat, dem rutscht der ganze Ärger, den er hinunterschlucken möchte, direkt in die Stirnader hinauf. Aber abgesehen von der blauen Ader hat es damals keine Reaktion auf Brenners Entgleisung gegeben, also daß der «die Täterinnen» gesagt hat.	information foreground		
AdT	3	130-3	Der Vergolder ist der einzige Angehörige der Opfer gewesen, also haben sie bei ihm	information foreground	eval.	
AdT	3	130-9	angefangen. Motiv hätte der (130-3) schon eines gehabt, weil der (130-9) erbt ein paar Millionen, und nicht daß du glaubst, Schilling.	information foreground	eval.	
AdT	3	132-10	Der Vergolder ist der einzige Angehörige der Opfer gewesen, also haben sie bei ihm angefangen. Motiv hätte der schon eines gehabt, weil der erbt ein paar Millionen, und nicht daß du glaubst, Schilling. Weil Amerika, und da gilt der Dollar. Aber daß dem selber halb Zell gehört und daß der nicht so blöd ist, daß er seine Schwiegereltern in Zell aufseinem eigenen Schilift - wie soll ich sagen, Ende Jänner hat es die Polizei auch eingesehen.	information foreground	eval.	

B Functions of *d*-pronouns

AdT	3	141-2	Aber der Brenner hat jetzt doch an die «Heidnische Kirche» denken müssen, freilich aus einem anderen Grund. Weil der hat sich jetzt in seinem Hotelzimmer im Hirschen sein Hemd wieder angezogen und ist auf den Balkon hinausgegangen.	information foreground	eval.	
AdT	3	147-1	Und der Brenner natürlich. Der ist auch immer noch dagewesen.	information foreground		
AdT	4	4-1	Aber jeder kennt den Taxifahrer Goggenberger Johnny . Der (4-1) ist ein Original, das kannst du laut sagen. Weil der (5-2) hat 120 Kilo und einen rosaroten Chevrolet, mit dem fährt er seit 20	information foreground	eval.	
AdT	4	5-2	Jahren Taxi in Zell. Was anderes hat der (6-4) nie getan, weil so alt ist der Johnny noch gar nicht,	information foreground	eval.	
AdT	4	6-4	wie er aussieht. Aber wo der (7-3) den Chevrolet herhat, würde mich interessieren.	information foreground		
AdT	4	7-3	Weil einmal hat sich ein Schwede beim Schifahren den Fuß gebrochen, und der hat sich vom Johnny heimchauffieren lassen, bis Schweden hinauf.	information foreground		
AdT	4	12-14	Es hat nämlich jede Mannschaft einen Anführer , sagen wir, wie ein Kapitän beim Fußball.	information foreground		
AdT	4	76-1	Der (76-1) heißt «Moar», frag mich nicht, wo das herkommt, aber der (76-16) heißt einfach so, und	information foreground		
AdT	4	76-16	der (76-22) darf zweimal schießen.	information foreground		
AdT	4	76-22	Alle anderen dürfen nur einmal schießen, aber wenn alle geschossen haben, hat die Mannschaft noch eine letzte Chance, weil dann geht der Moar noch einmal hinauf. Jetzt, wer der Moar ist, das ist ganz genau geregelt, weil das ist immer der Beste aus dem vorhergehenden Spiel, der ist automatisch der Moar.	information foreground		
AdT	4	78-25	Dann ist bei der einen Mannschaft, wo weniger sind, einer der Haggi . Der darf dann auch zweimal schießen, genau wie der Moar.	information foreground		
AdT	4	84-1	« Du Haggi! » ruft ein kleiner, ausgemergelter Mann, den der Brenner nicht gekannt hat. Er hat schmutzige Gummistiefel angehabt und einen alten Filzhut am Kopf. Das ist der Gschwentner-Bauer gewesen. Und der (91-2), den er gemeint hat, das war der Fux Andi, der (91-15) ist erst achtzehn oder neunzehn gewesen, aber hat schon eine volle Glatze gehabt.	disambiguate		
AdT	4	91-2	Jetzt mußt du wissen, daß der Gschwentner-Bauer nur so ausgesehen hat wie ein armer	information foreground	eval.	
AdT	4	91-15		information foreground		
AdT	4	96-2		information foreground		

B.1 Auferstehung der Toten excerpt

AdT	4	98-2	Bauer. Aber der (96-2) ist der größte Bauer weit und breit und geizig, das glaubst du nicht. Und das ist dem sein Geiz gewesen, was der Andi gemeint hat. Daß der (98-2) um einen Fünfer spielt, obwohl normalerweise ein Zehner schon das wenigste ist.	information foreground	eval.	
AdT	4	106-1	Und der Brenner hat den Vergolder Antretter erst jetzt erkannt. Der (106-1) ist der Moar der anderen Mannschaft gewesen, also nicht vom Gschwentner und vom Andi, sondern Gegner, und	disambiguate		
AdT	4	106-22	der (106-22) hat gleich den ersten Schuß gemacht und ist jetzt heruntergekommen, wo der Brenner gestanden ist.	information foreground		
AdT	4	108-2	Der Brenner hat sich gewundert, daß der Vergolder mit den gewöhnlichen Leuten Eis schießt. Weil der ist ja normalerweise mit ganz anderen Leuten zusammen.	disambiguate	eval.	
AdT	4	119-7	Was soll ich sagen, alle acht haben schon geschossen, und der Stock vom Vergolder klebt immer noch auf der Taube, daß du glaubst, angefroren. Jetzt ist der Haggi dran, der muß es jetzt ein zweites Mal probieren.	information foreground		
AdT	4	125-12	Der Brenner hat zuerst gar nicht verstanden, wieso alle so lachen, weil er nicht wissen hat können, daß der Andi Tankwart ist. Weil der Brenner hat ja kein Auto in Zell gehabt, der ist mehr so ein Spaziergänger gewesen.	information foreground		
AdT	4	130-2	Eine alte Frau mit dicken Bifokalgläsern. Aber an der ist etwas anderes noch viel auffälliger gewesen. Weil die hat keine Hände gehabt.	information foreground	eval.	
AdT	4	131-9	Sie ist neben dem Brenner stehengeblieben, und der hat sie gefragt, ob sie das versteht, wieso die Leute so lachen.	disambiguate		
AdT	4	141-1	Jetzt sind sie eine gerade Zahl gewesen, weil der Andi hat nicht mehr mitgetan. Der ist trotzig zum Kiosk hinübermarschiert:	disambiguate	eval.	
AdT	4	141-19	«Ein Bier», sagt er zum Gruntner Schorsch , der ist früher bei der Bahn gewesen, und jetzt in Pension führt er noch den Kiosk.	disambiguate		
AdT	4	143-6	Aber es ist heute nicht dem Andi sein Tag gewesen, weil der Gruntner sagt nur: «Laß dir Zeit.» Das war deshalb, weil der hat noch zwei andere Kunden zu bedienen gehabt.	disambiguate	eval.	

B Functions of d-pronouns

AdT	4	145-33	Der Brenner und die handlose alte Frau haben sich noch vor dem Fux Andi zur Würstlbude gestellt. Und der Brenner ist jetzt erschrocken, weil aus der Ferne hat er den Andi auf 40, wenn nicht 50 Jahre geschätzt, und jetzt hat er erst gesehen, daß der höchstens siebzehn, achtzehn Jahre alt ist.	disambiguate		
AdT	4	148-6	Der Fux Andi hat wie immer seine rote Latzhose von der Tankstelle angehabt. Auf seiner Brust hat der Brenner noch die Umriss einer Shell-Muschel erkannt, die muß dort einmal aufgenäht gewesen sein, aber jetzt ist nur mehr der Stoff an der Stelle etwas dunkler gewesen, nicht so ausgewaschen wie rundherum. Wie ein alter Mann steht der da, hat sich der Brenner gedacht, aber dann ist es wieder genau umgekehrt gewesen, wie der Andi geredet hat.	information foreground	eval.	
AdT	4	149-43	Wie ein alter Mann steht der da, hat sich der Brenner gedacht, aber dann ist es wieder genau umgekehrt gewesen, wie der Andi geredet hat. «Laß dir Zeit, laß dir Zeit, laß ich mir eh, Zeit laß ich mir eh, oder?» hat der HaggI den Kioskwirt schwindlig geredet mit seiner hohen, quäkenden Stimme, daß du geglaubt hast, der hat den Stimbruch noch gar nicht gehabt, praktisch: Eunuch.	disambiguate	eval.	
AdT	4	150-13	Und gleichzeitig hat er den Brenner ängstlich angeschaut, also: Steht der (150-13) vielleicht auf	disambiguate		
AdT	4	150-20	meiner Seite, lacht der (150-20) über meine Witze?	disambiguate		
AdT	4	186-1	Der Brenner hat eine komische Gewohnheit gehabt. Der gehört zu den Leuten, die, also wenn die eine Wurstsammel essen, dann wickeln sie sie nur zur Hälfte aus dem Papier aus.	information foreground		
AdT	4	191-4	Der Gruntner ist vorher bei der Bahn gewesen, Verschub, und da hat es ihm das linke Bein abrasiert, jetzt ist er in Pension, macht er den Kiosk noch ein bißchen. Gute Wurstsammeln macht der , hat sich der Brenner noch gedacht, da hört er den Andi sagen [...]	information foreground	eval.	
AdT	4	204-1	Weil aus den Augenwinkeln heraus beobachtet er, wie die Handlose ihr Bier trinkt. Die klemmt sich einfach das Bierglas zwischen die Unterarmstümpfe, und so trinkt sie, aber nicht, daß du glaubst: umständlich oder von mir aus unappetitlich.	disambiguate		
AdT	4	207-2	Und geraucht hat sie genau gleich. Weil die hat nämlich geraucht und gar nicht wenig.	information foreground	eval.	

AdT	4	230-22	«Kommst du mit?» sagt die Handlose , weil die ist überhaupt nicht auf das Geplapper vom Andi eingegangen.	information foreground	eval.	
AdT	4	234-13	Die Handlose hat so eine große Brille gehabt, wie es in den siebziger Jahren modern gewesen ist. Und so dicke Gläser, also, von der ihrem Gesicht hast du nicht viel gesehen. Nur ihre Augen sind doppelt so groß gewesen wie normal, weil die muß wahnsinnig weitsichtig gewesen sein.	information foreground	eval.	

B.2 Tschick excerpt

Tsch	29	75-2	«Der böse Mann will rüberkommen! Und was willst du machen, wenn du hier bist? Na los, komm doch. Komm her, Pussy. Ich fürchte mich jetzt schon.» « Die tickt doch nicht sauber», sagte Tschick.	information foreground	eval.	
Tsch	29	89-2	Lange waren von ih r nur die dreckigen Waden zu sehen. Nach einer Weile wurde eine Hand sichtbar. «Schläuche sind da drüben.» «Was?» «Da drüben.» « Die will sich wichtig machen», sagte Tschick.	information foreground	eval.	
Tsch	29	142-2	Und irgendwie hatte ich gleich ein komisches Gefühl bei der Sache, als ich sah, wie sie uns hinterherlief. Normalerweise können Mädchen ja nicht laufen, oder nur so schlenkerig. Aber die konnte laufen.	information foreground	eval.	contr.
Tsch	29	151-16	Sie machte mit dem Zeigefinger einen Kreis um ihren Mund und meinte: «Und ich dachte schon, ihr seid Schwuchteln. Wegen hier Lippenstift.» Tschick und ich gingen einfach weiter, und Tschick flüsterte mir nochmal zu, dass die nicht ganz richtig tickte.	information foreground	eval.	
Tsch	30	41-3	Aber sie schien langsamer zu werden, und bald konnten wir sie nicht mehr entdecken. Die Dunkelheit kroch zwischen den Bäumen durch. Einmal raschelte es im Unterholz, aber das war vielleicht nur ein Tier. «Wenn die uns nachläuft, ist megakacke», sagte Tschick.	information foreground	eval.	

B Functions of *d*-pronouns

Tsch	30	46-1	«Irgendwas musste ich ja sagen. Und Alter, hat die voll gestunken! Die wohnt garantiert auf der Müllkippe da. Asi.»	information foreground	eval.	
Tsch	30	48-5	«Aber schön gesungen hat sie », sagte ich nach einer Weile. «Und logisch wohnt die nicht auf der Müllkippe.»	information foreground	eval.	
Tsch	30	48-14	«Und logisch wohnt die nicht auf der Müllkippe.» «Warum fragt die dann nach Essen?»	information foreground		
Tsch	30	49-15	«Warum fragt die dann nach Essen?» «Ja, aber wir sind hier nicht in Rumänien. Hier wohnt keiner auf der Müllkippe.» «Hast du nicht gemerkt, wie die gestunken hat?»	information foreground	eval.	
Tsch	30	51-2	«Hast du nicht gemerkt, wie die gestunken hat?» «So riechen wir jetzt wahrscheinlich auch.» « Die wohnt da, garantiert. Von zu Hause abgehauen. [...]»	information foreground	eval.	
Tsch	30	54-1	«Die wohnt da, garantiert. Von zu Hause abgehauen . Glaub mir, ich kenn solche Leute. Die ist abgedreht. Tolle Figur, aber voll asi.»	information foreground	eval.	
Tsch	31	30-4	Das Schloss ist kaputt, oder der Besitzer hat nie abgeschlossen, was weiß ich. Ich glaube, der hat nie abgeschlossen.	information foreground		
Tsch	42	14-1	Kleber wohnte im dritten Stock und hat uns immer angeschrien. Der hatte einen Riesenhass auf Kinder.	information foreground	eval.	
Tsch	42	15-2	Der hatte einen Riesenhass auf Kinder. Und der ist da mit seinem Dackel rumspaziert und hat mit seiner Taschenlampe ins Kornfeld reingeleuchtet und geschrien, dass wir den Bauern ruinieren.	information foreground		
Tsch	42	19-2	[...] und dann stand da der Alte mit seinem Dackel und hat mir den Rückweg versperrt. Und der ging da auch nicht weg [...]	information foreground		
Tsch	42	19-9	Und der ging da auch nicht weg, der funzelte mit seiner Lampe rum [...]	information foreground		
Tsch	43	11-3	Jemand kurbelte das Beifahrerfenster runter. « Hat der dich gesehen?», fragte Tschick.	information foreground		
Tsch	43	12-4	« Hat der dich gesehen?», fragte Tschick. «Oder guckt der die Beule in unserem Dach an?»	information foreground		
Tsch	45	60-1	Dein asiger Russe ist nicht so dämlich wie du. Der kennt das schon.	information foreground		
Tsch	45	61-1	Der kennt das schon. Der hat schon eine richtige kriminelle Karriere hinter sich, Ladendiebstahl mit seinem Bruder, Schwarzfahren, Betrug und Hehlerei.	information foreground		
Tsch	45	65-2	Hat er dir natürlich nicht erzählt. Und der hat auch kein solches Elternhaus vorzuweisen, der lebt in der Scheiße.	information foreground	eval.	

B.2 Tschick excerpt

Tsch	45	65-10	Und der hat auch kein solches Elternhaus vorzuweisen, der lebt in der Scheiße.	information foreground	eval.	
Tsch	45	67-1	In seiner Sieben-Quadratmeter-Scheiße, wo er auch hingehört. Der kann froh sein, wenn er in ein Heim kommt.	information foreground		
Tsch	45	69-2	Aber die können den auch abschieben, sagt der Schuback. Und der wird morgen versuchen, um jeden Preis seine Haut zu retten – ist dir das klar?	disambiguate		
Tsch	45	70-1	Und der wird morgen versuchen, um jeden Preis seine Haut zu retten – ist dir das klar? Der hat seine Aussage schon gemacht.	information foreground		
Tsch	45	71-1	Der hat seine Aussage schon gemacht. Der gibt dir die ganze Schuld.	information foreground		
Tsch	45	78-2	Du kannst von Glück sagen, dass der Typ von der Jugendgerichtshilfe hier so begeistert war. Wie der das Haus gesehen hat.	information foreground		
Tsch	45	79-2	Wie der das Haus gesehen hat. Wie der allein den Pool gesehen hat!	information foreground		
Tsch	45	86-2	Ich erzähl dem Richter , was passiert ist», sagte ich. « Der ist doch nicht blöd.»	disambiguate	eval.	
Tsch	46	60-26	Nämlich der Typ von dem Jugendheim erklärte ausführlich, aus was für Verhältnissen Tschick kommen würde, und er redete über Tschick, als wäre der gar nicht anwesend, und sagte, dass seine Familie so eine Art asozialer Scheiße wäre, auch wenn er andere Worte dafür gebrauchte.	information foreground		
Tsch	46	69-1	Nicht wie bei meinem Vater oder an der Schule immer, sondern schon eher so Sachen, wo man dachte, es geht an dem Ende um Leben und Tod, und ich hörte mir das sehr genau an, weil mir schien, dass dieser Richter nicht gerade endbescheuert war. In dem Gegenteil. Der schien ziemlich vernünftig.	information foreground	eval.	contr.
Tsch	46	70-2	Der schien ziemlich vernünftig. Und der hieß Burgmüller, falls es jemanden interessiert.	information foreground		

Appendix C: Full statistical results of ERP experiments

C.1 Tschick Experiment

100 ms time window	effect	estimate	t	p	significance
0 – 100	sag	-3.189e-01	-5.395	1.96e-06	***
	lat	1.539e-01	3.850	0.000285	***
	pronoun	-1.924e-02	-0.135	0.892967	
	sag:lat	-3.674e-02	-0.638	0.523457	
	sag:pronoun	8.761e-02	2.971	0.002969	**
	lat:pronoun	-3.054e-02	-1.099	0.271929	
	sag:lat:pronoun	-2.950e-02	-0.512	0.608427	
100 – 200	sag	-1.377e-01	-1.826	0.0744	.
	lat	2.030e-01	4.852	9.31e-06	***
	pronoun	-6.081e-02	-0.502	0.6161	
	sag:lat	1.046e-02	0.180	0.8569	
	sag:pronoun	4.141e-02	1.394	0.1634	
	lat:pronoun	-1.841e-02	-0.657	0.5111	
	sag:lat:pronoun	2.539e-03	0.044	0.9651	
200 – 300	sag	2.400e-01	3.258	0.002141	**
	lat	2.483e-01	5.644	6.09e-07	***
	pronoun	-1.799e-01	-1.529	0.128029	
	sag:lat	6.241e-02	1.132	0.257645	
	sag:pronoun	-4.656e-02	-1.649	0.099145	.
	lat:pronoun	-9.500e-02	-3.569	0.000359	***
	sag:lat:pronoun	-4.784e-02	-0.868	0.385576	
300 – 400	sag	2.990e-01	3.812	0.000424	***
	lat	1.384e-01	3.125	0.002865	**
	pronoun	-1.821e-01	-1.282	0.201136	
	sag:lat	4.288e-02	0.794	0.427276	
	sag:pronoun	-1.621e-01	-5.859	4.67e-09	***
	lat:pronoun	-4.098e-02	-1.571	0.116149	
	sag:lat:pronoun	-3.942e-02	-0.730	0.465484	

C Full statistical results of ERP experiments

400 – 500	sag	5.547e-01	7.304	3.78e-09	***
	lat	6.524e-02	1.500	0.1393	
	pronoun	-1.790e-01	-1.163	0.2466	
	sag:lat	2.286e-02	0.416	0.6772	
	sag:pronoun	-3.018e-01	10.733	<2e-16	***
	lat:pronoun	-1.246e-02	-0.470	0.6384	
	sag:lat:pronoun	-3.152e-02	-0.574	0.5659	
500 – 600	sag	9.323e-01	11.300	1.43e-14	***
	lat	-4.352e-02	-0.903	0.3710	
	pronoun	-8.711e-02	-0.589	0.5563	
	sag:lat	4.823e-02	0.886	0.3757	
	sag:pronoun	-4.843e-01	17.366	<2e-16	***
	lat:pronoun	5.350e-02	2.035	0.0418	*
	sag:lat:pronoun	-4.137e-02	-0.760	0.4474	
600 – 700	sag	9.857e-01	11.790	3.98e-15	***
	lat	-1.116e-01	-2.452	0.01762	*
	pronoun	-1.799e-01	-1.306	0.19300	
	sag:lat	9.367e-02	1.783	0.07453	.
	sag:pronoun	-5.882e-01	21.866	<2e-16	***
	lat:pronoun	7.293e-02	2.876	0.00403	**
	sag:lat:pronoun	-8.520e-02	-1.622	0.10480	
700 – 800	sag	8.954e-01	12.656	<2e-16	***
	lat	-1.526e-01	-3.098	0.00314	**
	pronoun	-1.714e-01	-1.201	0.23125	
	sag:lat	1.656e-01	2.914	0.00357	**
	sag:pronoun	-5.940e-01	20.405	<2e-16	***
	lat:pronoun	1.794e-01	6.535	6.36e-11	***
	sag:lat:pronoun	-1.211e-01	-2.130	0.03316	*
800 – 900	sag	7.313e-01	11.602	7.17e-16	***
	lat	-1.923e-01	-3.862	0.000291	***
	pronoun	-1.173e-01	-0.692	0.490170	
	sag:lat	9.621e-02	1.467	0.142507	
	sag:pronoun	-4.521e-01	13.456	<2e-16	***
	lat:pronoun	2.221e-01	7.013	2.34e-12	***
	sag:lat:pronoun	-5.917e-02	-0.902	0.367111	
900 – 1000	sag	5.114e-01	8.235	7.90e-11	***
	lat	-1.877e-01	-4.610	1.98e-05	***
	pronoun	-8.855e-02	-0.563	0.574	
	sag:lat	8.509e-02	1.387	0.166	
	sag:pronoun	-2.319e-01	-7.379	1.60e-13	***
	lat:pronoun	2.093e-01	7.063	1.63e-12	***
	sag:lat:pronoun	-3.424e-02	-0.558	0.577	

C.1 Tschick Experiment

1000 – 1100	sag	2.743e-01	4.417	5.79e-05	***
	lat	-1.298e-01	-3.069	0.003309	**
	pronoun	-9.896e-02	-0.796	0.426983	
	sag:lat	4.750e-02	0.863	0.388142	
	sag:pronoun	9.995e-02	3.546	0.000391	***
	lat:pronoun	8.475e-02	3.189	0.001427	**
	sag:lat:pronoun	-4.956e-02	-0.900	0.367892	
1100 – 1200	sag	-1.279e-01	-2.291	0.0262	*
	lat	-8.373e-02	-2.045	0.0453	*
	pronoun	5.763e-03	0.044	0.9652	
	sag:lat	9.225e-02	1.627	0.1037	
	sag:pronoun	2.238e-01	7.710	1.27e-14	***
	lat:pronoun	6.513e-02	2.379	0.0173	*
	sag:lat:pronoun	-8.233e-02	-1.452	0.1464	
1200 – 1300	sag	-2.094e-01	-3.619	0.000691	***
	lat	1.061e-02	0.221	0.826096	
	pronoun	-6.641e-02	-0.479	0.632576	
	sag:lat	1.097e-01	1.888	0.059057	.
	sag:pronoun	2.168e-01	7.283	3.27e-13	***
	lat:pronoun	1.644e-02	0.586	0.557854	
	sag:lat:pronoun	-5.222e-02	-0.899	0.368884	
1300 – 1400	sag	-2.782e-01	-5.406	1.6e-06	***
	lat	-6.714e-02	-1.450	0.153	
	pronoun	3.323e-02	0.258	0.797	
	sag:lat	2.737e-02	0.478	0.633	
	sag:pronoun	2.605e-01	8.882	<2e-16	***
	lat:pronoun	3.582e-02	1.295	0.195	
	sag:lat:pronoun	-1.226e-02	-0.214	0.830	

Table C.1: Full summary of significant interactions in the main time windows of the Tschick Experiment. Significance coding: ‘***’ < 0.001, ‘**’ < 0.01, ‘*’ < 0.05, ‘.’ < 0.1

C.2 Post-hoc perspective analysis

time window	effect	estimate	t	p	significance
300 – 1000	sag	1.162e+00	10.142	1.08e-14	***
	perspective [Tschick]	5.181e-01	1.421	0.160	
	perspective [Father]	1.404e-01	0.357	0.722	
	sag:perspective [Tschick]	4.047e-01	4.794	1.64e-06	***
	sag:perspective [Father]	-6.801e-01	-7.696	1.42e-14	***

Table C.2: Full summary of significant interactions in the main time windows of the post-hoc analysis in the Tschick Experiment. Significance coding: ‘***’ < 0.001, ‘**’ < 0.01, ‘*’ < 0.05, ‘.’ < 0.1

C.3 AdT Experiment

100 ms time window	effect	estimate	t	p	significance
0 – 100	sag	-2.371e-01	11.709	< 2e-16	***
	lat	4.595e-02	2.167	0.0353	*
	pronoun	-4.730e-02	-1.032	0.3101	
	sag:lat	-7.398e-02	-1.871	0.0613	.
	sag:pronoun	8.133e-02	4.017	5.90e-05	***
	lat:pronoun	7.825e-02	4.099	4.15e-05	***
100 – 200	sag:lat:pronoun	8.409e-03	0.213	0.8316	
	sag	-3.627e-02	-0.541	0.5925	
	lat	3.631e-02	0.937	0.3553	
	pronoun	-6.048e-02	-0.603	0.5470	
	sag:lat	-2.614e-03	-0.069	0.9453	
	sag:pronoun	4.419e-02	2.263	0.0236	*
200 – 300	lat:pronoun	1.006e-01	5.467	4.59e-08	***
	sag:lat:pronoun	4.686e-02	1.229	0.2190	
	sag	8.981e-02	1.293	0.20544	
	lat	6.133e-02	1.586	0.12208	
	pronoun	-2.927e-01	-2.718	0.00721	**
	sag:lat	2.783e-03	0.072	0.94284	
	sag:pronoun	3.691e-02	1.857	0.06335	.
	lat:pronoun	8.443e-02	4.505	6.64e-06	***

C.3 AdT Experiment

	sag:lat:pronoun	3.407e-02	0.878	0.38010	
300 – 400	sag	1.731e-01	2.311	0.0276	*
	lat	3.747e-02	0.941	0.3535	
	pronoun	-8.116e-02	-0.788	0.4319	
	sag:lat	-4.734e-02	-1.233	0.2177	
	sag:pronoun	4.738e-02	2.408	0.0160	*
	lat:pronoun	1.448e-02	0.781	0.4349	
	sag:lat:pronoun	7.802e-02	2.031	0.0422	*
400 – 500	sag	3.064e-01	3.710	0.000814	***
	lat	-2.093e-02	-0.517	0.608279	
	pronoun	-6.892e-02	-0.655	0.513816	
	sag:lat	-6.295e-02	-1.627	0.103711	
	sag:pronoun	-1.653e-02	-0.834	0.404306	
	lat:pronoun	3.702e-02	1.981	0.047547	*
	sag:lat:pronoun	4.514e-02	1.167	0.243374	
500 – 600	sag	3.429e-01	4.257	0.000178	***
	lat	-4.068e-02	-0.860	0.396298	
	pronoun	-3.513e-02	-0.362	0.718121	
	sag:lat	-6.124e-02	-1.564	0.117872	
	sag:pronoun	-3.541e-02	-1.766	0.077476	.
	lat:pronoun	1.205e-03	0.064	0.949189	
	sag:lat:pronoun	2.076e-02	0.530	0.596040	
600 – 700	sag	2.515e-01	3.315	0.00231	**
	lat	-9.879e-02	-1.884	0.06838	.
	pronoun	8.427e-02	0.750	0.45395	
	sag:lat	-2.328e-02	-0.486	0.62703	
	sag:pronoun	-2.776e-02	-1.131	0.25799	
	lat:pronoun	2.086e-02	0.902	0.36727	
	sag:lat:pronoun	6.149e-02	1.283	0.19936	
700 – 800	sag	4.993e-02	0.893	0.378163	*
	lat	-9.694e-02	-2.066	0.046555	
	pronoun	8.712e-02	0.809	0.419532	
	sag:lat	-3.455e-02	-0.750	0.453220	
	sag:pronoun	8.658e-02	3.670	0.000243	***
	lat:pronoun	3.923e-02	1.764	0.077749	.
	sag:lat:pronoun	3.425e-02	0.743	0.457213	
800 – 900	sag	-3.209e-02	-0.685	0.4982	
	lat	-5.764e-02	-1.567	0.1262	
	pronoun	1.295e-01	1.191	0.2354	
	sag:lat	-4.164e-02	-1.029	0.3037	
	sag:pronoun	5.284e-02	2.549	0.0108	*
	lat:pronoun	3.939e-02	2.015	0.0439	*
	sag:lat:pronoun	2.005e-02	0.495	0.6204	

C Full statistical results of ERP experiments

900 – 1000	sag	-9.904e-03	-0.182	0.85710	
	lat	-7.121e-02	-2.056	0.04723	*
	pronoun	2.740e-03	0.025	0.97991	
	sag:lat	-7.832e-02	-1.943	0.05206	.
	sag:pronoun	6.367e-02	3.084	0.00205	**
	lat:pronoun	4.324e-02	2.221	0.02633	*
	sag:lat:pronoun	6.666e-02	1.654	0.09822	.
1000 – 1100	sag	4.386e-02	0.719	0.4775	
	lat	-7.107e-02	-2.247	0.0307	*
	pronoun	-2.569e-02	-0.224	0.8233	
	sag:lat	-2.912e-02	-0.709	0.4782	
	sag:pronoun	1.172e-01	5.571	2.53e-08	***
	lat:pronoun	2.120e-02	1.069	0.2849	
	sag:lat:pronoun	3.976e-02	0.968	0.3329	
1100 – 1200	sag	1.288e-01	2.205	0.0348	*
	lat	1.165e-02	0.349	0.7288	
	pronoun	-2.081e-02	-0.202	0.8404	
	sag:lat	2.045e-02	0.507	0.6121	
	sag:pronoun	-4.206e-02	-2.036	0.0417	*
	lat:pronoun	-6.219e-02	-3.194	0.0014	**
	sag:lat:pronoun	-1.886e-02	-0.468	0.6400	
1200 – 1300	sag	1.328e-01	2.646	0.0124	*
	lat	-2.711e-02	-0.960	0.3432	
	pronoun	-6.027e-02	-0.591	0.5553	
	sag:lat	2.381e-02	0.595	0.5521	
	sag:pronoun	-1.047e-01	-5.108	3.25e-07	***
	lat:pronoun	-1.794e-02	-0.928	0.3533	
	sag:lat:pronoun	-8.654e-02	-2.162	0.0307	*
1300 – 1400	sag	1.392e-01	2.309	0.027602	*
	lat	-1.458e-02	-0.558	0.580204	
	pronoun	-1.079e-02	-0.114	0.908998	
	sag:lat	3.674e-03	0.091	0.927141	
	sag:pronoun	-8.806e-02	-4.280	1.87e-05	***
	lat:pronoun	-7.026e-02	-3.622	0.000292	***
	sag:lat:pronoun	-5.928e-02	-1.475	0.140093	

Table C.3: Full summary of significant interactions in the main time windows of the AdT Experiment. Significance coding: ‘***’ < 0.001, ‘**’ < 0.01, ‘*’ < 0.05, ‘.’ < 0.1

Appendix D: Post-hoc ERP analysis of evaluation

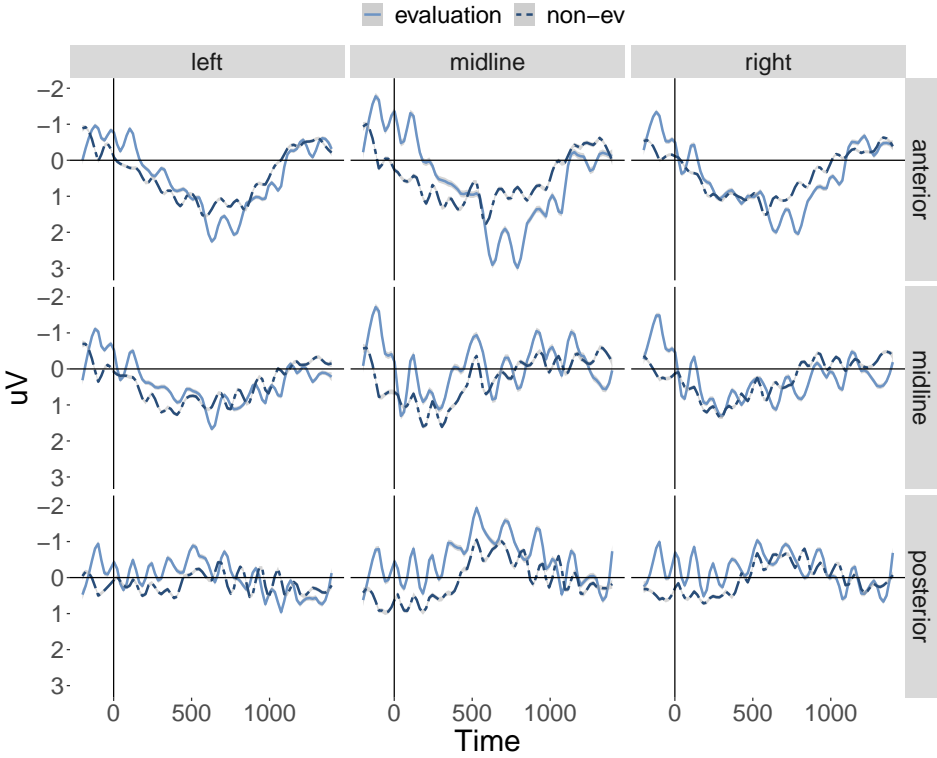


Figure D.1: Grand-average ERPs of d-pronouns in the Tschick excerpt with the evaluation function (dark blue striped) and without the evaluation function (light blue solid). The vertical line indicates stimulus onset.

D Post-hoc ERP analysis of evaluation

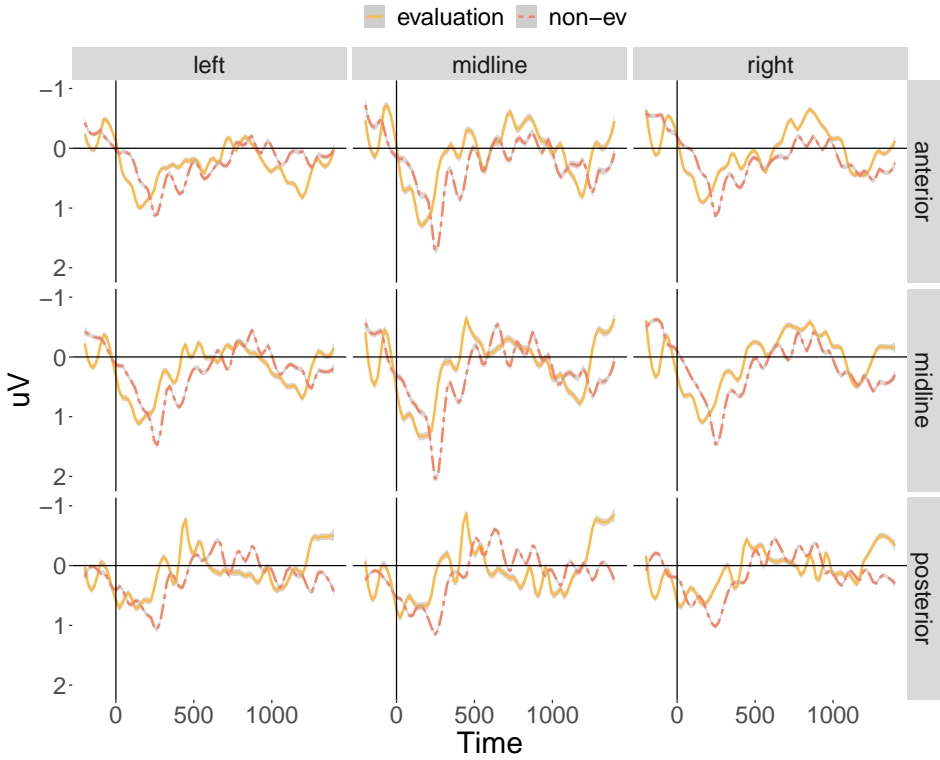


Figure D.2: Grand-average ERPs of d-pronouns in the AdT excerpt with the evaluation function (yellow solid) and without the evaluation function (orange striped). The vertical line indicates stimulus onset.

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