The competition between arguments for prominence in German Sign Language

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List of publications

This cumulative dissertation is based on the following publications[1] (the numbering corresponds to the order in which the studies will be discussed in this dissertation):

Published:

Sudy 1: de Souza Santos, Thiago, Antonia Dietrich, Peggy Steinbach, and Pamela Perniss. 2025. “Differential Object Marking in DGS (German Sign Language): A prominence-based account of the use of PAM based on naturalistic data.” *Glossa: a journal of general linguistics* 10 (1). doi: 10.16995/glossa.11591.

Study 2: de Souza Santos, Thiago, Antonia Dietrich & Pamela Perniss. "Interaction of the differential object marker pam with other prominence hierarchies in syntax in German Sign Language (DGS)" *Open Linguistics* 11, no. 1 (2025): 20250057. https://doi.org/10.1515/opli-2025-0057

Under review:

Study 3: de Souza Santos, Thiago & Pamela Perniss. Under review. Looking at verb indication in German Sign Language (DGS) through the lens of prominence. *Glossa: a journal of general linguistics*.

[1] The full versions of the studies are available in the supplementary materials.

1 Introduction

Research on argument structure in sign languages faces a significant challenge compared to studies on spoken languages: the visuo-spatial nature of sign languages, which introduces fundamental differences in how arguments are realized and organized. General linguistics, historically focused on spoken languages, began recognizing space as a crucial grammatical element in sign languages only in the second half of the 20th century. This shift brought new attention not only to the role of hands and articulation but also to the spatial organization of referents, opening new perspectives on how arguments are marked and tracked.

One of the key aspects of argument marking in sign languages is the use of space to encode relationships between arguments and predicates. Unlike spoken languages, which primarily rely on word order and morphology, sign languages can assign arguments to specific locations in the signing space. This strategy involves verb movement, specialized markers, and embodied techniques, all contributing to argument tracking in discourse.

Among the linguistic elements involved in this spatial organization, three phenomena are particularly relevant for German Sign Language (DGS) and will be highlighted in this dissertation: the directional modification of verbs, the use of the Personal Agreement Marker (PAM), and the role of Constructed Action (CA) as a referent-mapping strategy. Verb modification involves the spatial movement of verbs to express relations between arguments; PAM functions as an additional argument-marking device; and CA allows signers to embody referents directly, impacting the way space is used to organize arguments.

This dissertation uses naturalistic data from the DGS Corpus (Konrad et al., 2020) to explore these phenomena through the lens of linguistic argument tracking. Rather than offering a detailed theoretical discussion of argument structure, the aim is to provide an illustrative

background that prepares the ground for the empirical studies, where theoretical debates are developed in depth.

This work is further guided by the concept of linguistic prominence, drawing on the cognitive framework proposed by Himmelmann and Primus (2015). The authors developed this approach based on three fundamental principles firstly applied to prosodic studies: competition, dynamism, and structural attention. Firstly, prominence competition occurs among elements of the same nature. For instance, in a picture with 100 black umbrellas and one red umbrella, a red umbrella stands out among black umbrellas because they all belong to the same category. Similarly, linguistically, the subject is more prominent than the object because it commonly precedes the verb. The agent is the most prominent semantic role because it controls the event, while the patient is affected by it. However, the second principle posits that inherently prominent elements are not always the most prominent in a given context. Thus, an object may become more prominent and receive an additional syntactic marking (e.g., DOM, passive construction). Lastly, elements sensitive to prominence play a crucial role in structuring languages. Passive voice, for example, is based on the notion that the subject position is the most prominent, leading many languages to develop a structure that allows a prominent patient to occupy the subject position. From this perspective, prominence plays a central role in shaping how arguments are spatially and grammatically realized. Based on this approach, the central research question of this dissertation is:

What is the effect of linguistic prominence on the spatial marking of arguments in DGS?

To address this question, the thesis is structured as follows: Chapter 2 provides a general theoretical background on how space is used to mark arguments in DGS, illustrating key phenomena without engaging in exhaustive theoretical debates. Chapter 3 presents the subquestions, objectives, and hypotheses. Chapters 4 and 5 report two studies on the use of PAM as a differential argument marker in DGS. Chapter 6 investigates the modification of

indicating verbs and their relationship to argument prominence. Chapter 7 offers a general discussion connecting findings across the studies, and Chapter 8 presents the conclusion, addressing the central research question

2 Background

2.1 Spatial Strategies for Argument Marking in DGS

This section provides an overview of how spatial mechanisms are used to mark arguments in DGS. The aim is to illustrate key modality-specific strategies, offering a broad background to support the empirical studies without engaging in a full theoretical treatment of argument structure. We first introduce the role of verbs in argument marking, highlighting modality-specific behaviors through a classification of verb types. We then discuss the use of the PAM in DGS, relating it to argument-tracking mechanisms found across sign languages. Finally, we examine CA as a referent-mapping strategy that, while not the focus of the empirical studies, plays a fundamental role in the spatial organization of arguments in DGS.

2.1.1 Verb Classes in DGS

Early descriptions of verb behavior in sign languages were shaped by Padden's (1988, 1990) classification of three main verb types. Padden observed that the way verbs interact with their arguments depends fundamentally on how they are spatially articulated. She distinguished:

- Agreeing verbs, which show directional movement between referents associated with distinct spatial locations;
- Spatial verbs, which depict actual movement of the referent itself through space;
- Plain verbs, which do not exhibit spatial directionality to express argument relations, remaining anchored to the signer's body.

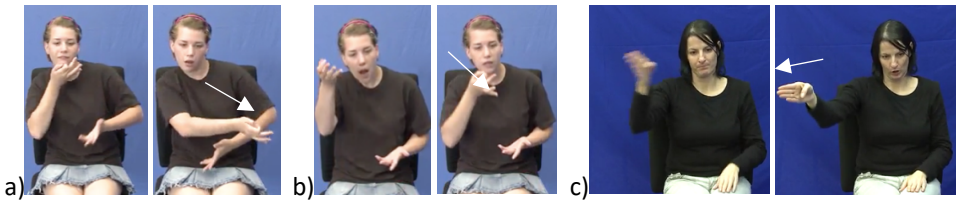
Building on these insights, Liddell (2000, 2003) proposed a gestural-morphemic interpretation of verb modification. Rather than framing verb modification as syntactic agreement, Liddell argued that the modification of verbs in space results from the combination of gestural and linguistic elements. According to this view, verbs indicate their arguments by pointing to spatial locations, in a way that resembles how speakers gesture when referring to

entities in space. Thus, verb movement in sign languages reflects a gestural-morphemic strategy of argument indication rather than strict syntactic computation.

Within the broader category of plain verbs, it is useful to distinguish between neutral plain verbs, which move through neutral space to indicate an argument, and body-anchored plain verbs, whose articulation is fixed to a part of the signer's body (see Oomen, 2021, for a description of neutral and body-anchored verbs in DGS). For the purposes of this dissertation, we adopt the following classification:

- Indicating verbs, which express argument relations through directional movement (e.g. ASK, Figures 1a and 1b);
- Spatial verbs, which depict referents' physical movement (e.g. GO, Figure 1c);
- Neutral plain verbs, which are articulated in neutral space without anchoring; and
- Body-anchored plain verbs, which are attached to specific body locations.

This section will briefly illustrate each type of verb. However, the empirical studies will focus primarily on the modification patterns of indicating verbs, which are most directly involved in expressing argument relations through space. Indicating verbs exhibit phonological flexibility that allow them to move in space to point to their arguments. In the examples below, we observe the use of the indicating verb ASK in Figures 1a and 1b, which show argument marking through verb movement, while Figure 1c illustrates the verb GO, indicating the referent's movement from one location to another.

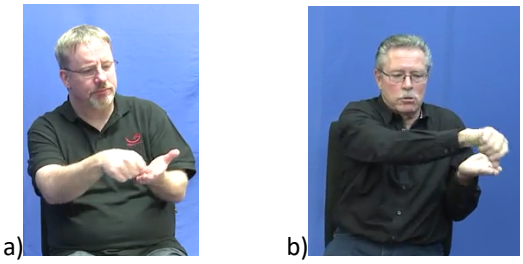


a) 1sg-ASK-3sg "I ask him/her." b) 3sg-ASK-1sg "S/he asks me." c) 1sg-GO-loc "I went there."

Figure 1: DGS examples showing spatial modification for subject and object with the indicating verb ASK[2] and the referent's location change with the spatial verb GO.

[2] All pictures used in the examples in DGS are extracted from the DGS Corpus website (Konrad et al., 2020)

Neutral verbs indicate the location of a referent, which can be either a subject or an object. In Figure 2, we see two examples of the verb PAY. In 2a, PAY is produced at the subject's location (second person), while in 2b, it is realized at the object's position. However, the verb does not explicitly show the relationship between the arguments.



a) 2sg-PAY-∅
"You pay them."

b) ∅-PAY-3pl
"I pay them."

Figure 2: DGS examples of the neutral verb PAY modifying to the subject in 3a and to the object in 3b.

Beyond this basic classification, other verb types and behaviors are observed in DGS, as in other sign languages. Typically, in directional verbs, the movement begins at the agent's locus and ends at the patient's locus, reflecting the transfer of action from the subject to the object. However, some verbs—referred to as backward verbs (Meir, 1998)—reverse this pattern: the movement ends at the subject's locus instead. In these cases, the agent (subject) is associated with the final position of the movement rather than the starting point, as illustrated by the verb INVITE (Figure 3a). Additionally, some verbs exhibit partial phonological restrictions, such as the verb THANK (Figure 3b), which always retains its initial position anchored to the body but allows its final position to shift toward the object. Other verbs, like TRUST (Figure 3c), only modify for the subject when the object is first-person. Another noteworthy category includes what Liddell (2003) refers to as depicting verbs (see Figure 3d), which are a specific type of Depicting Sign (DS). These signs belong to a highly productive lexical class in sign languages and therefore exhibit less fixed morphology, allowing for greater spatial and iconic.

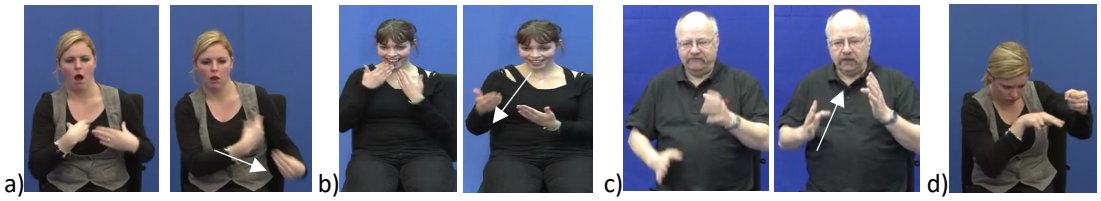


Figure 3: DGS examples of verbs with uncommon behavior.

Verbs in Figures 3a, 3b, and 3c are considered indicating verbs, but depicting verbs are categorized as a separate class due to their productive morphology. They can incorporate different objects, and their form exhibits a higher level of transparency with real-world referents. For example, in 3d, the signer's left hand symbolizes the act of holding a bunch of grapes. However, if the object were a piece of paper, the shape and movement would change accordingly, always adapting to the referent's physical form. This type of modification differs from the modification in ASK, where the physical characteristics of the referent do not influence the verb's handshape.

The works of Pfau et al. (2018) and Schembri et al. (2018) provide a broad overview of research on verb modification. While Pfau et al. (2018) argue against the gestural perspective and present a syntactic interpretation of the phenomenon, Schembri et al. (2018) advocate for a gestural account. New research continues to explore these and other directions to clarify the nature of verb modification in sign languages. Building on this debate, the present dissertation contributes by examining the modification of indicating verbs in DGS through the lens of linguistic prominence, offering new insights into how discourse and morphosyntactic factors interact in shaping spatial verb modification.

Oomen (2021) employs the DGS Corpus (Konrad et al., 2020) to analyze verbs—not only indicating verbs and spatial verbs, but also neutral and plain verbs—from a more formal perspective. The author proposes an analysis of verbal agreement in DGS across all verb types. Specifically regarding agreement verbs, she argues that verbal agreement in DGS is obligatory,

as incongruences between verb modification and the referent's position in space were rare in her data. Regarding the semantic behavior of the investigated sentences, the author asserts that inanimate arguments resist localization and that the central signing space is more commonly used for referents with low referentiality. Finally, she applies Malchukov's (2005) verbal classification to identify a semantic association between verb types, showing that plain verbs are more frequently used in experiential events (e.g., LOVE, UNDERSTAND), neutral verbs are used for more prototypical events, whether transitive or intransitive (unaccusative) and agreement verbs (indicating verbs) tend to occur with interactional events involving two participants (e.g., ASK). However, the author does not conduct an in-depth investigation into these features in terms of competition between referents or arguments.

2.1.2 PAM in DGS

The use of PAM in DGS has been the subject of extensive investigation in syntactic studies. Rathmann (2003) interprets this sign as a type of auxiliary verb that carries syntactic agreement marking with arguments of plain verbs. Plain verbs cannot be spatially modified to indicate their arguments because they are body-anchored. The verb LOVE in Figure 4, followed by PAM, illustrates this dynamic between the verb and the auxiliary.

Figure 4: DGS example of a clause with the plain verb LOVE followed by PAM.

Pfau and Steinbach (2007) support this interpretation and argue that this sign has undergone grammaticalization from the noun PERSON (Figure 5), which is used in DGS to position a human referent within the signing space. According to the authors, the sign, originally

produced with a vertical direction, gradually developed a curved movement toward the object of the verb and can also originate from the subject. Finally, the authors state that PAM may also accompany verbs capable of modification, attributing double agreement, which serves a pragmatic function of emphasis.

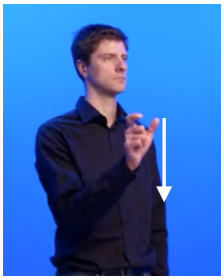


Figure 5: Sign PERSON extracted from the DGS Corpus website

Other studies point to the grmmaticalization of PERSON as an argument marker in other languages. Meir (2003) examines the use of a sign with a form highly similar to PAM, termed Obj_{PRO}, which functions as an object marker in Israeli Sign Language (ISL). She notes that its use is constrained by nominal and verbal semantic parameters like animacy and ditransitivity. Börstell (2017, 2019) also identifies a sign derived from PERSON in Swedish Sign Language (SSL), specifically used for animate objects. The author further provides an extensive list of sign languages where the grammaticalization of PERSON into object markers and auxiliaries has occurred. The diagram in Figure 6, developed by Pfau and Steinbach (2013), illustrates the grammaticalization path from PERSON to PAM in DGS.

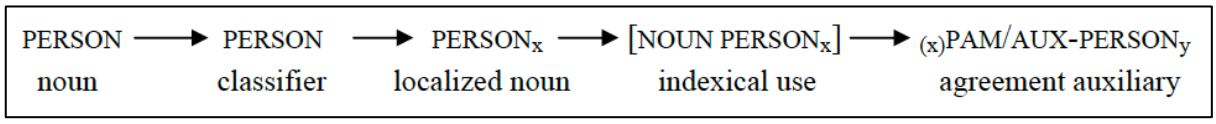


Figure 6: Grammaticalization path from PERSON to PAM in DGS (Pfau and Steinbach, 2013)

More recently, Bross (2020) proposed an analysis of PAM in DGS as a Differential Object Marker (DOM), arguing that PAM marks animate, definite, and affected objects. Based on an

acceptability judgment study with native DGS signers, he suggests that PAM functions similarly to a preposition-like element rather than as an auxiliary. His analysis also links the distribution of PAM to semantic classes, such as animacy, definiteness and affectedness.

A more detailed investigation is also necessary regarding the semantic behavior of PAM. Bross's (2020) study considered only DGS as signed in southern Germany and did not use naturalistic data. Oomen (2021) supports the analysis of PAM as an auxiliary but states that there is insufficient data for a more in-depth analysis of PAM's behavior in the corpus.

The studies by Macht (2016) and Proske (2020) also utilize the DGS Corpus (Konrad et al., 2020) to investigate the use of PAM. Among other findings, Macht identifies a preference for PAM in post-verbal position (69%), but within the DP, there is no clear preference for initial or final positioning. Additionally, the author highlights two distinct behaviors of PAM: one where the object is in the first person (which features more mouthing of "auf" and can occur pre-verbally or post-verbally), and another where the object is non-first person, featuring more verb-related mouthing spread onto the sign and occurring predominantly post-verbally. Proske (2020) disagrees with Pfau et al. (2018) regarding the idea that PAM is an agreement auxiliary linked to plain verbs (Oomen, 2021, also found no such connection), as her data show a higher occurrence of PAM with agreement verbs (indicating verbs) and in internal positions before the object. Following Bross (2020), the author interprets the use of PAM in her data as a DOM but acknowledges the need for further research, particularly on the ordering and function of PAM, as her study do not focuses on PAM, but on overall word order in DGS.

Finally, Steinbach (2022) presents a theoretical reflection considering major experimental and formal studies on the use of PAM in DGS. The author concludes that there are two uses of PAM: the first, described as PAM_x, is interpreted as a DOM, while the second, described as $_xPAM_y$, is interpreted as an auxiliary or agreement marker. The syntactic difference between these uses lies in subject agreement and sign order. PAM_x is an element (which could

be a preposition-like element or a determiner) that does not agree with the subject and occurs in a pre-verbal position, referencing Bross (2020). Meanwhile, $_{x}$PAM$_{y}$ is an auxiliary that agrees with both subject and object and occurs in post-verbal position, following the findings of Macht (2016). An experimental investigation testing these assumptions remains necessary, particularly considering the syntactic and semantic prominence relations involved in the use of PAM.

2.1.3 Constructed Action (CA) in DGS

Another important phenomenon related to argument marking in DGS is Constructed Action (CA). CA is described by Fischer and Kollien (2006) as a strategy where the signer uses their body and movements to represent a referent—typically a human character—acting or speaking within a narrative. In CA, the signer is no longer merely narrating events but temporarily "becomes" one of the characters, introducing a performative dimension into the spatial organization of discourse. The spatial restructuring involved in CA can be related to what Liddell (2003) calls surrogate space: a framework where the signer's physical body and signing space are mapped onto the mental space of the narrative. His notion of surrogate space helps explain how the signer's embodiment of a referent reconfigures spatial relationships during enactment. Figure 7 illustrates how such a spatial shift occurs.

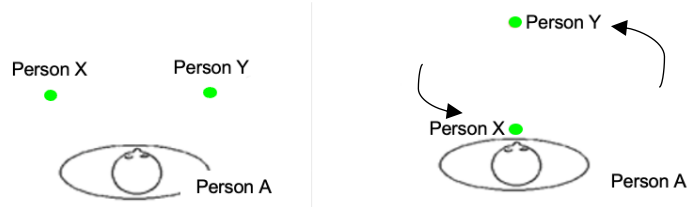
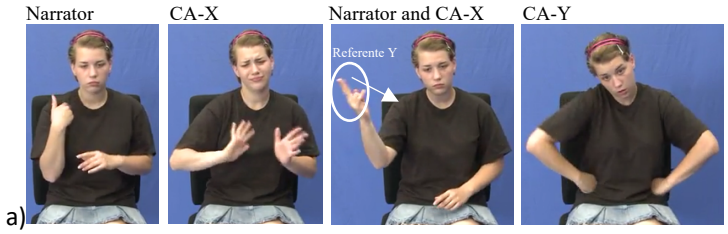


Figure 7: Shifting location through mapping referent onto the body in CA

In the first part of the figure (left side), Person X and Person Y are established as distinct points in space relative to Person A, the signer—X on left side and Y on right side. In the second part (right side), when the signer enacts Person X through CA, their own body becomes associated with X's spatial location. Simultaneously, Person Y, who was previously mapped laterally, is

now repositioned in front of the signer. This performative shift reorganizes the spatial structure: one referent (X) is embodied by the signer, while the other (Y) moves into a new spatial position.

This spatial shift has implications for the use of indicating verbs, since the positions of X and Y in space influence how these verbs are directed and interpreted by the addressee. Figures 8a and 8b provide examples of location shifts. The signer explains that in school, teachers complained when she used sign language (Figure 8a). Later, she recounts that once a teacher (possibly the same one, as she modifies the verb from the same location as in figure 8a) asked questions in spoken language and told her she was wrong when she answered him in sign language (Figure 8b).



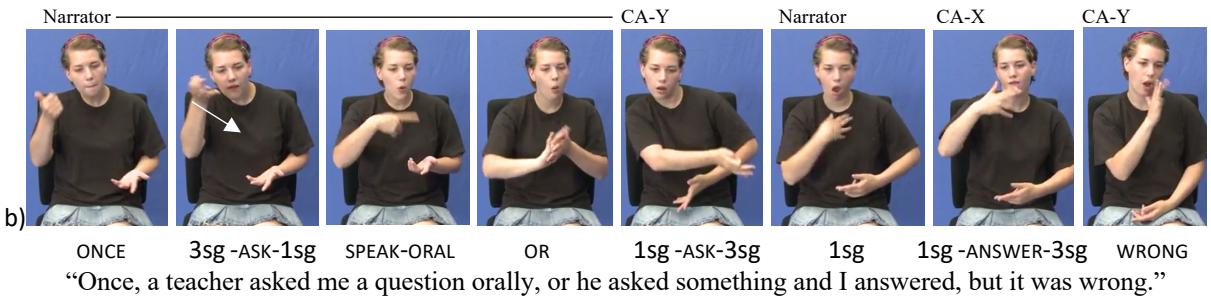


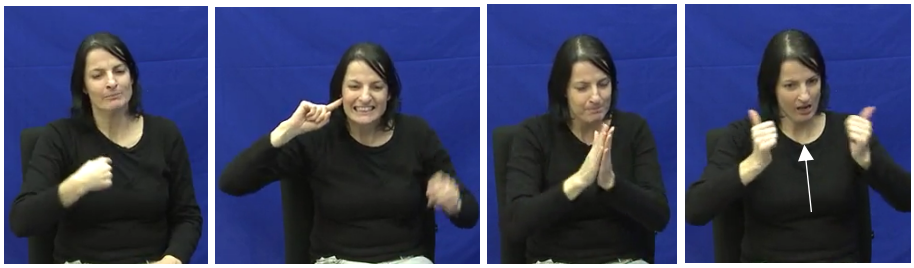
Figure 8: Examples of CA in DGS With referent location shifting

In Example 8a, the referent Y initially appears to the right of the signer, which is also the right of the referent X in the situation . However, in the final image, when mapping referent Y onto

the body(in GESTURE), referent X moves to the second-person position, in front of the signer. In Figure 8b, the signer modifies the verb ASK, initially signing from 3sg to 1sg, with 3sg being referent Y (the teacher is the agent of the verb ASK) and 1sg being referent X (herself). However, when signing ASK again, the participant shifts her torso to the right, mapping referent Y onto her body. She then signs ASK from 1sg to 3sg, with Y(teacher) now becoming 1sg and X (the girl) becoming 3sg. Finally, she moves her body again to indicate that X responds and Y judges the answer as incorrect.

Fischer and Kollien (2006) further note that CA can be "pure", where the entire body of the signer enacts the entire body of the referent (as in 8a), or "parallel", when only part of the body enacts the referent (as in 8b, when the participant is in CA while signing ASK). This occurs when the hands are signing the verb (e.g., ASK), or even when the hands represent another referent, such as in the sign PERSON-COME in 8a (Narrator and CA at the same time). In addition to CA, another type of constructed representation is Constructed Dialogue (CD), in which the signer enacts what a referent is saying or thinking.

While CD is a subtype of CA—since it also involves the embodiment of a referent—it relies on a different set of semiotic principles and serves a distinct discursive function. For example, in 9b, the signer is in CA during the final sign WRONG, but more specifically, this is an instance of CD, because the signer is enacting the teacher's utterance*:* "Wrong!" This distinction is essential. In the case of ASK, the signer is not quoting the referent's actual words but narrating the event using a verb the referents did not produce themselves—hence, it is a case of parallel CA. In contrast, WRONG is a direct quotation from the referent and thus represents pure CA, realized as CD. Crucially, CD is not anchored to individual verbs, but to the quoted utterance as a whole. A clear example of this distinction can be seen in Figure 9.



1sg DEAF PLEASE 2sg-HELP-1sg

"I am deaf. Please help me"

Figure 9: Example of CD in DGS

In this case, the signer uses CA to embody the person who originally signing, i.e. enacting the act of signing rather than the action of helping itself. The verb HELP is modified directionally (from second person to first person), but this modification must be interpreted within the structure of the quotation. Here, the enactment applies not only to the verb HELP, but to the entire quoted signing. To correctly understand who is the subject and object of HELP, it is first necessary to analyze the structure of the CD: that is, who is signing what to whom. Only after establishing the speaker–addressee relationship within the quotation can the argument structure of the verb be accurately interpreted. This distinction is fundamental for understanding how CA—and particularly CD—affects the spatial organization and referential interpretation of indicating verbs in DGS.

This section has provided an overview of the syntactic structure of DGS, with a particular focus on verb classes. Building on Padden's classification, different types of verbs were presented, adopting Liddell's (2000) terminology of indicating verbs—those that express transitivity by spatially pointing to their arguments. This dissertation focuses specifically on indicating verbs that mark participant arguments, excluding verbs that primarily indicate locative arguments. The methodological decision to exclude locative verbs is based on the aim of analyzing competition between arguments of the same type—namely, participants in the event, whether animate or inanimate, rather than locations. By concentrating on transitive clauses involving two participants, the study isolates contexts where competition for

prominence between subject and object is most visible, which is central to the aims of this research. We also discussed the use of the sign PAM in DGS, drawing on two studies that analyze its role. PAM is considered crucial for examining argument competition, especially when interpreted as a marker of differential object marking (DOM). Finally, we looked at constructed Action, which, while not the main focus of the analyses that follow, plays an important role in shaping the spatial structure of arguments. This makes it necessary to explore CA in greater depth, particularly in relation to indicating verbs. The next section turns to the notion of linguistic prominence. The foundational concepts introduced there will help us understand how this notion interacts with, and can illuminate, argument relations in DGS—especially in terms of competition.

2.2 Linguistic Prominence

The concept of prominence in linguistics has been used to understand how the relationship between elements of the same nature can structure language. On a morphosyntactic level, competition between arguments plays a significant role in several phenomena. For instance, in DO-cleft constructions (Primus et al., 2022), prominence influences acceptability: the prominence of semantic roles varies across constructions, and DO-clefts specifically highlight particular role features, supporting a feature prioritization approach rather than a prototypicality account. In Differential Object Marking (DOM) (Kizilkaya et al., 2022), prominence emerges through the affectedness of the object; objects undergoing greater change are more likely to receive differential marking, particularly in dynamic and telic events. Finally, in word order phenomena (Kretzschmar et al., 2012), prominence does not alter initial parsing strategies (which show a preference for subject-initial structures), but influences reanalysis processes during comprehension: when word order violates referentiality or thematic role hierarchies, reanalysis becomes more difficult. Across these domains, prominence operates dynamically, shaping both morphosyntactic structure and real-time processing.

Generally, the subject position is prototypically occupied by the agent, an inherently prominent element from a cognitive perspective (Himmelmann & Primus, 2015). When describing an event, it is common to begin by mentioning the entity that caused the event. As a result, the subject is expected to be the agent of the event, occupying the first position and receiving an inherent and passive prominence status. Himmelmann & Primus (2015) argue that cognitive perception and linguistic attention to the agent are passive because they are expected, but this prominence is not permanent, as other elements may become prominent and attract active attention. The authors explain that this active attention is syntactically generated through additional information, such as the use of passive constructions, where the agent ceases to be the focus and the patient assumes the subject position, gaining prominence.

Beyond the principle that some elements are inherently prominent and receive A-center status (center of attention), and the principle that this status can change depending on syntactic context, Himmelmann & Primus present another principle: prominent elements serve as structural anchors from which linguistic structure is defined. The authors argue that it is through the (proto)agent that an event is characterized—either as an action if the agent has volition, or as a process if not. In syntax, they explain that the agent-first principle helps disambiguate sentences where the subject and object share the same properties.

At the discourse level, other phenomena follow these same principles. Von Heusinger & Schumacher (2019) illustrate these principles in discourse using the concepts of accessibility (Ariel, 1994) and continuous topic (Givón, 1983). In discourse, competition occurs between referents, with the most prominent referent being more accessible and more likely to serve as the discourse topic. As a result, accessible elements are more frequently resumed using pronouns or null arguments than less accessible elements. However, contextual changes can cause a new referent to become the discourse topic and thus more prominent. Ultimately, the entire anaphoric structure of discourse is guided by the conception of one referent as the

discourse topic, providing evidence of the relationship between discourse topicality, accessibility, and linguistic prominence.

Although the same principles operate on a morphosyntactic and discourse level, it is crucial to recognize that different levels of analysis impose different types of prominence. Discourse prominence should not be confused with morphosyntactic prominence. A syntactically prominent element may be one that carries more overt marking, such as case marking in objects (see Aissen, 2003). However, this can also move in the opposite direction. For example, Haude (2019) foundo for Movina (Bolívia) that discourse prominence moved in the opposite direction of a morphosyntactic level prominence—elements that were less prominent in discourse received greater syntactic prominence.

2.3 Linguistic Prominence in Sign Languages

In this section, we relate briefly relates studies in sign languages to the notion of prominence presented in the previous section. These studies will serve as the foundation for structuring the research questions that will be introduced in the next section. We focus on verb modification and the use of DOM. The primary reference for the modification of indicating verbs is Fenlon et al. (2018). In their corpus analysis of BSL, the authors found that the modification of indicating verbs in BSL is related to the animacy of the object, the maintenance of the referent in discourse, person marking, and the use of constructed action, with the latter being the most emphasized factor. The modification of verbs for arguments occurred more frequently with animate and discourse-maintained objects. This result aligns with Aissen's (2003) notion of object individuation, which suggests that individuated objects tend to trigger the use of DOM across languages. Although subjects were also modified more often when maintained in discourse, animacy was not a significant factor for verb modification toward the subject. These findings support the interpretation of modification as an element that confers a morphosyntactic prominence to the object.

In addition, modification occurred more frequently with maintained referents exhibiting null coreference, which may indicate a high level of accessibility for modified referents. Thus, verb modification also appears to align with discourse prominence, as both subjects and objects were modified more frequently when maintained in discourse. However, the authors also note that while higher modification rates were indeed found with maintained referents, these were often associated with null arguments—referents not overtly expressed in the preceding clause. Additionally, reintroduced elements also showed high rates of modification. This suggests that modification is not strictly tied to discourse maintenance per se, but rather to the absence of an overt linguistic realization in the immediately prior sentence. The authors conclude that verb modification serves to re-mention or re-anchor referents in space, functioning as a gestural strategy with linguistic material, rather than simply showing agreement.

In DGS, the use of PAM, interpreted by Bross (2020) as a DOM, also demonstrates PAM's sensitivity to prominence-related features such as animacy, definiteness, and affectedness. Even analyses of PAM as an auxiliary (Rathmann, 2003; Steinbach & Pfau, 2007) do not deny the relationship between PAM and animacy, as PAM was likely grammaticalized from PERSON, a sign carrying a semantic feature of humanness. The same applies to analyses of DOM in SSL (Börstell, 2019) and the object marker in ISL (Meir, 2003), where the sign is used to mark animate objects.

3 Research questions

The previous sections have outlined key theoretical and empirical studies related to verb modification and the use of PAM in DGS. While these studies provide important foundations, they also reveal gaps concerning the role of linguistic prominence in shaping the spatial marking of arguments, particularly in connection with spatial organization strategies in DGS. Building on this background, we arrive at the general research question of the present study:

What is the effect of linguistic prominence on the spatial marking of arguments in DGS?

This overarching question gives rise to three more specific research questions, which will be pursued across the three studies conducted in this dissertation:

- Research Question 1: Is the use of PAM related to competition between arguments for prominence in DGS? (Study 1)
- Research Question 2: If so, how does the use of PAM as a marker of syntactic prominence relate to other syntactic prominence-marking strategies among arguments? (Study 2)
- Research Question 3: Finally, how can the modification of verbs in indicating verbs be related to linguistic prominence at the morphosyntactic and discourse levels? (Study 3)

To answer these questions, we conducted three studies using the DGS Corpus (Konrad et al., 2020) as a source of naturalistic data and examined the behavior of PAM and verb modification based on syntactic and semantic factors, primarily observing the frequency of these factors as a starting point for interpreting the relationship between the factors and the phenomena studied. In the first two studies, our results are based on the description of the behavior of PAM in sentences containing PAM. In the first study, in addition to analyzing the dataset containing all occurrences of PAM, we conducted a secondary analysis including both negative and positive occurrences of PAM across the verb scale identified by Bross (2020), solely to verify the obligatory use of PAM. In the second study, we focused on the behavior of

PAM in sentences with PAM within the corpus. The third study, focusing on verb modification, presents a statistical analysis of how syntactic and semantic factors may favor or disfavor verb modification. To achieve this, we analyzed all indicating verbs in spontaneous conversations within the corpus. The following section details the hypotheses for each research question.

3.1 Research Question 1

For the first research question, we take the results of Bross (2020) as a starting point, as the author identifies PAM as a DOM, an element widely studied in the literature as being sensitive to prominence (see von Heusinger et al., 2024, for a recent investigation on DOM in Spanish). Since the author highlights the influence of nominal features such as animacy and definiteness, as well as the verbal feature of affectedness in the use of PAM, we conducted our corpus research with two specific objectives: (i) determine the relationship between animacy and definiteness (individuation) and, (ii) to test the influence of object affectedness on the use of PAM. Our primary goal is to relate the use of PAM to linguistic prominence, specifically how PAM in DGS may be interpreted as providing additional information (marking) that shifts the agent from its natural position as the center of attention.

Following Aissen's (2003) framework, we expect that PAM, as a DOM, will occur more frequently with semantically prominent objects—namely, animate, human, and definite objects. However, we do not expect PAM to function as a mandatory marker of individuation: its use is predicted to be sensitive to semantic prominence but not systematically required, meaning that PAM may also appear with inanimate or less individuated objects, and its presence should not be strictly determined by definiteness.

Regarding the affectedness parameter, we expect to find a divergence between the use of PAM in the corpus and the results presented by Bross (2020). First, this expectation arises from our argument against the obligatory or restrictive nature of PAM in specific semantic contexts. Additionally, Bross (2020) employs Tsunoda's (1985) scale, which was not

specifically designed to measure affectedness but rather to address verb transitivity. The scale suggests that higher-ranked verbs in the hierarchy have a more prototypical argument structure across languages. Furthermore, Bross (2020) asserts that PAM is obligatory in verbs of medium affectedness (without mentioning definiteness interference) but states that highly affected verbs exhibit definiteness interference, meaning PAM is only obligatory for definite objects. For low-affected verbs on Tsunoda's (1985) scale, the author claims that PAM is not permitted. However, there is no direct or inverse correlation between the obligatoriness of PAM and Tsunoda's hierarchy, as only verbs in the middle of the hierarchy are deemed obligatory. Additionally, the author does not provide a theoretical explanation for why definiteness interference occurs exclusively with highly affected verbs.

3.2 Research Question 2

In the second study, still focused on PAM, we shift our perspective from semantic features to syntactic behavior in sentences containing PAM. This time, following Steinbach's (2022) proposal of two types of PAM —one as a DOM and the other as an agreement auxiliary— we examine word order, PAM modification for subject and object, and the types of verbs that occur with PAM to assess the plausibility of interpreting PAM as an agreement auxiliary. Additionally, we aim to understand how other syntactic prominence hierarchies (e.g. sign order) interact with the use of PAM.

Regarding the first objective, we anticipate no correlation between PAM use for the subject and syntactic position, as we argue that there is a single interpretation of PAM as a differential marker, rather than two distinct types. We further expect a significantly higher frequency of PAM with the object, reinforcing the analysis of PAM as being sensitive to object prominence. As for word order, based on current evidence, we do not expect a predominant pattern associated with the use of PAM.

For the second objective, following Fenlon et al. (2018), we assume that verb modification for the object serves as a marker of morphosyntactic prominence. We also recognize that initial object position can independently contribute to increased prominence. Additionally, we propose that object omission (object drop) can signal prominence, insofar as highly accessible referents are often not overtly realized. Our hypothesis is that in sentences with PAM, other syntactic prominence markers (such as initial object position, verb modification, or overt realization) are less likely to co-occur. This could either suggest that PAM tends to occur when other prominence markers are absent or that PAM itself confers sufficient prominence to the object, making additional markers redundant.

3.3 Research Question 3

The third study focuses on verb modification. For this study, we follow the methodology of the corpus study conducted by Fenlon et al. (2018). In their study, the authors examined linguistic factors such as animacy, coreference, person, and CA, as well as social factors including language background, age, gender, and ethnicity. We analyze similar factors with some differences. Since the DGS Corpus (Konrad et al., 2020) is stratified only by age, gender, and region, we utilize these social factors. Regarding sociolinguistic influences, we also include the potential impact of the modification of one argument on the modification of the other. Additionally, we analyze the semantic role of the subject (agent vs. experiencer) and the semantic role of the object (patient vs. recipient). As in Fenlon et al. (2018), our objective is to explore the nature of verb modification, but here specifically through the lens of linguistic prominence.

The ongoing debate surrounding the nature of modification centers on whether it functions as verbal agreement, in line with patterns in spoken languages (Pfau et al., 2018), or whether it reflects sensitivity to discourse-related factors (Schembri et al., 2018). Based on this theoretical background, we approach our analysis with the expectation that the findings will

challenge the agreement-based account and instead support the view that modification is influenced by factors such as coreference and the use of CA. We also hypothesize that modification is not obligatory and may be shaped by pragmatic and idiosyncratic factors, which would further weaken a strict agreement interpretation. In terms of linguistic prominence, we propose that modification aligns more closely with discourse prominence—particularly referent accessibility—rather than with morphosyntactic prominence. Consequently, we do not predict consistent differences in modification patterns between subjects and objects, since both may be equally accessible within the discourse, regardless of their syntactic role.

4 Study 1: Differential object marking in DGS (German Sign Language): A prominencebased account of the use of pam based on naturalistic data

Sudy 1: de Souza Santos, Thiago, Antonia Dietrich, Peggy Steinbach, and Pamela Perniss. 2025. "Differential Object Marking in DGS (German Sign Language): A prominence-based account of the use of PAM based on naturalistic data." *Glossa: a journal of general linguistics* 10 (1). doi: 10.16995/glossa.11591.

4.1 Background

This study investigates the use of the sign PAM in DGS as a DOM linked to the notion of linguistic prominence. Linguistic prominence relates to DOM in that DOM usage marks special objects, providing additional information that makes the object more prominent than the subject (Himmelmann & Primus, 2015; Aissen, 2003). The use of DOM is associated both with the syntagmatic axis, in competition with other verb arguments, and with the paradigmatic axis, in competition among other possible objects (de Swart, 2014). Individuation (animacy and definiteness) has been identified as a semantic parameter that attracts differential object marking in many languages (Aissen, 2003), and affectedness, in interaction with individuation, can also enhance object prominence (Næss, 2004).

Bross (2020), in his investigation of PAM in DGS, classifies the sign as a DOM triggered by animacy, definiteness, and affectedness. Regarding animacy, the relationship between PAM and this feature had already been indicated by analyses of the grammaticalization of PAM from the PERSON sign, which carries a semantic feature of humanness. We follow the scale human > animate > inanimate (Aissen, 2003) to analyze the level of animacy in objects marked with PAM.

Regarding definiteness, Bross relies on a referentially based definition (referents already mentioned in discourse). We adopt the notions of familiarity and uniqueness (Lyons, 1999; Almeida-Silva, 2019) to classify objects according to the scale definite > specific > non-

specific, where definite includes all referents already mentioned in discourse (familiarity) or unique referents in the world, such as Princess Diana or President Kennedy (uniqueness). The difference between specific and non-specific was determined by the signer's familiarity with the referent. When the signer knew who the referent was (even if the interlocutor did not), the object was classified as specific. When the referent was unknown to both the signer and the interlocutor, the object was classified as non-specific.

Regarding affectedness, Bross (2020) employs Tsunoda's (1985) hierarchy to analyze the affectedness parameter. When developing this hierarchy, Tsunoda (1985) presented a transitivity scale among verbs, suggesting that higher-ranked verbs are also more transitive. Therefore, affectedness cannot be analyzed solely based on this scale. For this reason, we rely also on Beavers' (2011) scale, which also considers affectedness based on the potential for change in the object affected by the verb, while acknowledging that affectedness is a parameter that can involve multiple factors. Figure 10 illustrates the relationship between Tsunoda's and Beavers' scales.

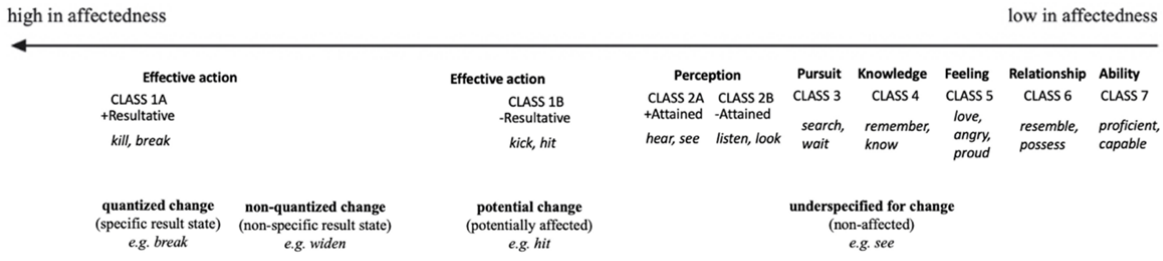


Figure 10: Correspondence between Tsunoda's (1985) and Beavers' (2011) scales of affectedness.

In addition to this verbal parameter, we also analyzed the data based on the verb classes proposed by Meir (2003) for the use of the object marker OBJ_{PRO} in ISL. Meir identifies an object marker in ISL that is highly similar to PAM (with the same handshape and movement) and states that this sign is most common in three categories of verbs: psych verbs, content verbs, and negative effect verbs. The following section explains the structure of our study.

4.2 Methods

We analyzed all instances of PAM in the DGS Corpus (Konrad et al., 2020) through a structured search using the ELAN software (2023, version 6.6). We downloaded all ELAN files from the corpus videos and searched for the gloss ON-PERSON1 (PAM), initially identifying 696 occurrences. With the assistance of native signers, we excluded 192 occurrences glossed as ON-PERSON1 that were actually the PERSON sign (the original version from which PAM evolved). Additionally, we identified 14 occurrences that were not glossed as ON-PERSON1. The final number of PAM occurrences analyzed was 462.

To assess the obligatoriness of PAM, as proposed by Bross (2020), in contexts involving animate objects of medium affectedness and animate, definite objects of high affectedness, we created another dataset containing all 29 verbs listed in Bross's study, categorizing them by affectedness class (as shown in Figure 10). We analyzed videos from six regions in Germany: Berlin, Frankfurt, Münster, Munich, and Stuttgart. Initially, we found 1,730 occurrences and applied three exclusion criteria: we excluded all non-human objects, verbs with a clausal complement as an object, and occurrences where verbs carried a different meaning (e.g., SEE meaning "to look like"). A total of 1,193 tokens were excluded, leaving 537 for the second analysis.

4.3 Results and Discussion

The results of the first analysis indicate a strong relationship between the use of PAM and the individuation parameter. The number of human objects was 423, accounting for 92% of all occurrences, compared to 1% (N = 3) for animate non-humans and 7% (N = 36) for inanimate objects. Nevertheless, the number of inanimate objects was higher than expected. This may have occurred because many inanimate cases were related to humans, such as when someone mentioned complaining to the TV, but the actual complaint was directed at the football players in the televised match. Regarding definiteness, the proportion of definite objects was even

higher, at 94% (N = 433), compared to 3% (N = 14) specific and 3% (N = 15) non-specific objects. Table 1 presents the results of the cross-analysis between these two parameters, highlighting PAM's preference for individuated objects.

Table 1: Distribution of PAM use based on individuation (animacy and definiteness) of object referent.

	Definite	**Specific**	**Non-specific**
Human	398 (86%)	12 (2%)	13 (3%)
Animate non-human	3 (1%)	0 (0%)	0 (0%)
Inanimate	32 (7%)	2 (0.5%)	2 (0.5%)

Only two cases of PAM marked non-specific and inanimate objects, while the number of human and definite objects was 398, representing 86% of cases. Observing affectedness, we found that medium-affected objects received more PAM than highly affected objects, whereas no cases of PAM appeared with low-affected objects according to Tsunoda's (1985) scale, following the behavioral pattern suggested by Bross (2020). 85% (N = 391) of PAM cases followed medium-affected verbs (with a preference for pursuit-type verbs) compared to 15% (N = 70) for highly affected verbs. Analyzing this parameter using Beavers' (2011) scale, we observed that PAM occurrences were higher in verbs with lower affectedness, as illustrated in Figure 11.

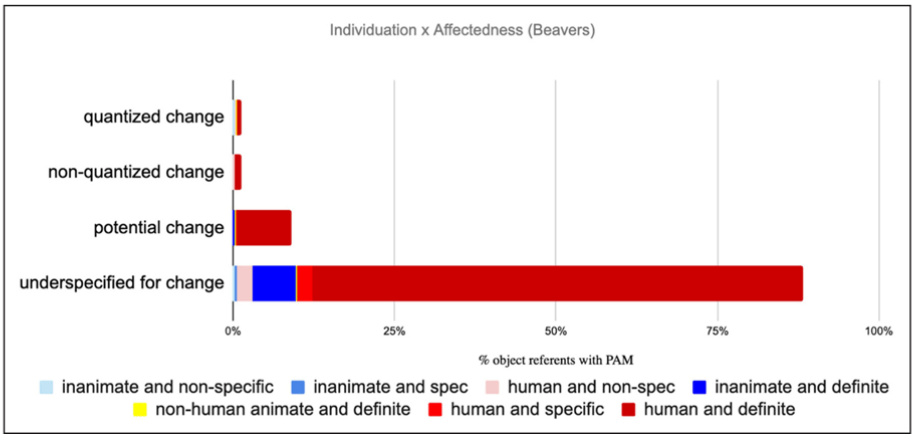


Figure 11: Occurrences of PAM based on Beavers' (2011) verb classes and different levels of object individuation

The cases classified as underspecified for change, meaning non-affected, had the highest proportion, reaching 89% (N = 408), compared to 9% (N = 41) of potential change verbs, and 1% (N = 6) in each of the remaining two categories. These numbers may indicate an inverse relationship between the use of PAM and affectedness in terms of the object's state change. The second analysis, specifically on Tsunoda's (1985) verb classes, revealed a rare use of PAM across all categories, which was expected given that the corpus consists of 50 hours of recordings with fewer than 500 PAM occurrences. Figure 12 illustrates this result.

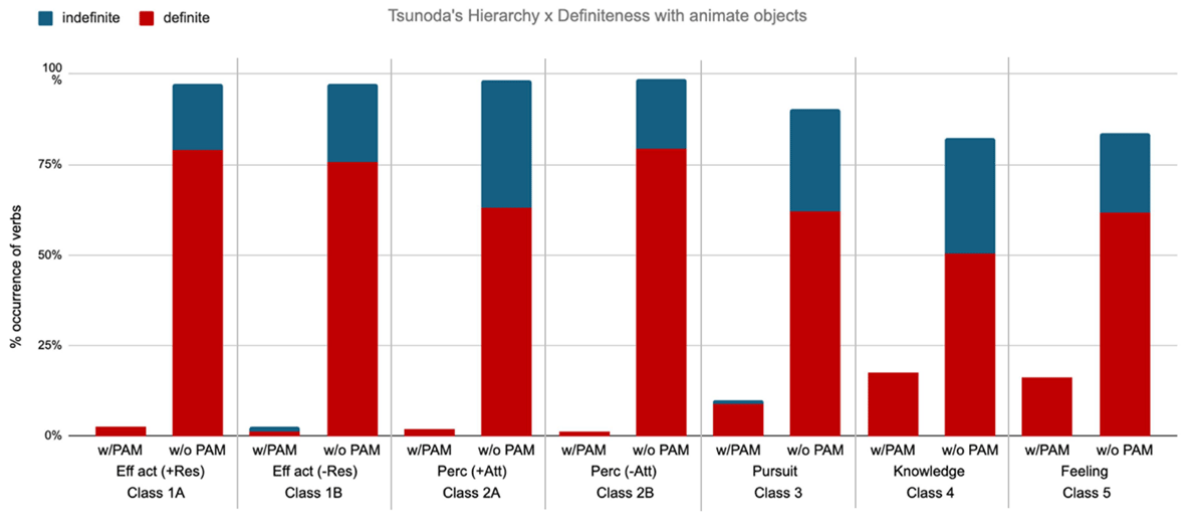


Figure 12: Definite vs. indefinite animate human objects occurring with and without PAM.

The graph in Figure 12 shows that despite a higher frequency of PAM in medium-affected verbs, the use of PAM is far from obligatory. Additionally, PAM is rarely used with highly affected verbs, even with human and definite objects, demonstrating that PAM is not obligatory in any of these parameters.

Analyzing PAM occurrences through Meir's (2003) categories, we found that approximately 75% of PAM cases fit into one or two of Meir's (2003) categories. The first Meir's category (psych) corresponds to categories 4 (knowledge) and 5 (feeling) in Tsunoda's (1985) classification. Content verbs are ditransitive verbs where OBJ_{PRO} marks the indirect object. Negative effect verbs generate an effect on the object but not necessarily in the terms

of Tsunoda and Beavers. Furthermore, we applied Malchukov's (2005) interpretation of Tsunoda's (1985) transitivity scale to analyze the verbal behavior of PAM occurrences. Malchukov explains that Tsunoda's hierarchy actually represents a decrease in patienthood and agentivity from left to right. In psych verbs (e.g., LOVE), the agent is an experiencer affected by the object, which takes on a stimulus status. This experiencer-stimulus construction highlights the elevated prominence of the object over the subject. Thus, it makes sense that PAM usage is higher toward the right side of the hierarchy, where roles become less prototypical and more competitive.

Content verbs (e.g. ASK) accounted for 28% of all PAM occurrences, and in this case, the marking may apply to the relationship between direct and indirect objects, with a preference for the more individuated object (the recipient). Even so, 25% of cases involved agent subjects and patient objects. In these cases, affectedness influenced verb behavior in various ways, including negative effect verbs with (e.g., beat) or without (e.g., insult) potential change, as well as positive effect verbs with (e.g., hug) or without (e.g., help) potential change. According to Næss (2004), affectedness in individuated objects produces a unique effect, as it can also impact the agent of the event. Thus, it is unsurprising that 25% of PAM cases involved affected objects. Table 2 synthesizes the overall verbal behavior and semantic roles of arguments in corpus sentences with PAM.

Table 2: Overview of argument properties predominantly associated with the use of PAM.

Subject (semantic role)	**Object (semantic role)**	**Verb type (Meir)**	**Verb class (Tsunoda / Beavers)**	**Example of verb**	**% with PAM**
Experiencer	Stimulus (causer)	Psych verbs	Class 4, Knowledge & Class 5, Feeling / underspecified for change	LOVE	38%
Agent (volitional)	Stimulus (causer)	Miscellaneous	Class 2B, Attained Perception & Class 3, Pursuit / underspecified for change	LISTEN; SEARCH	9%
Agent (volitional)	Recipient	Content	Class 3, Pursuit / underspecified for change	ADVISE	28%
Agent (volitional)	Patient	Negative effect	Class 3, Pursuit / underspecified for change	INSULT	10%
Agent (volitional)	Patient	N/A	Class 3, Pursuit / underspecified for change	HELP	3%
Agent (volitional)	Patient	N/A	Class 1A&B, (Non-)Resultative Effective Action / Quantized change, Potential for change	KILL; BEAT	12%

4.4 Conclusion

This study provided evidence of the relationship between the use of PAM and the parameters of individuation and affectedness. First, we observed that PAM is not obligatory in any of the analyzed contexts. We also found that PAM is more common with individuated objects, but its use is not restricted to inanimate and indefinite objects. Regarding verbal behavior, PAM can confer prominence to the more individuated object in ditransitive verbs. Additionally, PAM also enhances the prominence of stimulus objects, as they behave like agent-like entities and are more prominent than the subject. Finally, we found that affected individuated objects also attract syntactic prominence through the use of PAM.

5 Study 2: The interaction of the differential object marker PAM with other prominence hierarchies in syntax in German Sign Language (DGS)

Study 2: de Souza Santos, Thiago, Antonia Dietrich & Pamela Perniss. "Interaction of the differential object marker pam with other prominence hierarchies in syntax in German Sign Language (DGS)" *Open Linguistics* 11, no. 1 (2025): 20250057. https://doi.org/10.1515/opli-2025-0057

5.1 Background

In this study, we investigate how PAM interacts with different syntactic prominence hierarchies. First, we consider sign order, based on the assumption that arguments appearing earlier in a sentence tend to be more prominent. In the absence of strict grammatical categories such as subject and object in sign languages, constituent order provides a structural cue for prominence, with initial arguments typically associated with agentive and subject roles. Second, we analyze verb modification as a prominence-marking strategy: the spatial modification of the verb towards the object can be seen as additional morphosyntactic marking that lends prominence to the object, particularly when conditioned by semantic features such as animacy. Third, we consider argument omission in terms of discourse prominence: more prominent referents in discourse (e.g., given or definite referents) are more likely to be omitted, following patterns observed in discourse-based recoverability. By examining PAM alongside these hierarchies—sign order, verb modification, and argument omission—we aim to clarify whether PAM marks prominence independently or interacts with other syntactic strategies that reflect argument competition.

Steinbach (2022) argues that there are two uses of PAM in DGS, designating them as PAM_x and $_xPAM_y$, based on a meta-analysis. According to the author, PAM_x is characterized as a DOM, with its behavior distinguished by word order, where PAM_x functions as a pre-verbal nominal sign (near the object) with single agreement (modification) within the object domain.

In contrast, $_{x}PAM_{y}$ is characterized as an agreement auxiliary and, therefore, appears in the final position (adjacent to the verb) and agrees with both subject and object, given its association with the verb.

Beyond this debate regarding PAM's nature, this study examines its relationship with other syntactic prominence hierarchies. Here, we consider the hierarchies of Word Order, Overtness, and Verb Modification as additional mechanisms that may confer syntactic prominence to an argument. Drawing from the notion of linguistic prominence (Himmelmann & Primus 2015), we understand that competition between arguments for prominence can have a structural impact on languages, leading to the emergence of non-canonical structures that assign prominence to an argument. A canonical structure example is the subject appearing in the first position, with variations between object and verb, with SOV and SVO being the primary constituent orders (see Leeson & Saeed 2012 for spoken languages and Napoli et al. 2017 for sign languages). This subject-first phenomenon appears to reflect the agent-first principle (e.g., Primus 2001), wherein agents commonly occupy the first position because they initiate and are the most crucial part of an event, thereby conferring inherent prominence in more prototypical structures (see Hopper & Thompson 1980; Dowty 1991).

However, prominence is only evident when inherently prominent elements can lose this status depending on the linguistic context (Himmelmann & Primus 2015). Thus, the first position, typically reserved for the most prominent argument, may be occupied by the object in non-canonical structures (e.g., passive voice). The first position > nonfirst position hierarchy serves as a mechanism for assigning prominence to the object.

Another syntactic mechanism in sign languages that can be considered sensitive to syntactic prominence is verb modification. In sign languages, some verbs are anchored to the body and cannot move within the signing space—these are called plain verbs. However, some verbs do move within the signing space, either toward event participants (agreement verbs) or

to indicate the referent's actual movement (spatial verbs) (Padden 1988, 1990). The research by Fenlon et al. (2018) shows that such modification is not obligatory in BSL but depends on factors sensitive to prominence, such as animacy and coreferentiality.

Since modification occurs more frequently for animate objects and coreferential arguments, we infer that modification can enhance object prominence, as the authors' findings indicate a preference for object modification—a tendency also observed in many other sign languages (see Oomen 2021 for an overview). The prominence hierarchy concerning object modification is modified > non-modified.

Finally, we present argument omission as a prominence-sensitive factor. Generally, omission is a non-canonical phenomenon where an argument is not explicitly mentioned but is still part of the syntactic structure. In sign languages, subject omission is observable (Oomen 2017; Oomen & Kimmelman 2019), especially for first-person subjects due to the body-as-subject phenomenon (Meir et al. 2007), where the body is interpreted as the realization of the subject, eliminating the need for a manual argument. This subject omission phenomenon occurs in DGS (Oomen 2021), particularly with plain verbs, but is uncommon for objects (Proske 2022), making object omission even less canonical.

The omission of an argument may be influenced by discourse accessibility effects. In discourse, more accessible referents tend to be mentioned less frequently (Ariel 1990). Von Heusinger and Schumacher (2019) identify this mechanism as prominence-sensitive, as more accessible elements tend to be discourse topics, carrying greater prominence than new or peripheral referents. Thus, object omission may serve as a syntactic prominence marker, creating the omitted > realized hierarchy.

5.2 Methods

Based on data from the DGS corpus (Konrad et al. 2020), we investigate the behavior of PAM in different morphosyntactic environments to understand its interaction with various

morphosyntactic phenomena involved in argument structure marking. We focus on word order, overtness, and verb modification. We analyzed 462 clauses featuring PAM (the same clauses examined in this dissertation's first study (chapter 4)) regarding the order and overtness of signs (observing only subject, verb, object, and PAM), the type of verb, and whether the verb and PAM were being modified to indicate the object.

Regarding verb types, we expanded the classification to seven categories, based on our corpus observations. Indicating verbs (also classified as agreement verbs by Padden 1990) were categorized in two ways: "both" for verbs that can indicate both subject and object (e.g., ASK) and "away" for verbs that can only indicate the object (e.g., THANKS). Neutral verbs (see Oomen 2021) were labeled "neutral-plain" (e.g., PAY) as they are produced at the location of the argument in space, sometimes marking the object and sometimes the subject. We considered a verb "modified" when it was produced in a location different from the default space in front of the signer's torso for an argument, while the other argument in the same sentence was marked as N/A. Plain verbs were categorized as "body-plain" (e.g. LOVE), and we included three additional classifications: "quotation", when PAM was connected not to a verb but to a predicate or quotation sign (e.g., HELLO). "Productive", when a classifier was used before PAM (e.g., a handshake gesture to signify congratulating someone). "No-verb" When no verb was signed, but its meaning could still be captured, such as when a signer mouthed a verb without manually producing it.

5.3 Results and Discussion

The results showed that in only very few cases was A2 in the first position (4%), either by means of an overt nominal and/or pronominal INDEX form. We compared our results with the findings of Oomen (2019, 2021), who also used the DGS corpus as a research source. In her analysis of 1,063 clauses in DGS, Oomen found a proportion of 13% of topicalized objects in the first position, suggesting that the presence of PAM decreases the frequency of this

prominence marking. Regarding omission, however, the results showed that approximately 75% of objects with PAM were omitted. In this sense, object omission and the use of PAM can be considered a double marking of prominence. Finally, the distribution of verb types in clauses with PAM is illustrated in Figure 13.

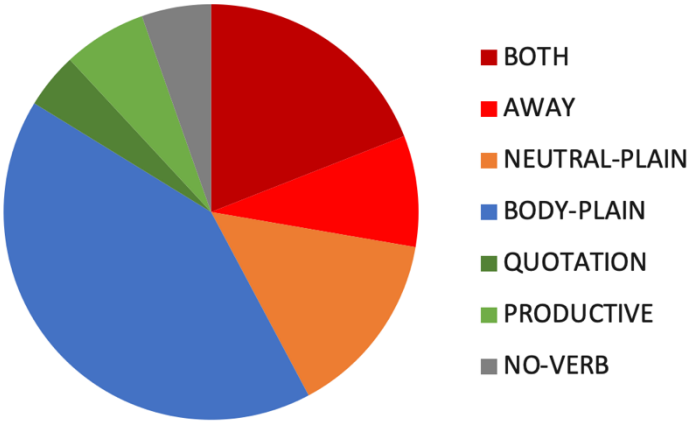


Figure 13: Distribution of verbs types across clauses with PAM

PAM was used 44% of the time with verbs that can be modified; however, the verb only presents a clearly perceptible modification in one-third of these cases. That is, the use of PAM is more common when the verb is not modified. Thus, analyzing the three prominence hierarchies, we found that PAM is more common with objects that are not in the first position and not modified, but it is more common with omitted objects. This suggests that PAM is a strong prominence marker that does not require many additional elements, but that double prominence marking with PAM is possible in DGS.

Regarding the syntactic status of PAM in DGS, we analyzed the modification of PAM for the subject and object in contexts of pre-verbal and post-verbal PAM order. The results are illustrated in Figure 14.

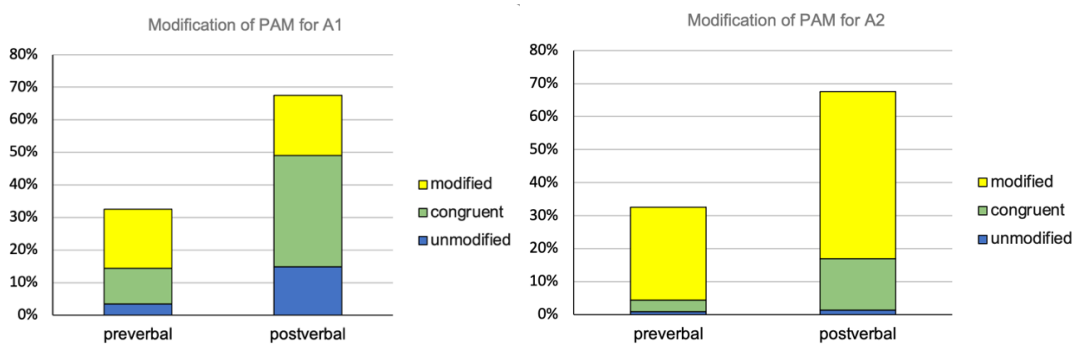


Figure 14: Modification behavior of PAM for A1 and A2 arguments by preverbal and postverbal occurrence.

The graphs indicate that there is no relationship between the pre-verbal use of PAM and the lack of subject modification. A total of 344 sentences had a modified object, with 123 being pre-verbal and 221 post-verbal. The interpretation of two types of PAM would be viable if cases of post-verbal PAM with object modification also modified for the subject, but this is not what we observed. Of the 221 occurrences of post-verbal PAM with object modification, only 36% (N = 79) were modified, while 39% (N = 87) were congruent (when the subject position matches the citation form), and 25% (N = 55) were not modified. The subject modification numbers are actually higher in pre-verbal contexts, where the subject was modified along with the object in 64% (N = 79) of cases, compared to 24% (N = 29) congruent and only 12% (N = 15) non-modified cases.

If we exclude the effect of first-person modification, given that subject modification is not perceptible, i.e. no distinguishable from citation form, for first-person subjects and is phonologically confounded when the object is first-person, the results for non-first-person subjects and objects indicate 52% (N = 48) non-modified, 27% (N = 25) modified, and 21% (N = 19) congruent.

These results challenge the analysis of PAM as having two distinct uses. The interpretation of PAM as an agreement auxiliary is not viable, as there is no consistent pattern of subject modification. Additionally, modification occurs alongside verbs that can already

modify themselves, meaning an auxiliary is not necessary for these verbs. The fact that most of them are not modified suggests that PAM is a stronger prominence marker that inhibits verb modification rather than assisting it. However, there remains a question about interpreting PAM as an object marker, given that, although rare, PAM also modifies for the subject.

We suggest interpreting PAM as a differential argument indexing mechanism. Haig (2018) states that the difference between agreement and indexing is that the former is obligatory, whereas the latter is related to pragmatic and semantic factors. Thus, indexing an argument is far more common for objects but is also possible for subjects. When this occurs, the marking of both arguments may be linked to reference-tracking functions (Iemmolo 2011; Just 2024).

5.4 Conclusion

This study's main findings indicate that the relationship between PAM and other prominence hierarchies supports the interpretation of PAM as a stronger prominence marker that enhances object prominence without requiring additional elements. We also found that double syntactic prominence marking is possible in DGS. Finally, we found no evidence for a dual use of PAM as both a DOM and an agreement auxiliary. Instead, we propose that, more than a DOM, PAM functions as a differential argument indexing mechanism that indexes both subject and object with a reference-tracking function.

6 Study 3: Looking at verb indication in German Sign Language (DGS) through the lens of prominence

Study 3: de Souza Santos, Thiago & Pamela Perniss. Under review. Looking at verb indication in German Sign Language (DGS) through the lens of prominence. *Glossa: a journal of general linguistics*.

6.1 Background

The third and final study aims to delve deeper into the modification of indicating verbs in DGS, particularly in terms of linguistic prominence. First, we seek to contribute to the discussion regarding the nature of verb modification in sign languages, which some scholars argue is verbal agreement, while others interpret it as a fusion of gestural and morpheme elements to indicating referents (see Pfau et al. 2018 and Schembri et al. 2018 for an extensive discussion). We base the structure of this study on the work of Fenlon et al. (2018). These authors analyzed syntactic, semantic, and discourse factors to understand how verb modification occurs in BSL to discuss the nature of verb modification, and we conduct a similar analysis for DGS.

We also aim to understand how discourse prominence and morphosyntactic prominence influence verb modification in DGS. To achieve this, we examine factors related to discourse coreference, such as whether the referent is maintained, reintroduced, or new in the target sentence containing the modified verb. Additionally, if the referent is maintained, we observe how it was previously mentioned—whether with a name, a pronoun, or omitted. We also analyze how referents are mentioned in the target sentence—whether null, with a pronoun, or with a name. These factors help us determine whether the argument modified by the verb is accessible, considering that more accessible referents are more prominent in discourse (von Heusinger & Schumacher 2019). Furthermore, we investigate how syntactic and semantic factors such as verb position, person hierarchy, thematic role, and animacy may indicate the syntactic prominence of an argument. For example, animate objects tend to receive greater

syntactic prominence (Aissen 2003). Finally, we observe whether modification occurs in CA or non-CA constructions.

6.2 Methods

We use the DGS Corpus to analyze naturalistic data. We searched for all free conversation videos, following the methodology of Fenlon et al. (2018). Each video involved two participants conversing. In total, 56 participants were included in the study, consisting of 28 men and 28 women: 12 young, 22 young adults, 12 adults, and 10 elderly individuals. The participants came from 11 regions in Germany: Schleswig-Holstein, Hamburg, Cologne, Frankfurt, Göttingen, Münster, Leipzig, Berlin, Rostock, Munich, and Stuttgart. We analyzed the first 500 signs from each participant. In total, 758 occurrences of indicating verbs were identified and analyzed, yielding an average of 13.54 occurrences per participant.

We annotated verb position based on the position of arguments, labeling A1 for subject, A2 for object, and A3 for the direct object of ditransitive verbs (with A2 being the indirect object in these cases). We classified verb modification as Modified when the modification differed from the citation form and was adapted to the location of the argument. It was classified as Unmodified when the verb was produced in its citation form with the same predefined location, and Congruent when the location of the argument matched the citation form, making it unclear whether the verb was modified. We also annotated constructions as yes-CA when the participant was enacting the target verb, or no-CA when the participant was not enacting the target verb.

Additionally, we recorded, for each argument, whether it was first-person or non-first-person, its semantic role (agent or experiencer for subjects; patient or recipient for objects, excluding A3), whether it was human, animate, or inanimate, and finally, how it was realized (name, pronoun, or null). We also noted how or if it was realized in the previous sentence, considering whether it was new, reintroduced, or maintained.

With this data, we structured the statistical analysis. The dependent factor was argument modification, requiring separate analyses for subject and object. The independent factors included: Modification of the other argument, CA, Verb position, Argument form, Semantic role, Animacy, Person, Referent form in the previous sentence, and Coreference, in addition to the social factors gender, age, and region (with cities categorized into east, west, north, and south). The random effects included verbs and participants. We conducted logistic regression analysis using Rbrul in R Studio.

6.3 Results and Discussion

The results indicated that verb modification for the subject or object is not obligatory. Modification for the object was statistically more frequent than for the subject, with objects showing 69% modified, 22% congruent, and 9% unmodified, while subjects had only 26% modified, 49% congruent, and 10% unmodified. Statistical analysis revealed that the modification of one argument influences the modification of the other argument (p<0.001), suggesting that verbs prefer to modify both arguments rather than just one.

Statistical analysis also highlighted the effect of Constructed Action (CA) on verb modification for the object (p<0.001), as referents are more accessible in the signing space during CA, facilitating modification in indicating verbs. Additionally, the factor of Person significantly influenced modification for the subject (p<0.001), showing that modification occurred more frequently in verbs from non-first to first-person arguments. This suggests an influence of first-person involvement in discourse as a factor promoting verb modification.

Regarding social factors, age and gender were significant for object modification (p<0.05), with men and older participants modifying verbs more often. This finding aligns with Labov (2001), who suggested that non-modification could be a more innovative and prestigious linguistic form. However, strong conclusions cannot be drawn from these factors since age was not evenly stratified and may have been influenced by the region factor (as indicated by model

correlation). Furthermore, concerning gender, there are no strong social indicators that suggest contemporary German women seek more prestigious linguistic forms than men (Stratton & Beaman 2024).

To analyze whether verb modification in DGS is influenced by linguistic prominence, we examined three main factors: (1) the thematic role of the subject, assuming agents are more prominent than experiencers; (2) the animacy of both arguments, with human referents being more prominent than inanimates; and (3) coreference for objects, based on the idea that previously mentioned (and thus definite) objects carry greater prominence than new or indefinite ones (de Souza Santos et al., 2025). Although statistical analysis did not identify any of these individual factors as significant predictors of verb modification for either subject or object, some patterns in the data suggest a potential link between modification and the competition for prominence between arguments. To explore this, we established relative prominence scores for each argument based on previous research (Himmelmann & Primus, 2015; Aissen, 2003; de Souza Santos et al., 2025).

For subjects, prominence was assessed based on Role and Animacy:

- Human agents = 2
- Inanimate agents or human experiencers = 1
- Inanimate experiencers (not present in the dataset) = 0

For objects, we used Coreference and Animacy:

- Coreferential human = 2
- Coreferential inanimate or non-coreferential human = 1
- Non-coreferential inanimate = 0

Each clause was then classified based on the relative prominence of its arguments:

- A1 > A2: subject more prominent than object
- A1 = A2: equal prominence
- A1 < A2: object more prominent than subject

Figure 15 presents verb modification rates across these three prominence competition scenarios.

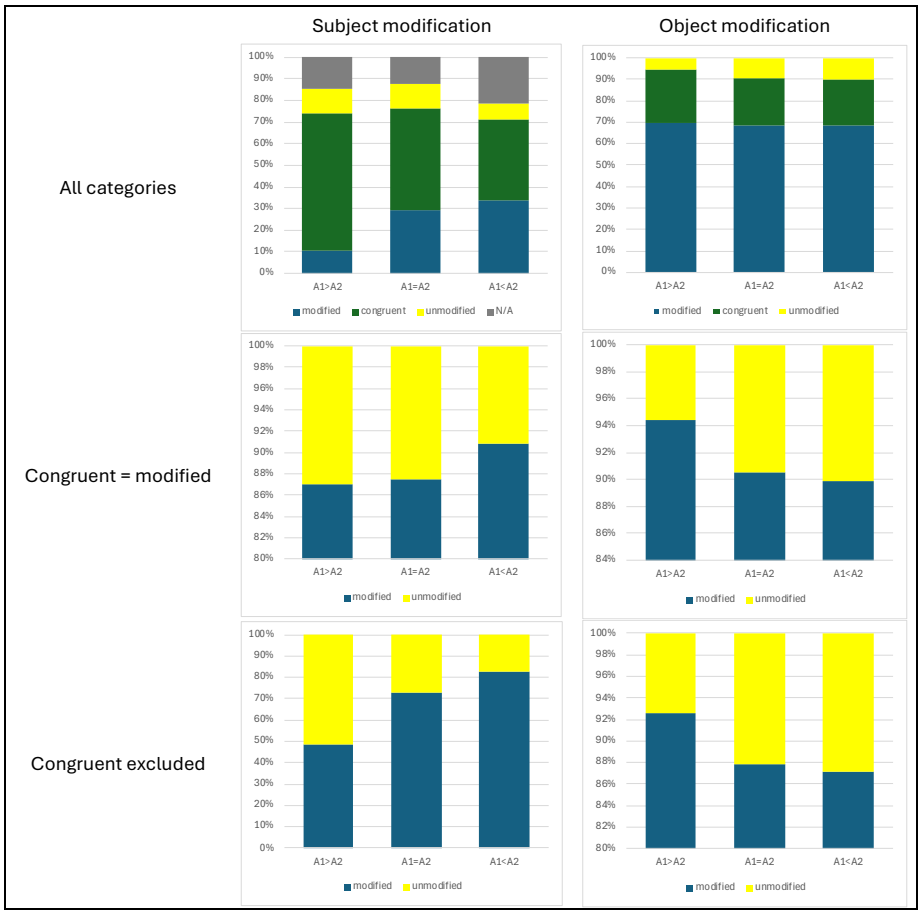


Figure 15: Verb modification rates across prominence competition scenarios

The analysis of verb modification across the three datasets reveals a subtle tendency for modification to occur more frequently when arguments are less prominent, such as slightly higher subject modification when the subject is less prominent than the object, and vice versa. Although these tendencies were not statistically significant, they challenge the initial expectation that more prominent arguments—particularly prominent objects—would show greater modification. Instead, the data suggest that modification may function as a referential strategy rather than a marker of grammatical agreement. While morphosyntactic prominence (e.g., subject-object hierarchy) does not appear to systematically influence modification, discourse-related factors like referent accessibility play a more compelling role. Arguments

that are null or reintroduced in discourse tend to show higher rates of modification, supporting the idea that modification helps to (re)anchor referents within the signing space. This aligns with findings from BSL (Fenlon et al., 2018), where modification is used to reintroduce referents with overt spatial material. In DGS, modification seems to reflect the need not just to retrieve a referent in discourse, but to re-establish it physically in signing space—especially when the referent lacks recent overt expression. Although more data and finer-grained annotation (e.g., distinguishing institutional actors from inanimates) are needed, our findings point to a view of verb modification in DGS as discourse-driven and sensitive to spatial-referential dynamics, rather than as a purely syntactic or agreement-based mechanism.

6.4 Conclusion

We conclude that modification in DGS is best interpreted as a referential device, as it is more influenced by discourse factors such as Constructed Action (CA) and is not an obligatory agreement mechanism. Moreover, modification exhibits strong gestural characteristics, including idiosyncratic variation and reliance on the use of mental space. In this context, mental space refers to the conceptual spaces that signers create during discourse to map referents spatially; the verb's movement typically aligns with the location associated with a referent within the signer's constructed mental representation of the event. Thus, modification is not only a formal linguistic process but also a gestural projection into the spatial-cognitive structure of the narrative. The prominence analysis further supports the interpretation of modification as a discourse-oriented rather than syntactic phenomenon, as no significant syntactic factors influenced modification patterns. Instead, there was a slight preference for modification in less prominent referents—such as inanimates, less agentive entities, and low-reference items—suggesting that non-modification corresponds to referents that require less overt linguistic material. This aligns with the concept of discourse accessibility, where highly accessible elements are less likely to be overtly marked.

7 Discussion

7.1 RQ1

In our first study, our main goal was to relate the use of PAM to linguistic prominence, specifically how PAM in DGS may be interpreted as providing additional marking that shifts prominence away from the agent, which is typically the default center of attention. This was based on the research question: *Is the use of* PAM *related to competition between arguments for prominence in DGS?* After presenting and discussing our findings, we showed evidence that the use of PAM is indeed related to the competition between arguments for prominence—particularly in the sense that PAM serves as an additional element that often shifts prominence from the subject to the object.

We arrived at this conclusion by analyzing occurrences of PAM in relation to the parameters of animacy, definiteness, and affectedness. Regarding nominal parameters, we found that object individuation (i.e., animacy and definiteness), as predicted by Aissen (2003), attracts the use of PAM in DGS, which supports our hypothesis. We also confirmed that PAM is not obligatory. Across 50 hours of recorded DGS conversations, we found fewer than 500 occurrences of PAM.

In our analysis of verbal parameters, while we confirmed that PAM is not determined by affectedness in Bross's (2020) terms, we did find that verbal properties influence PAM use. The classifications proposed by Meir (2003) and Malchukov (2005) provided greater clarity regarding how verb types can shape PAM usage. We confirmed our hypothesis that the competition between arguments—based on nominal parameters—is the main factor influencing the use of PAM. First, using Meir's (2003) verb typology, we identified nearly one-third of PAM occurrences as appearing with *content verbs*—i.e., verbs that may take two objects—indicating that object–object competition is at play. Drawing on Malchukov's (2005)

interpretation of Tsunoda's (1985) transitivity scale, we found that over a third of the verbs were less prototypically transitive, with both agents and patients showing lower degrees of prototypicality. Stimulus objects tend to be more agentive and, therefore, compete more for prominence. Finally, we revisited the parameter of affectedness through the frameworks of Beavers (2011) and Meir (2003). We annotated all affected objects—positively or negatively—whether physically touched or not. In this way, affected objects stand in contrast to non-affected ones and may receive PAM for this reason.

7.2 RQ2

In our second study, we asked: *How does the use of* PAM *as a marker of syntactic prominence relate to other syntactic prominence-marking strategies among arguments?* This question fits within a broader debate on how different hierarchies of prominence interact. We confirmed the hypothesis that in sentences where PAM appears, other prominence hierarchies tend not to show prominence marking. We examined three such hierarchies through mechanisms potentially sensitive to prominence: sign order, verb modification, and overtness. Our study concluded that PAM functions as a strong additional marker that can give prominence to the object, even in the absence of other prominence indicators. In other words, PAM may co-occur with objects in the initial position or alongside verb modification, without incompatibility.

Additionally, we sought to define PAM grammatically, based on the hypothesis that it is not an agreement auxiliary. Our conclusion is that, since PAM is not restricted to objects alone, it can be understood not only as a DOM (Differential Object Marker), but also as a DAI (Differential Argument Indexing) in DGS. Rather than signaling agreement or serving a phonological function, PAM tracks verb arguments based on semantic motivations—especially when subjects and objects are similar, i.e., when competition for prominence is high.

7.3 RQ3

In our third study, on the modification of indicating verbs, we asked: *How can verb modification in indicating verbs be related to linguistic prominence at the morphosyntactic and discourse levels?* This question necessarily involved the debate around the nature of modification. We presented evidence that modification is more referential and discourse-driven, instead of agreement. We also confirmed the hypothesis that modification is sensitive to discourse prominence: it occurs more frequently with less prominent referents, functioning to reintroduce or re-anchor them in space. We found no evidence that modification is responsive to morphosyntactic prominence.

Although we observed slightly more modification for less agentive subjects—which could be seen as an additional marker of prominence (similarly to PAM in Study 1)—we also found higher modification rates for less prominent objects, which contrasts with the use of PAM. Despite the small differences in proportions, the modification of verbs shows a different semantic behavior from PAM in DGS. The following sections will further address how these findings relate across all three studies.

7.4 Is PAM a DOM or a DAI?

Our first study concluded that PAM functions as a DOM in DGS, while the second study supported the interpretation of PAM as a DAI. To reconcile these perspectives, we reviewed the two key contrasts between the terms: Object vs. Argument, and Marker vs. Indexing. In Study 1, we focused on PAM in relation to the nominal properties of the object but not of the subject. We showed that PAM is commonly used with individuated objects. In examining verbal parameters, we saw that subjects in these constructions tend to be less agentive—but we did not examine their nominal features.

According to Meir (2003), the use of OBJ_{PRO} (in ISL) requires not only a human object but also a human agent. Indeed, the majority of subjects in PAM-marked constructions in our data were also human. The key difference between our study and those on ISL (Meir, 2003)

and SSL (Börstell, 2017) is that while DOMs in those languages only mark the object, PAM in DGS may mark both subject and object.

Our results show that most subject modifications occur when the object is in the first person, requiring an outward-to-inward direction, which forces the subject modification interpretation. In third-person-to-third-person contexts, subject modification occurs in only 27% of cases (N = 25), representing just over 5% of all occurrences. This suggests that subject modification via *PAM* is uncommon, while object modification occurs in nearly all cases. Thus, PAM appears to be primarily associated with the object. Moreover, the PERSON sign, from which PAM originates, typically only associates with one argument. When PAM lacks directional movement, it is generally linked to the object.

So, interpreting PAM as a DOM is not incorrect, especially since it is linked to the nominal features of the object and originates from a sign usually associated with a single argument. However, interpreting PAM as a DAI is also valid, since we see it marking both arguments, and since subject parameters (e.g., agentivity) are also relevant in our analysis.

As for the Marker vs. Indexing distinction, it is important to clarify what is meant by indexing: indexed arguments are typically introduced or highlighted via morphological or spatial means associated with the predicate itself, such as affixes, clitics, or directional movements, rather than through separate elements like prepositions. In this sense, PAM seems to play an indexing role with certain verbs in DGS. For example, verbs like ANGRY, which are often intransitive, can be transitivized through the addition of PAM, spatially anchoring an affected argument. A similar process occurs with verbs like WAIT, where PAM spatially indicates the participant being waited for. According to Tsunoda's (1985) transitivity scale, such constructions involve less prototypical transitivity, often requiring additional strategies to clarify argument structure. In cases with ditransitive verbs—nearly 30% of our dataset— PAM also serves to spatially index recipients (e.g., in verbs of quotation), even when these participants are not overtly realized.

What about the subject? As Johnston (2016) noted fo Australian Sign Language (AUSLAN) , identifying the subject is particularly challenging. The assumption that subject and object roles map neatly onto semantic roles like source and target (as in spoken language research) does not always apply to sign languages. Moreover, Meir et al. (2007) point out the "body-as-subject" effect—verbs articulated on the body tend to be interpreted as first-person. In non-first-person contexts with low-transitivity verbs (like ANGRY), which are transitivized through PAM, subject indexing may be absent both spatially and semantically. For example, ANNOYING can either refer to the experiencer or the cause, depending on context. This shows that prototypical subject-object roles may not be clearly established, and that PAM helps satisfy transitivity by pointing to one or both arguments. In this sense, PAM clearly functions as a DAI in DGS.

Nonetheless, PAM is also used with more canonical verbs that require clear semantic roles. In such cases, PAM may highlight special object types, such as affected animate objects, which draw more attention due to their animacy (Naes, 2004), or individuated objects, which are human and definite (Aissen, 2003). Finally, PAM may also distinguish objects from subjects when both share similar properties, even with prototypically transitive verbs. Thus, it is equally valid to classify PAM as a DOM.

7.5 Is Verb Modification a Morphosyntactic Prominence Hierarchy?

Our second theoretical tension lies in how we interpret verb modification in relation to prominence. In our second study, we classified verb modification as reflecting morphosyntactic prominence. However, in our third study, we showed that modification does not appear to be clearly sensitive to prominence at the morphosyntactic level. This apparent contradiction raises two important challenges for prominence research: first, how to understand the interaction between different prominence hierarchies at the same level of analysis; and second, how prominence operates across distinct levels, such as morphosyntax and discourse.

When comparing the results of verb modification across Studies 2 and 3, we see that indicating verbs in Study 3 are modified far more often than in Study 2. In other words, overall, modification occurs less frequently in clauses with PAM. Why does this happen? First, we maintain that prominence hierarchies rarely overlap. We continue to interpret verb modification as being sensitive to morphosyntactic prominence, but suggest that our third study may not have yielded conclusive results because we did not use parameters well attuned to morphosyntactic prominence (e.g., affectedness and definiteness). Additionally, it is possible that PAM is not solely sensitive to morphosyntactic features but also reflects discourse prominence. If both PAM and verb modification operate on the same level (e.g., discourse), it would be less common for them to co-occur.

Another possibility is that PAM fulfills a similar function to verb modification—namely, indicating arguments—thus reducing the need for both mechanisms to appear together.

Our findings in Study 3 showed greater verb modification when subjects were less agentive. For this, we considered animacy and volitionality—two factors strongly associated with agentivity. For objects, we looked at animacy and coreference. Coreference was used as a proxy for individuation, since referents previously mentioned in discourse tend to be more individuated. However, we acknowledge that coreference alone is not an ideal measure of individuation. While we used coreference to annotate definiteness in Study 1, we also incorporated uniqueness. For example, a new referent like “my mother” or “Princess Diana” was marked as definite. We also considered familiarity: if a referent was familiar to the signer but not to the addressee, it was marked as indefinite specific; if unfamiliar to both, as indefinite non-specific. These distinctions were not made in Study 3. In Study 3, we followed Fenlon et al. (2018) and focused on identifying which factors best aligned with prominence. It remains possible that verb modification is, in fact, responsive to morphosyntactic prominence, and that more refined annotation could clarify this.

Likewise, PAM —when understood as a DOM—may be sensitive to discourse prominence. Von Heusinger et al. (2024) show that DOM-marked objects in Spanish tend to be more prominent in discourse than unmarked ones. The same may apply to DGS: PAM could mark referents that are discourse-prominent. Our third study suggests that verb modification, on the other hand, is more frequent with *less* prominent referents, functioning to re-anchor them in signing space. Therefore, discourse pressure may explain why PAM-marked objects—already prominent in discourse—do not co-occur with verb modification. PAM itself may already be fulfilling the role of reintroducing or localizing the referent spatially. Further investigation is needed—either by analyzing PAM in discourse contexts (as in Von Heusinger et al., 2024) or by examining the behavior of arguments in the clause preceding PAM, as we did for verb modification.

In conclusion, the relationship between prominence hierarchies presents significant challenges for linguistic analysis. First, it is crucial to verify whether the hierarchies being compared operate on the same analytical level and whether they are compatible. Second, one must consider the directionality of each hierarchy in relation to prominence. In Study 2, we suggested that modification indicates greater prominence than non-modification, but the results from Study 3 suggest the opposite—that non-modification may signal prominence. Similarly, with object overtness: in discourse terms, a null object may signal greater prominence (due to high accessibility), whereas in syntactic terms, the overt form may be more prominent. Moreover, PAM, as a nominal element, inherently marks the argument as overt in all occurrences. These inconsistencies highlight the need to deepen our understanding of the differences between types of prominence. Discourse and morphosyntactic prominence often overlap in features such as animacy and agentivity, but they may pull in opposite directions. In discourse, accessible referents tend to require less overt material, while in syntax, marked (overt) arguments are often those considered more prominent.

7.6 Exploratory reflections on the grammaticalization and current use of PAM

Although the present studies were not designed to investigate grammaticalization processes directly, some observations can be made regarding the diverse behavior of PAM in DGS. First, it is important to note that PAM remains a relatively rare phenomenon in the DGS Corpus, occurring far less frequently than other strategies for argument marking. This rarity has also been confirmed by informal comments from deaf colleagues and consultants involved in this research, who pointed out that PAM is often overused by hearing signers or learners of DGS. According to these observations, the use of PAM may sometimes reflect influence from German spoken language structures or teaching practices, rather than representing native usage patterns. Among deaf signers who use DGS more intensively, particularly younger signers, PAM seems to be less frequent. Instead, there appears to be a tendency to rely more on alternative strategies to clarify referents, such as the use of CA. While this observation is based on impressions gathered during corpus annotation and informal discussions, it suggests that CA and other discourse strategies may sometimes play a greater role than PAM in structuring argument relations in native DGS usage.

From a grammaticalization perspective, it is possible that PAM has not yet stabilized into a single, fixed function. Given its lexical origin from the sign PERSON (Steinbach & Pfau, 2013), PAM may still exhibit a transitional behavior: sometimes functioning as a marker of differential object properties, sometimes acting more like an indexing device, and occasionally resembling either a pronoun or a prepositional element. Its increasing flexibility, such as its occasional use with inanimate referents, also supports the idea that PAM is moving beyond its original semantic constraints.

These reflections point to the need for future studies focusing specifically on the grammaticalization of PAM in DGS. Such studies could investigate the different roles PAM plays across signer groups and contexts, its interaction with other argument-marking strategies, and its potential development into distinct grammatical forms. Comparative studies across different

sign languages could also shed light on how similar markers emerge and stabilize—or remain fluid—depending on modality-specific and sociolinguistic factors.

7.7 Challenges of Corpus-Based Research

All three studies have an exploratory character. That is, although we had some hypotheses and clues about which factors might be most relevant to the phenomena studied, we had limited literature to draw on and few established conventions. Moreover, working with a corpus presented further challenges—especially in dealing with naturally occurring data filled with contextual variables beyond our control. On the one hand, we could have tried to annotate every nuance in every occurrence in order to control for as many variables as possible. On the other hand, we could have ignored differences and applied external conventions to force the data to fit existing models. Instead, we opted for an intermediate approach: we annotated features that appeared most distinctive in the data, while also considering the demands of quantitative analysis and the need to remain in dialogue with existing literature.

Because of this exploratory nature, we worked with many variables, which made it impractical to annotate each one in detail. We annotated several variables that were ultimately excluded from the final analysis, such as *form of mention*, which initially included ten different categories but was later simplified to name, pronoun, and null. We also identified interesting results involving factors like Constructed Action in PAM contexts, which were left out of the current study but may become the focus of future work. The breadth of variables helped us identify what was truly relevant in the final analyses, but it also meant that we had to collapse some annotation categories for the purpose of the statistical analysis.

Regarding sign order, we had to ignore adjuncts such as negations, locatives, and repetitions, since our goal was to track verb position relative to its arguments. However, we acknowledge that such elements may influence sign order and argument structure. Animacy was one of the most important factors across both PAM and verb modification studies, but even

so, we had to simplify it. We know that animacy involves more than just human, non-human animate, and inanimate distinctions, and that this simplification likely influenced the final results—especially in the number of inanimate referents identified. All referents not clearly human in context (e.g., “the government sent a letter,” “the school invited me to work”) were marked as inanimate. Given the link to human, it may be importante to reconsider treating these as inanimate.

As mentioned earlier, definiteness was annotated based on familiarity and uniqueness—concepts that were sometimes clear but often left some room for interpretation, particularly when contextual information about the referent was limited or ambiguous. Additionally, DGS-specific features such as verb modification, verb classification, and the identification of PAM required continuous consultation with native DGS signers, given that such features are often gradient and can vary depending on individual signer strategies or regional variations. These annotations, although carefully discussed and informed, inevitably involve a degree of subjective judgment. Differences in the interpretation of context, in the recognition of spatial modifications, or in the classification of verb behaviors may lead future studies using the same corpus to arrive at slightly different annotations for the same phenomena.

8 Conclusion

This dissertation explored the relationship between argument structure, linguistic prominence, and spatial expression in DGS, focusing on two core phenomena: the use of PAM and the modification of indicating verbs. Across three empirical studies, we investigated how these phenomena interact with different types of prominence—morphosyntactic and discourse—and how they contribute to argument tracking in a visual-spatial language.

In the first study, we demonstrated that PAM in DGS is closely linked to competition between arguments for prominence, particularly when prominence shifts from the subject to the object. Our analysis showed that PAM is more frequently used with individuated and affected objects, supporting its classification as a Differential Object Marker (DOM). However, we also found evidence that PAM can index both subjects and objects in contexts of low agentivity or unclear transitivity, leading us to argue for its classification as a Differential Argument Indexing (DAI) strategy as well. These findings suggest that PAM is not limited to marking syntactic roles, but reflects broader semantic and discourse-related pressures.

In the second study, we examined how PAM interacts with other strategies of syntactic prominence marking, such as sign order, verb modification, and overtness. We concluded that PAM provides a strong enough cue to prominence that it may override or make redundant other marking strategies. This supports the view that PAM functions independently within the grammar of DGS and is sensitive to argument competition, especially in contexts where subjects and objects share similar properties.

The third study focused on verb modification in indicating verbs and its relationship to linguistic prominence. Contrary to predictions based on morphosyntactic hierarchies, we found no strong evidence that modification correlates with syntactic prominence. Instead, the results suggest that verb modification is a discourse-driven strategy used to reintroduce or re-anchor referents that are less prominent or less accessible in the discourse. These findings challenge

traditional agreement-based models of modification and align with recent studies (e.g., Fenlon et al., 2018) that interpret modification as a referential device in sign languages.

Together, the three studies presented here contribute to our understanding of how DGS organizes argument structure through spatial means, showing that argument marking is not solely dependent on grammatical roles, but is shaped by a complex interplay of discourse, semantics, and spatial organization. The interaction between prominence hierarchies—both within and across morphosyntactic and discourse levels—emerges as a central theme, revealing that multiple systems may converge or compete in signaling argument prominence.

Despite these insights, the research also faced methodological limitations, particularly regarding annotation granularity and the categorization of parameters such as animacy, definiteness, and affectedness. These limitations reflect broader challenges in corpus-based studies of sign languages, where naturally occurring data offer richness and authenticity, but demand nuanced and often subjective annotation practices.

Future research should aim to refine and expand the annotation categories used in the studies reported here, especially in relation to semantic roles, degrees of animacy, and discourse accessibility. Longitudinal data or experimental approaches may help validate the functional distinctions between PAM and verb modification, and further clarify their roles in argument tracking. Additionally, investigating the co-occurrence of PAM and verb modification in more controlled contexts could shed light on their distribution and functional overlap. Comparative studies with other sign languages could also offer valuable insights into how widespread these strategies are and whether similar grammaticalization paths can be observed cross-linguistically.

Ultimately, this dissertation highlights the importance of considering prominence not as a fixed property of argument structure, but as a dynamic interaction of grammatical, semantic, and discourse-level factors. In visual-spatial languages like DGS, these interactions

are made visible in unique ways—through space, movement, and gesture—which opens promising paths for both theoretical and empirical advancements in the study of language.

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11 Suplementary material

Sudy 1: de Souza Santos, Thiago, Antonia Dietrich, Peggy Steinbach, and Pamela Perniss. 2025. “Differential Object Marking in DGS (German Sign Language): A prominence-based account of the use of PAM based on naturalistic data.” *Glossa: a journal of general linguistics* 10 (1). doi: 10.16995/glossa.11591.

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Differential object marking in DGS (German Sign Language): A prominence-based account of the use of PAM based on naturalistic data

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This paper examines the nature of object marking in DGS (German Sign Language), providing an account of the behavior of the sign glossed as PAM, previously analyzed as an agreement auxiliary (person agreement marker) and more recently as a differential object marker (Bross 2020). We investigate the influence of animacy and definiteness (object individuation) and the affectedness of the object as properties that have been claimed to be relevant for differential object marking, in general, and for DGS, in particular. We provide an account of object-marking based on the notion of linguistic prominence, specifically on how the use of PAM in DGS may be interpreted as providing additional information (marking) that brings the object into the center of attention. We suggest that the use of PAM is triggered through object prominence in three ways: being highly individuated (animate, definite); being a stimulus/causer rather than a patient; not being (very) affected by the verbal action. In addition, we find that an association with negative intent by the subject as well as the selectional constraints on verbs occurring with PAM are captured very well for DGS by the account proposed by Meir (2003) for ISL (Israeli Sign Language), a sign language historically related to DGS.

1 Introduction

Many accounts of the morphosyntactic realization of arguments are related to referential prominence. Prominence can be characterized by the degree to which a linguistic element (e.g. a phoneme, syllable, or word) becomes centered in attention in relation to other elements of the same nature (Himmelmann & Primus 2015; von Heusinger & Schumacher 2019). Arguments of verbs compete with each other for prominence in this way, and their prominence can be measured based on their morphosyntactic behavior and semantic characteristics. Semantically, it is the thematic role of agent that presents itself as an inherently prominent element. In both cognitive and functional terms, agents are considered to be natural centers of attention. As Himmelmann & Primus (2015: 47) note, "the human cognitive system seems to have developed a special sensitivity to those natural objects that are potential agents". In this sense, language evolution has conditioned linguistic structures to conventionalize agents as centers of attention. However, the center of attention can be modified or displaced. That is, the agent is not the center of attention in any given context. There is a competitive relationship between it and other elements, and it must be possible for other roles besides the agent to become more prominent and to become the center of attention. A non-agent argument can signal linguistic prominence, for example, by assuming the initial position in the sentence (as with passive constructions) or by receiving morphosyntactic marking (e.g. differential object marking). In this paper, we explore the nature of differential object marking as signaling prominence in DGS (German Sign Language).

The fundamental idea behind differential object marking (DOM) is that objects in transitive constructions receive some special marking when they have what are considered to be non-object-like properties, i.e. when they are particularly prominent or agent-like. On this account, the subject of a transitive clause is animate and definite, while the object is inanimate and indefinite (Comrie 1989). When the object, however, is itself animate and definite (i.e. highly individuated and thus agent-like in its prominence), additional marking is triggered. This is exemplified, for example, in Spanish where the preposition *a* is used in conjunction with human referents (as in example 1a), but not with inanimate referents (as in example 1b). The phenomenon of DOM is one way in which the notion of linguistic prominence reveals itself as a structuring factor in languages.

(1) *Spanish* (García García 2018: 211)

a. *Pepe ve *ø/a la actriz.*
Pepe see[3SG] ø/to the actress
'Pepe sees the actress.'

b. *Pepe ve ø/*a la película.*
Pepe see[3SG] ø/to the film
'Pepe sees the film.'

In sign languages, morphological marking does not typically occur on the arguments themselves. Rather, who does what to whom is indicated through constituent order, spatial modification (i.e. directional movement) of verbs, or through pragmatic inference (Cormier et al. 2012; Johnston 2019). However, there is evidence that argument marking – and, in particular, object marking – plays a role in sign languages. Verbs that move through space to indicate their arguments have been argued to show a tendency to favor object marking over subject marking (Rathmann & Mathur 2002 for DGS: Fenlon et al. 2018 for BSL (British Sign Language)) and the use of dedicated object-markers has been described for a number of sign languages, notably ISL (Israeli Sign Language) (Meir 2003), SSL (Swedish Sign Language) (Börstell 2019), and DGS (Bross 2020; see also Proske 2020; Steinbach 2022). For DGS, Bross (2020) analyses the sign glossed as PAM (based on its previous analysis as a Person Agreement Marker, Rathmann 2003; Steinbach & Pfau 2007) as a differential object marker whose use is triggered by animacy, definiteness, and affectedness. In this paper, we use naturalistic corpus data to test these claims made by Bross (2020) regarding the use of PAM.

2 Theoretical Framework

2.1 Linguistic Prominence

Seeing prominence as a general organizational principle of language, the notion of focusing or concentration of attention is especially important. Himmelmann & Primus (2015) call the focus on one object or entity among other simultaneously available objects attentional centering. The attentional center is then the focused entity that stands out with respect to linguistic properties – i.e. is given more prominence in linguistic structures. Agents (acting out of volition and with control) are taken to be attentional centers by default, with convergent arguments coming from evolutionary, psychological, and linguistic perspectives. As humans, we are especially sensitive to properties of agents, as entities able to act and move of their own volition and control. In evolutionary terms, this special sensitivity, evident e.g. in the animate monitoring bias (New et al. 2007), would have been important for detecting changes in the environment with potentially life-threatening consequences. From a processing perspective, it is equally important that we can quickly and unambiguously identify the entity in control (Alday et al. 2015). Evidence for this is provided by agent-first advantages in processing, and conversely, by processing difficulties when prototypical agent referents do not appear in first position (Bornkessel-Schlesewsky & Schlesewsky 2009). The grammars of languages reflect this by giving agents more prominence, or privileged status, in linguistic structures (Himmelmann & Primus 2015). Importantly, however, our attention centering is dynamic, and thus grammars must also have means by which to mark shifts in attention, such that non-agent participants may become the center of attention, as observable in case-marking and argument displacement patterns (Himmelmann & Primus 2015).

Grammars offer speakers and signers different ways of signaling shifts in attentional centering. An object that is agent-like attracts attention and thus marking, with the passive alternation

and differential object marking being clear examples of the shift in attentional center between agent and patient. On a prominence account of differential object marking, the morphosyntactic marking of a human object (as in Spanish) reflects the interaction of linguistic structure with the dynamics of attentional centering. This differs from an account of differential object marking in terms of markedness, where an animate, definite object is considered subject-like and thus atypical and morphologically marked (to distinguish it from the subject) (Comrie 1989). On a prominence account, the two event participants are both candidates to be the center of attention, generating competition for prominence between elements of equal status. Bringing the object referent into attentional centering in this case triggers (or grammatically requires) additional information through morphological marking or displacement. In this paper, we apply this notion of prominence to argument marking, in particular object marking, in a sign language, specifically DGS. What structural means exist in DGS to highlight or mark patient referents that attract attentional centering? Conversely, what properties must a patient referent exhibit in order to be treated as an attentional center? In the next section, we provide a brief overview of argument marking in sign languages.

2.2 Argument marking in sign languages

A main organizing principle of the grammar of sign languages is the use of space to indicate arguments. Notably, pronominal signs point to referents in space and a subset of verbs called indicating verbs (Liddell 2003; traditionally called agreement verbs, Padden 1990), move between locations in space associated with event participants. The DGS verb ASK is an example of an indicating verb; in **Figure 1a-b**, its beginning and end points indicate the agent/subject and patient/object arguments, respectively. In **Figure 1a**, the sign moves from the signer's body, associated with first person reference, to a location associated with a third person referent (*I ask her/him*); in **Figure 1b**, the sign moves from a third person location to first person (*S/he asks me*). Other verbs, like THANK (**Figure 1c**) always start at the signer's body, regardless of the subject/agent referent, and move only to indicate their object/patient argument (*X thanks him/her*). Finally, some indicating verbs, e.g. the DGS sign TRUST, exhibit partial subject agreement.[1] In these verbs, the subject is marked in space only when the object argument is first person; in **Figure 1d**, the sign moves toward the signer's body to indicate a first person object (*X trusts me*).[2]

[1] This has also been called optional subject agreement (Lillo-Martin & Meier 2011), though it is not clear that the subject agreement is actually optional. This may vary between sign languages.

[2] Throughout the article, all DGS examples are taken from the Public DGS Corpus (Konrad et al. 2020). Examples are accompanied by a label of the form "dgscorpus_[city]_[dyad] | [age group][gender]" (e.g. dgscorpus_nue_08 | 18–30f), which links directly to the timestamp of the video in the corpus, such that all examples may be viewed. See the Appendix for full versions of the links.

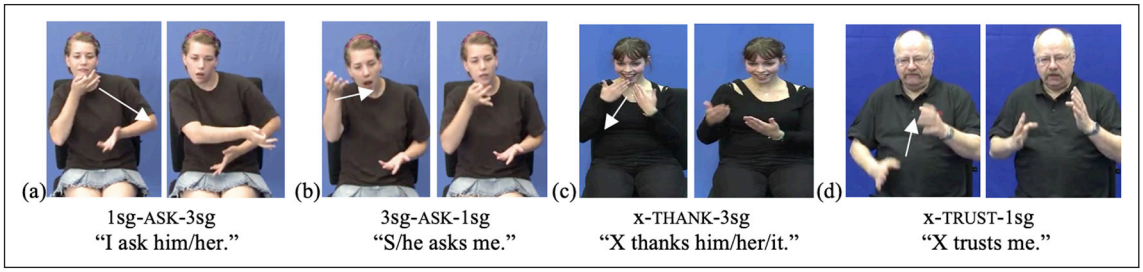

Figure 1: DGS examples showing the spatial modification for subject and object with the indicating verb ASK moving from (a) 1st person to 3rd person (dgscorpus_nue_08 | 18-30f) and (b) 3rd person to 1st person (dgscorpus_nue_08 | 18-30f). In (c), the movement of the DGS verb THANK spatially indicates only the object argument (dgscorpus_koe_01 | 18-30f). In (d), the verb TRUST shows spatial marking of the subject only with a 1st person object argument (dgsdorcus_mvp_06 | 61 + m). (Translations for these examples are our own.)

This brief overview of the typology of indicating verbs suggests that spatial marking is more common for the patient/object argument than for the agent/subject argument, and indeed a preference for object marking over subject marking has been claimed for a number of different sign languages (Morgan 2006; Quadros & Lillo-Martin 2007; Lillo-Martin & Meier 2011).[3] However, as Meir et al. (2007) argue, this "long standing typological puzzle" (p. 3) is explained through the frequent use of the body as subject, particularly for body-anchored verbs that express the subject in the lexical form of the verb, where a first person subject is implicit in the sign form. Such body-anchored verbs belong to the subset of verbs called plain verbs (Padden 1990). These verbs do not move through space and thus cannot indicate their arguments through spatial modification. Their place of articulation is on or near the body (body-anchored plain verbs) or in neutral space (the sign space in front of the signer's body; neutral plain verbs) (Steinbach 2022). When verbs cannot move to indicate their arguments, argument structure is indicated through word order or interpreted based on event semantics. In addition, some sign languages have so-called agreement auxiliaries that indicate verb arguments through spatial modification (see Sapountzaki 2012 for an overview). DGS has been traditionally analyzed as having such an agreement auxiliary, called a person agreement marker (PAM) (Rathmann 2003; Steinbach & Pfau 2007). **Figure 2a** shows a sentence from the Public DGS Corpus with the body-anchored plain verb LOVE in which the object argument is indicated through spatial modification of PAM post-verbally. Neutral plain verbs, e.g. DIE in DGS (see **Figure 2b**), can be localized in space to indicate (or agree with) arguments, in particular the sole argument of intransitive verbs (Oomen 2021). Steinbach (2022) implies that the occurrence of PAM with neutral verbs is possible, though an example is not provided.

[3] Under an agreement analysis, the movement of the verbs agrees with person features, thus the initial location of the verb agrees with the subject and the final location of the verb agrees with the object (see Schembri et al. 2018 for an overview). An exception are so-called backwards verbs, e.g. INVITE in DGS, which move from object to subject. In all cases, however, movement is from agent to patient, or from source to goal in Meir's (1998) terms.

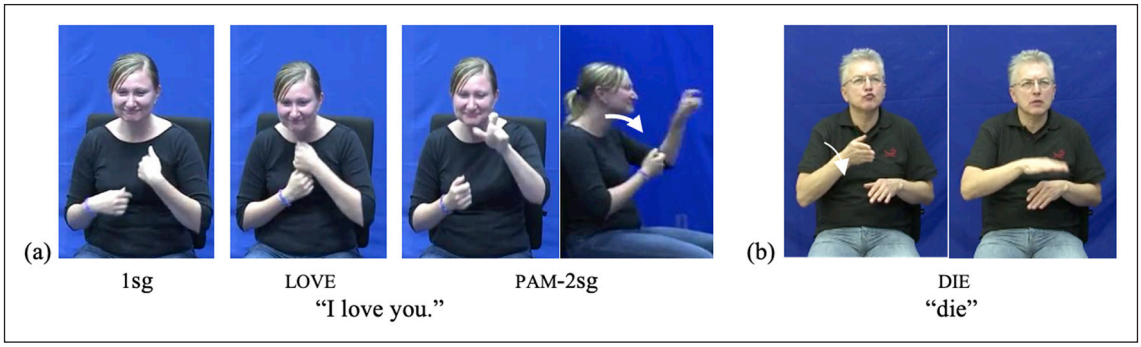

Figure 2: (a) Use of the DGS body-anchored plain verb LOVE with the sign PAM indicating a 2nd person patient/object (dgscorpus_ber_09 | 18-30f). (b) The neutral plain verb DIE in DGS (dgscorpus_fra_05 | 46-60m).

The status of DGS PAM (and similar signs in other sign language) as an (agreement) auxiliary comes from its role in marking arguments in conjunction with plain verbs (Sapountzaki 2012). The auxiliaries mark arguments in the same way as indicating (or agreement) verbs, but without contributing verb semantics. However, it has been noted that agreement auxiliaries occur not only with plain verbs, i.e. when the verb itself cannot move to indicate its arguments, but also together with indicating verbs (e.g. Rathmann 2003, Steinbach & Pfau 2007 for DGS; Krebs et al. 2020 for ÖGS (Austrian Sign Language); Costello 2015 for LSE (Spanish Sign Language). This suggests that these signs do more than "overcome the 'agreement gap' created by plain verbs" (Pfau & Steinbach 2013: 195). This double agreement (Krebs et al. 2020) has been described as functioning as a pragmatic marker of emphasis (e.g. Steinbach & Pfau 2007; Costello 2015). In addition, for DGS, Rathmann (2003) has suggested that double agreement contributes to an episodic, definite reading (marking a specific period of time) in contrast to a generic reading.

2.3 Differential Object Marking (DOM)

Recent analyses have pointed to evidence for the phenomenon of differential object marking in sign languages, or at least to the existence of dedicated object pronouns in a number of sign languages. In this section, we first describe the phenomenon of differential object marking in more detail, relating it specifically to the notion of prominence and then provide an overview of accounts of (differential) object marking in sign languages. We give special attention to accounts of differential object marking in DGS, as the language under investigation in the present study.

2.3.1 Differential object marking as a marker of prominence

As noted above, differential object marking (DOM) refers to special marking of patient arguments triggered by certain properties of the referents. These properties are typically linked to referential prominence, especially animacy, definiteness, specificity, and topicality (Moravcsik 1978; Comrie

1989; Bossong 1991; Aissen 2003). The more animate (particularly human), definite, or topical a patient referent is, the more agent-like and prominent it is, and thus the more likely it is to receive overt case marking, compared to other – less animate, less definite, less topical – patients. In Comrie's (1989) terms, overt marking of the object serves to distinguish between subjects and objects, precisely when there is a potential for confusion between subject and object. Similarly, Aissen (2003) describes that the properties we expect of subjects are the inverse of what we expect of objects. Assuming that subjects are prototypically defined human agents, animacy and definiteness would thus confer prominence to objects but not to subjects. The active attention caused by a definite animate referent as patient motivates the appearance of additional marking on the direct object.

A related concept relevant to the discussion of DOM is that of individuation. Highly individuated objects are animate (human), agentive, definite, specific, concrete, countable and, as such, more likely to be prominent (or salient, Comrie 1989) and at the center of attention. The more individuated a direct object is, the more likely it is to receive special formal marking. For both Comrie (1989) and Aissen (2003), animacy and definiteness are central to the notion of prominence (and salience). For Comrie (1989), salience is related to the notion of attentional centering (Himmelmann & Primus 2015) in that it refers to agents as the default focus of attention for humans, whereby less salient – less individuated – arguments are given attention secondarily. Relating prominence to grammatical marking, Aissen (2003) considers case-marked objects to be more prominent than those not marked with case. Animate and definite objects, as prominent individuated referents, receive case marking as a highlighting feature, whereas inanimate and indefinite objects are left unmarked because they are not prominent. This corresponds nicely to the (asymmetric) marking shown for Spanish in example 1.

The picture regarding case-marking and DOM across languages is not as clear-cut, of course. For Aissen (2003), the tension between the forces of iconicity (whereby prominent substance is reflected in prominent structure) and economy (which discourages the use of additional material) results in different marking behavior across languages. In a large-scale typological investigation, Sinnemäki (2014) shows that there is no systematic relationship between animacy and definiteness properties of the object and case-marking across languages, though there is a general preference for some kind of differential marking of objects. The marking can be symmetric, such that all objects are marked, with alternations between different markers depending on properties of the object, or asymmetric, where only a subset of objects is formally marked (Iemmolo 2013). These differences in formal systems align with different approaches or explanations for DOM (Iemmolo & Klumpp 2014; de Swart 2014). Central to the discriminatory approach – exemplified by Comrie (1989) and Aissen (2003) – is the idea that overt (asymmetric) marking is needed to distinguish the object from the subject. This approach is associated with a syntagmatic explanation of DOM because marking on the object serves correct identification of grammatical relations when the

two arguments may not be distinguishable based on their semantic properties. In the highlighting approach, DOM functions to highlight certain semantic features of objects as different from other objects based on differences in their semantic features. As such, DOM marking on this approach is more paradigmatically motivated, and is often associated with symmetric systems, where objects are always differentiated from subjects through marking, but different kinds of objects are marked in different ways (de Swart 2014).

In addition to properties of the object, DOM has also been related to properties of the verb, and more specifically, to the interaction between the lexical semantics of the verb and properties of the object. The notion of object affectedness, that is, the degree to which the object undergoes a change due to the event, figures prominently here. How affectedness is construed depends to a considerable extent on assumptions regarding the defining features of transitive clauses and the arguments participating in them. According to Hopper & Thompson (1980), the prototypical transitive clause has a volitional agentive subject and a highly individuated object. Note that this stands in opposition to the markedness approach advanced by Comrie (1989) and Aissen (2003), where a typical, unmarked object is assumed to be inanimate and indefinite, very low in individuation (Næss 2007). Tsunoda (1985) proposes a verb class hierarchy of formal object case-marking based on the degree of transitivity of the clause. The higher the semantic transitivity (following Hopper & Thompson 1980), the higher the likelihood of (prototypical) formal marking of the object (e.g. through accusative case-marking), and this correlates with affectedness. Highest on Tsunoda's scale are verbs of effective action (where the action physically impinges on the patient) (e.g. *kick*), followed by verbs of perception (e.g. *see*), pursuit (e.g. *search*), knowledge (e.g. *know*), feeling (e.g. *love*), relationship (e.g. *resemble*), and ability (e.g. *proficient*) (see **Figure 3** in section 2.3.3). The patient is more likely to be affected in prototypical transitive clauses, and indeed, an animate patient – as a prototypical patient on this analysis – should best reflect transitive case-marking of the object. More individuated objects are thus more likely to be affected by their verbs, in the sense of undergoing a change due to the event. For this reason, Næss (2004) argues that it is not individuation that favors the use of DOM but rather the degree of verb affectedness, and that affectedness should in fact be seen as the central notion motivating differential object marking. Kizilkaya et al. (2022), for Turkish and Uzbek, find evidence that the degree of affectedness can be linked to the use of DOM. Specifically, their results indicate that affectedness and animacy are related to the use of DOM, supporting Næss's proposal (2004) that animacy of the object increases the degree to which the verb affects the object, thereby making the object more prominent. Kizilkaya et al. (2022) base their analysis on the affectedness scale developed by Beavers (2011). While Tsunoda's (1985) verb hierarchy is based on case-marking behavior in languages, Beavers' scale is based on a semantic notion of affectedness. Beavers (2011) defines four categories ranging from high to low in affectedness based on the notion of change undergone by the patient: quantized change with a specific result

state (e.g. *break*); non-quantized change with a non-specific result state (e.g. *widen*); potential change and thus a potentially affected object (e.g. *hit*), and underspecified for change and thus a non-affected object (e.g. *see*).

2.3.2 Differential object marking in sign languages

The first explicit analysis of a sign functioning as a dedicated object marker was provided by Meir (2003) for ISL. She describes the use of a case-marked pronoun ($\text{PRO}_{[\text{bC}]}$)[4] that stands in a paradigmatic relationship with the general pronominal point (INDEX). $\text{PRO}_{[\text{bC}]}$ can be used only with human objects (in contrast to INDEX), and is moreover restricted in its use to certain classes of verbs. These verb classes are identified as being (1) "experiencer subject" psych verbs, i.e. verbs that have an experiencer subject, and whose object is what the emotions are directed at or concerned with (e.g. *hate, worry*); (2) verbs of negative effect, i.e. denoting an action that negatively affects the object (e.g. *lie (to), insult*); and (3) verbs that take a "content" object (e.g. *talk (about someone), write (about someone)*). Meir notes that these verb classes are united in that they relate to qualities of the object referent as a person, and she posits an animacy constraint on their subjects: verbs which appear with $\text{PRO}_{[\text{bC}]}$ require experiencers or volitional agents. In addition, she reports that the use of $\text{PRO}_{[\text{bC}]}$ implies a special connection and high degree of familiarity between the subject and object referents compared to the use of INDEX, as in REMEMBER + INDEX with a neutral meaning (e.g. in a question 'Do you remember him?') vs. REMEMBER + $\text{PRO}_{[\text{bC}]}$ with a long-lasting connection implied (e.g. 'I remember him, we grew up together' or 'I remember her well, she was my best teacher') (Meir 2003: 119 for examples and meanings).

Börstell (2017, 2019) similarly describes a dedicated object pronoun for Swedish Sign Language, and specifically links its use to the phenomenon of differential object marking (a link not made by Meir 2003 for ISL). Börstell (2019) describes the pronoun as marking only objects and only human referents. In contrast to the form described by Meir (2003), the Swedish Sign Language object pronoun is not restricted to specific verb classes and may be used for plural referents (by means of a horizontal sweep of the hand), but only for 1st and 2nd person forms in the plural. Börstell (2019) takes the restrictions on animacy and person to support a differential object marking analysis based on prominence. Though detailed descriptions are lacking, Börstell (2017, 2019) describes similar forms with similar functions across the sign languages of Scandinavia – including DSL (Danish Sign Language[5]), FinSL (Finnish Sign Language), NSL (Norwegian Sign Language), and FinSSL (Finland-Swedish Sign Language).

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[4] The gloss reflects the use of the so-called "baby-C" (bC) handshape (L) used in the sign and its function as a pronoun (PRO). The form of $\text{PRO}_{[\text{bC}]}$ looks very similar to the DGS sign PAM.

[5] But see Vermeerbergen & Engberg-Pedersen (2024), who argue (in Note 4) against the existence of such a form for Danish Sign Language based on occurrences of PERSON in monologic texts from the online Dictionary of Danish Sign Language.

2.3.3 Differential object marking in DGS

A differential object marking analysis of a sign very similar in form to the signs described by Meir (2003) and Börstell (2019) has been proposed for DGS for the sign PAM (Bross 2020; Steinbach 2022). As one of our main aims is to test the claims made by Bross (2020), we give a detailed description of his account here. Bross (2020) rejects an analysis of PAM as an agreement auxiliary or simple person agreement marker (Rathmann 2003, Pfau & Steinbach 2007), and posits that PAM is a preposition exhibiting DOM triggered by the semantic parameters of animacy, definiteness, and affectedness. On his analysis, PAM is used exclusively with animate objects, with a strong tendency toward human animate referents, and also shows restrictions with respect to verb classes. Taking Tsunoda's (1985) transitivity/affectedness hierarchy as a basis (see **Figure 3**), Bross (2020) claims that marking with PAM is obligatory with verbs of Pursuit, Knowledge, and Feeling (in the middle of the scale), and optional with verbs of Effective Action and Perception (i.e. verbs with high(er) degrees of object affectedness). The optional use of PAM is modulated by definiteness effects: PAM-marked animate objects receive a definite reading, while unmarked animate objects can be definite or indefinite (see example 2 below). Verbs with low degrees of object affectedness (verbs of Relationship and Ability on Tsunoda's scale) do not receive marking with PAM.

(2) *DGS* (Bross, 2020)

a. YESTERDAY PAUL_{3a} $\text{POLICE\#PERSON}_{3b}$ SEE_{3b}
'Yesterday Paul saw a/the policeman.'

b. Context: Do you remember the policeman that Paul talked about?
YESTERDAY PAUL_{3a} PAM_{3b} $\text{POLICE\#PERSON}_{3b}$ SEE_{3b}
'Yesterday Paul saw the policeman.'

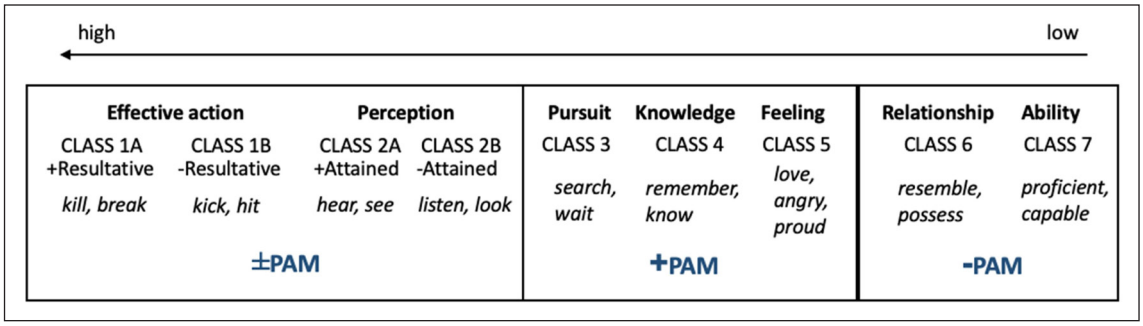

Figure 3: Tsunoda's (1985) verb hierarchy, adapted by Bross (2020), showing the effect of verb class on the use of PAM.

Previous analyses of the behavior of PAM by Murmann (2012), using an acceptability judgment paradigm, and Macht (2016), using task-based elicitation data from (non-public) DGS Corpus (Nishio et al. 2010), also find strong animacy effects, though both note that PAM is not used

exclusively with animate object referents. Based on a sentence repetition task, in which signers repeated sentences from memory and which resulted in instances of spontaneous insertion of PAM, Proske (2020) also finds good support for animacy restrictions associated with PAM, as well as weak support for a tendency for PAM to be subject to definite constraints, leading her to agree, in general, with the differential object marking analysis for PAM by Bross (2020). Proske (2020) did not explicitly investigate the effect of verb classes, but a list of DGS verbs that occurred with PAM in her data is provided (LOVE/LIKE, TEASE, ACCEPT, SHOW, PICK-UP, HELP, INFORM, ASK, INVITE, REPEAT and WAIT). These verbs all seem to correspond to medium-affected objects (primarily class 3) according to Tsunoda's (1985) scale, consistent with Bross's (2020) assumption of PAM-marking with these verbs. However, it does not seem from Proske's (2020) data that PAM occurred obligatorily with these verbs.

In a review of literature on argument marking in DGS, Steinbach (2022) proposes that DGS has an agreement marker, glossed as $_{x}$PAM$_{y}$ (which marks both subject and object arguments), and a differential object marker, glossed as PAM$_{x}$ (which marks only the object). Steinbach (2022) moreover notes a syntactic difference between the forms, with PAM$_{x}$ being a preverbal and $_{x}$PAM$_{y}$ being a postverbal marker. On this analysis, all occurrences of PAM as a differential object marker by Bross (2020) should be preverbal. This is not the case, however, as Bross's DOM analysis clearly includes both clause-internal and clause-final (his terms) uses of PAM. Crucially, the clause-internal, non-final pattern does not entail a preverbal position of PAM. The sentences in example (3), given by Bross (2020), both exemplify the clause-internal pattern; PAM precedes the object in both (a) and (b), but is preverbal only in (a).

(3) *DGS* (Bross, 2020)

a. PAUL$_{3a}$ PAM$_{3b}$ MARIA$_{3b}$ ANGRY
"Paul is angry at Maria."

b. PAUL$_{3a}$ ANGRY PAM$_{3b}$ MARIA$_{3b}$
"Paul is angry at Maria."

Finally, Bross (2020) (like Börstell 2017, 2019) explicitly links PAM to prominence based on a markedness-based definition of differential object marking. In the present study, as outlined in the following section, we investigate how the concept of prominence as a structuring principle of language (Himmelmann & Primus 2015) can be related to the use of PAM in DGS based on an analysis of naturalistic corpus data.

3 Present study

In this section, we describe the methodology used and motivate our test of the specific claims made by Bross (2020) for DGS PAM. We describe our process of data selection in the following section. The analysis of PAM by Bross (2020) is based on a translation task and grammaticality

judgments conducted with 13 DGS signers from Southern Germany. Participants were presented with German sentences and asked to provide translations of these sentences into DGS. With respect to the use of PAM, participants were asked if the sentences could be signed with or/and without PAM and if this resulted in any changes in meaning or sentence acceptability. Based on his analysis, Bross (2020: 30) formulated two generalizations with respect to object-marking with PAM in DGS (for the variant of DGS investigated), repeated below:

> **Generalization 1:** PAM is obligatorily used with transitive verbs with a mentally/emotionally affected animate object. Examples include KNOW, ADVISE, LOVE, HATE, BE-ANGRY, BE-PROUD, TRUST, WORRY, BE-PLEASED, BE-JEALOUS, BE-DISAPPOINTED, BE-NICE, ACCUSE, INSULT.

> **Generalization 2:** PAM is optionally used with transitive verbs which are high on Tsunoda's hierarchy. Similar to Turkish, differential object marking is related to definiteness effects in these cases. Examples include BEAT, HIT, KILL, KISS, SEE.

In the present study, we test these claims using naturalistic data from the Public DGS Corpus (Konrad et al. 2020). The use of naturalistic data to is an important contribution to our understanding of the distribution and function of PAM. Corpus data reflects actual language use – and the variability of language use – in a way that cannot be captured through grammaticality judgements and translation tasks. The objectives are as follows: (1) to determine the use of PAM in relation to animacy and definiteness and (2) to test the influence of affectedness of the object on the use of PAM. In addition, we aim to relate the use of PAM to linguistic prominence, specifically to how the use of PAM in DGS may be interpreted as providing additional information (marking) that moves the agent from its place as the natural center of attention.

4 Methodology

4.1 Data: Public DGS Corpus

Our analysis is based on naturalistic data from the Public DGS Corpus (www.sign-lang.uni-hamburg.de/meinedgs/ling/start_de, University of Hamburg). The corpus data includes participation from German deaf individuals from the whole of Germany and was collected in major cities across all federal states. For the corpus as a whole, of which the Public DGS Corpus is a part, a total of 330 deaf individuals participated in the data collection, balanced for gender (male, female) and age groups (18–30, 31–45, 46–60, and 61 + years old), resulting in about 550 hours of recordings. The corpus data was collected in rooms with a blue background and with cameras capturing interlocutors from different angles (see **Figure 4**). The textual genres used in the recordings ranged from elicited narratives and stimulus descriptions to free conversations.

The Public DGS Corpus comprises about 50 hours of recordings that are available on the corpus website. All videos from the public corpus can be downloaded together with ELAN files containing data annotations (see **Figure 5**).

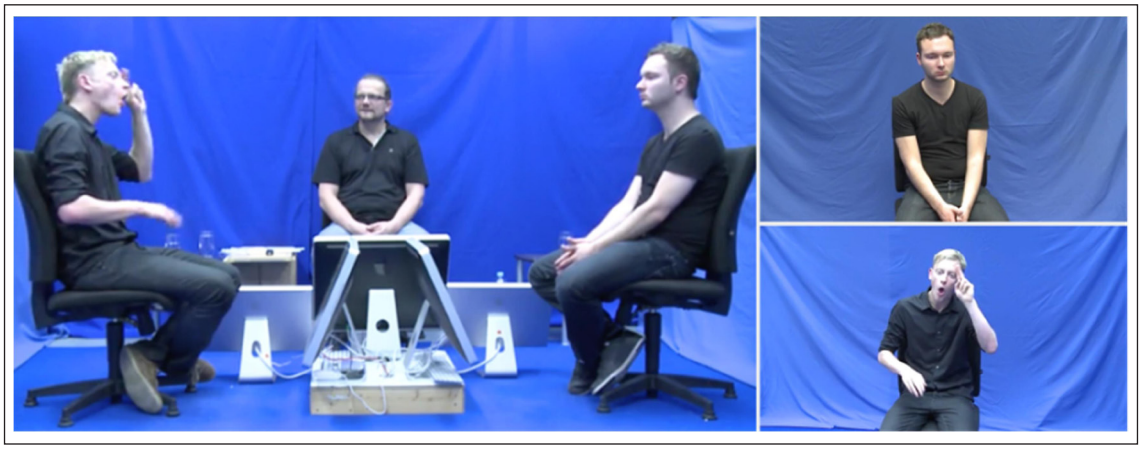

Figure 4: Images from the Public DGS Corpus showing the set-up for video recording of a participant dyad (dgscorpus_ber_01 | 18–30m).

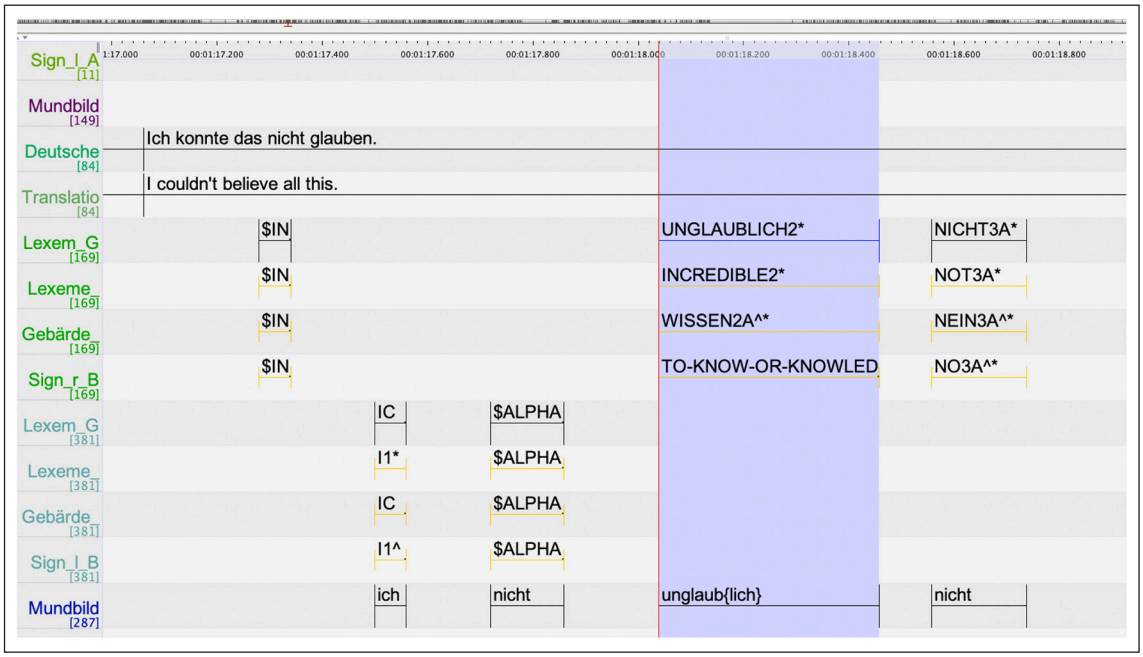

Figure 5: Annotation example of the Public DGS Corpus, as it is available for download. The annotation highlighted in blue corresponds to the sign production in Figure 4.

The Sign (Gebärde) tier contains glosses in English (German) that serve as identifying labels for the form (e.g. the sign glossed as TO-KNOW-OR-KNOWLEDGE2A (WISSEN2A) in **Figure 5**). The Lexeme_Sign (Lexem_Gebärde) tier presents an English (German) gloss with a conventionalized form-meaning association, and sign forms may be associated with multiple lexemes (e.g. the corresponding gloss INCREDIBLE2 (UNGLAUBLICH2).[6] There are separate Sign and Lexeme_Sign tiers for the right (r) and left (l) hands and for both signers (A and B). In addition, translations into English and German and information about mouthing (Mundbild) accompanying sign productions are provided on separate tiers.

4.2 Data selection and annotation for the first analysis

The first analysis uses the occurrences of PAM in the corpus to test the relationship of PAM to animacy, definiteness (and thus the level of object individuation; Aissen 2003) and affectedness. We expect that the individuation of the object is a factor that delimits the use of PAM in DGS, and that we should find PAM use in particular with objects high on the animacy and definiteness scales, supporting previous claims.

For the first analysis, we performed a structured multiple search using ELAN (2023, version 6.6) for PAM, which is glossed as ON-PERSON1^ (AUF-PERSON1^ in German), with (subtype) lexemes glossed as ON-PERSON1 (AUF-PERSON1), ON-OBJECT1^ (AUF-OBJEKT1^), and OVER-OR-ABOUT2 (ÜBER2) (see **Figure 6**). This search yielded 696 occurrences of PAM in the online corpus as a whole (675 tokens glossed as ON-PERSON1; 11 as ON-OBJECT1; 10 as OVER-OR-ABOUT2). All instances of PAM were individually checked by members of the research team, including two native DGS signers. This resulted in the exclusion of a substantial number of tokens glossed as ON-PERSON1^ in the corpus. Some of these (N = 10 ON-PERSON1) were identified as being personal pronouns, i.e. pointing signs typically produced with an extended index finger, but sometimes involving the index finger and thumb due to coarticulation effects (and thus looking phonologically similar to PAM). Other signs like SAY and COME, also phonologically similar to PAM especially in continuous signing, were also erroneously glossed as PAM (N = 33 ON-PERSON1; N = 2 ON-OBJECT1; N = 7 OVER-OR-ABOUT2), and some were excluded due to not being clearly recognizable as PAM (N = 4 ON-PERSON1). In addition, a large number of tokens (N = 188 ON-PERSON1; N = 2 ON-OBJECT1; N = 2 OVER-OR-ABOUT2) were identified as instead being (a version of) the sign PERSON (see **Figure 7**). The two signs are phonologically similar (with the same handshape, but a different path of movement, arc vs. straight), and PAM has been analyzed as being grammaticalized from PERSON (Pfau & Steinbach 2007). Alongside the more standard noun sign PERSON (**Figure 7**), there seems to be a version of PERSON that is also sensitive to semantic properties of the object. We show two examples of this version of PERSON

[6] Numbers following glosses indicate lexical variants; letters after the number indicate a phonological variant. The annotation conventions for the DGS corpus are available here: https://www.sign-lang.uni-hamburg.de/dgs-korpus/arbeitspapiere/DGS-Korpus_AP03-2018-01v02_en.pdf.

in **Figures 8** and **9**, noting the semantic context in the caption; we return to the relationship between PAM and PERSON in the discussion (section 6.5). Finally, in the other direction, we found (randomly) an additional 14 occurrences of PAM that were not glossed as such in the corpus. We relied on the judgment of native deaf signers to identify signs as being PAM. A total of 462 instances of PAM were used in the first analysis.

Figure 6: ON-PERSON1 (PAM) (dgscorpus_ber_09 | 18-30f).

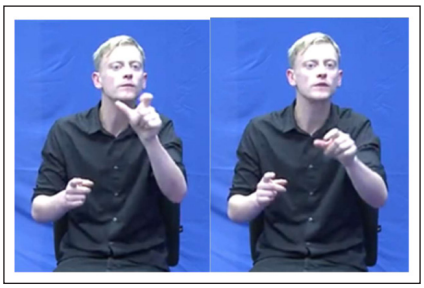

Figure 7: PERSON (dgscorpus_ber_01 | 18-30fm).

Figure 8: Example of a sentence with ON-PERSON1 (PAM) annotation in the corpus that was re-annotated as PERSON by the authors (dgscorpus_mst_13 | 46-60f). In this example, the signer is talking about a conflict with a teacher that went on for many years. The use of PERSON here reflects the association of the teacher's hatred with the attributes of the person, i.e. with the attributes of the signer that are the source of the conflict.

Figure 9: Example of sentence with ON-PERSON1 (PAM) annotation in the corpus that was re-annotated as PERSON by the authors (dgscorpus_fra_14 | 31-45f). In this example, the signer is talking about attending a talk and seeing a friend in the auditorium. The use of PERSON here reflects some distance and uncertainty regarding the situation.

For each occurrence of PAM included in the analysis, we coded the arguments of the clause in which it occurred. Clauses were identified on the basis of the presence of predicates, and the presence of one or more arguments. We coded arguments as A1 for subjects (agents and experiencers) and A2 for objects (patients and recipients). We coded for animacy, definiteness, and specificity as object-marking triggers typical of DOM. Animacy of A1 and A2 arguments was coded as animate (human), animate (non-human), or inanimate based on the animacy scale Human > Animals > Inanimate (Aissen 2003). Our coding of animate (human) referents included individual persons as well as groups of people (e.g., hearing people, family members) (Fenlon et al. 2018).

We operationalized definiteness and specificity in the sense of familiarity and uniqueness (Almeida-Silva 2019; Lyons 1999).[7] Referents that were previously mentioned – i.e. maintained across successive clauses or reintroduced (Ferrara et al. 2023; Perniss & Özyürek 2015) – in the discourse were considered familiar. Semantically unique referents (e.g. the President) and proper names (e.g. Kennedy) were considered definite based on the uniqueness criterion. Referents familiar to both participants were taken to be definite, referents familiar only to the signer were indefinite but specific, and referents unknown to both participants were considered indefinite and nonspecific (von Heusinger 2002). We coded introduced referents as indefinite when they were unknown to the interlocutor and as unspecified when they were introduced without a specific reference.

[7] Bross (2020) identifies object shift, i.e. the movement of the direct object into a structurally higher position, to be linked to definiteness of the object. This higher object position is a clause-internal position and thus aligns with the use of PAM in clause-internal position as being associated with definiteness effects. A syntactic analysis of object position in relation to definiteness was beyond the scope of the present paper.

Finally, for all analyzed occurrences of PAM in the corpus, we categorized the verb in the clause in which it occurred according to its level of affectedness. We did this based on Tsunoda's (1985) verb hierarchy, coding each verb as belonging to class 1, 2, 3, 4, 5, 6, or 7, with classes 1–2 representing verbs with highly-affected objects, classes 3–5 representing verbs with medium-affected objects, and classes 6–7 representing verbs with low-affected objects (cross-checking with Oomen 2018). We also categorized all verbs in clauses with PAM according to the affectedness hierarchy proposed by Beavers (2011), as adapted by Kizilkaya et al. (2022). We coded verbs as effecting in the object quantized change (class 1); non-quantized change (class 2); potential change (class 3), or no change (underspecified for change) (e.g. class 4). A comparison between the two scales shows that they diverge quite substantially in what would be considered high vs. low in affectedness (see **Figure 10**). What Beavers (2011) considers to be low in affectedness spans the high, mid, and low ranges in Tsunoda (1985) (and Bross 2020). Verbs high in affectedness according to Beavers (2011) overlap only with verbs of resultative effective action (class 1A) on Tsunoda's scale.

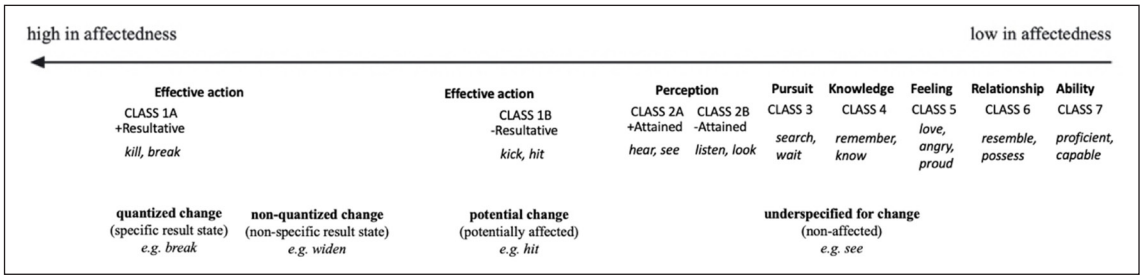

Figure 10: Correspondence between Tsunoda's (1985) and Beavers' (2011) scales of affectedness.

4.3 Data selection and annotation for the second analysis

The objective of the second analysis is to test the status of PAM with respect to differential object marking from the perspective of verb classes. Specifically, we test claims by Bross (2020) regarding the influence of object affectedness on the use of PAM, i.e. that PAM is obligatory for verbs of pursuit, knowledge, and feeling (classes 3–5 according to Tsunoda's 1985 hierarchy) and that the use of PAM with verbs of effective action and perception (classes 1–2) forces a definite reading of the object.

For this analysis, we searched the corpus for occurrences of all 29 verbs listed by Bross (2020) (and Tsunoda 1985) as belonging to these categories and being associated with the use of PAM (see **Figure 3** and Generalizations 1 and 2 above). We focused on data from six different cities around Germany (Berlin, Frankfurt, Cologne, Münster, Munich, Stuttgart), including data from Southern Germany (specifically Stuttgart and Munich), which corresponds to the dialect

of DGS reported on by Bross (2020). Table 1 lists these 29 verbs and assigns them to Tsunoda's (1985) verb classes, Bross's (2020) categorization of these classes according to affectedness, and Beavers' (2011) verb classes.

Verb	**N**	**Verb class (Tsunoda 1985)**	**Affectedness level (Bross 2020)**	**Verb class (Beavers 2011)**	**Affectedness level (Beavers 2011)**
KILL	38	Eff Act (+Res) (Class 1A)	High	Quantized (Class 1)	High
BREAK	0	Eff Act (+Res) (Class 1A)	High	Quantized (Class 1)	High
KICK	0	Eff Act (–Res) (Class 1B)	High	Potential (Class 3)	Medium
HIT	0	Eff Act (–Res) (Class 1B)	High	Potential (Class 3)	Medium
BEAT	65	Eff Act (–Res) (Class 1B)	High	Potential (Class 3)	Medium
KISS	9	Eff Act (–Res) (Class 1B)	High	Potential (Class 3)	Medium
SEE	39	Perc (+Att) (Class 2A)	High	Underspec (Class 4)	Low
HEAR	18	Perc (+Att) (Class 2A)	High	Underspec (Class 4)	Low
LOOK	67	Perc (–Att) (Class 2B)	High	Underspec (Class 4)	Low
LISTEN	11	Perc (–Att) (Class 2B)	High	Underspec (Class 4)	Low
WAIT	9	Pursuit (Class 3)	Medium	Underspec (Class 4)	Low
SEARCH	15	Pursuit (Class 3)	Medium	Underspec (Class 4)	Low
REMEMBER	4	Knowledge (Class 4)	Medium	Underspec (Class 4)	Low
KNOW	87	Knowledge (Class 4)	Medium	Underspec (Class 4)	Low
LOVE	15	Feeling (Class 5)	Medium	Underspec (Class 4)	Low

(Contd.)

Verb	N	Verb class (Tsunoda 1985)	Affectedness level (Bross 2020)	Verb class (Beavers 2011)	Affectedness level (Beavers 2011)
BE-ANGRY	7	Feeling (Class 5)	Medium	Underspec (Class 4)	Low
PROUD	11	Feeling (Class 5)	Medium	Underspec (Class 4)	Low
ADVISE	61	Pursuit (Class 3)	Medium	Underspec (Class 4)	Low
HATE	7	Feeling (Class 5)	Medium	Underspec (Class 4)	Low
TRUST	14	Feeling (Class 5)	Medium	Underspec (Class 4)	Low
WORRY	8	Feeling (Class 5)	Medium	Underspec (Class 4)	Low
BE-PLEASED	7	Feeling (Class 5)	Medium	Underspec (Class 4)	Low
BE-JEALOUS	6	Feeling (Class 5)	Medium	Underspec (Class 4)	Low
BE-DISAP-POINTED	4	Feeling (Class 5)	Medium	Underspec (Class 4)	Low
BE-NICE	7	Feeling (Class 5)	Medium	Underspec (Class 4)	Low
ACCUSE	0	Pursuit (Class 3)	Medium	Underspec (Class 4)	Low
INSULT	4	Pursuit (Class 3)	Medium	Underspec (Class 4)	Low
LOOK-AFTER	14	Pursuit (Class 3)	Medium	Underspec (Class 4)	Low
PUNISH	10	Pursuit (Class 3)	Medium	Underspec (Class 4)	Low

Table 1: Overview of verbs coded in the second analysis, based on Tsunoda (1985), Bross (2020), and Beavers (2011).

We used the structured multiple search function in ELAN to search for all occurrences of these verbs in the corpus, including subtypes and variants. For example, the gloss LOVE occurs in the variants LOVE1A, LOVE1B, and LOVE1C (**Figure 11**; see footnote 5 for annotation conventions). Since we could not know for sure which variant of each verb was analyzed by Bross (2020), we considered all variants of each of the verbs.

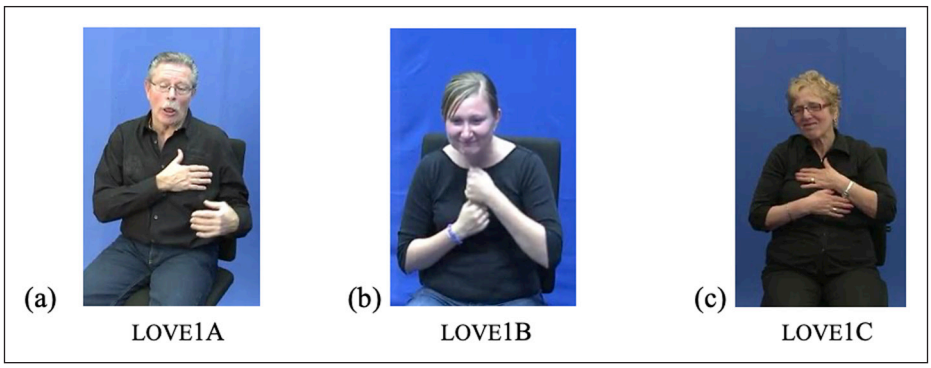

Figure 11: Variants of the sign LOVE in the DGS corpus, glossed as (a) LOVE1A (dgscorpus_koe_13 | 61+m), (b) LOVE1B (dgscorpus_ber_09 | 18-30f), and (c) LOVE1C (dgscorpus_stu_08 | 61+f).

Our initial search for these glosses in ELAN turned up 1730 occurrences across the six cities. We applied the following exclusion criteria: (1) verbs that occurred in clauses with non-human objects; (2) verbs with a clausal complement as object ; and (3) signs with verb glosses that were used in a different way (either attributively or nominally or used with a different meaning, e.g. SEE used to mean "to look like"). This resulted in the exclusion of 1193 tokens, such that 537 tokens remained for inclusion in the second analysis (see Table 1 for the number of tokens for each verb type). With respect to the distribution of these tokens across verb classes, about 60% belonged to Tsunoda's classes 3–5 (roughly split evenly across the classes), about 25% belonged to class 2, and the rest were categorized as highly affected class 1 verbs. By comparison, about 80% were verbs very low on Beavers' affectedness scale (underspecified for change), about 15% of verbs have objects with the potential for change, and the remaining 5% qualified as high on the scale (quantized change). We coded for the presence of PAM in all clauses with these verb tokens. Here, too, signs annotated as ON-PERSON in the corpus and identified as being PERSON through reliability coding within our team were excluded. We coded for the definiteness of the object, since definiteness is proposed by Bross (2020) to interact with affectedness.

5 Results

5.1 Results of the First Analysis

5.1.1 Animacy

We found a strong predominance of PAM with animate objects, in particular human objects (N = 423, 92%) and a very small number of non-human animate referents (N = 3, 1%). However, PAM was not used exclusively with animate objects. Though comparatively rare, PAM also occurred with some inanimate objects (N = 36, 7%). Upon closer examination of the inanimate objects, we observed that many were related to human referents. In some cases (N = 13), the object was a city, region, or country (e.g. Germany, Berlin), which signifies a strong connection with humans through the people living in that place or their governing representatives. There were also instances (N = 10) where the objects were institutions (e.g. bank, school, company),

and once again, the object may refer strongly to the individuals comprising or representing the institution. In two occurrences, the inanimate object represented something directly associated with a specific human (a person's lips; sentences written by a person), with PAM possibly assuming a kind of possessive pronominal function ("I can't see PAM(his) lips"; "I don't correct PAM(your) sentences"). Additionally, there were two cases in which the reference to humans was more contextual. For example, PAM occurred with the object SPORTS in a context in which playing sports is credited with paying for the subject's ability to travel around the world (see **Figure 12**). Similarly, PAM occurred with the object TELEVISION in a context in which people were yelling at the television while watching a football game (i.e. yelling at the players on the field).

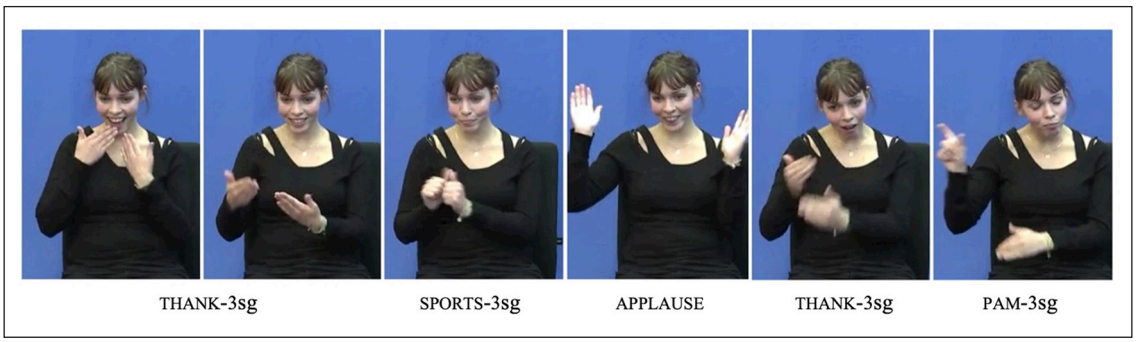

Figure 12: 'You owe a lot to sport' (dgskorpus_koe_01 | 18–30f).

However, not all cases exhibited a clear connection with humans (N = 9), either in a general sense or within the context (e.g. flooding, traffic sign), suggesting that the use of PAM is not fully restricted to an occurrence with animate objects. Despite this, these results suggest that animacy, specifically humanness, is a factor that clearly triggers the use of PAM to mark objects, consistent with claims by Bross (2020).

5.1.2 Definiteness

When we look at the relationship between definiteness and the use of PAM overall, the results indicate that PAM is used predominantly with definite objects (N = 433, 94%). There were few occurrences of PAM with indefinite objects, and these are equally divided between instances of indefinite specific (N = 14, 3%) and indefinite non-specific (N = 15, 3%) referents.

5.1.3 Individuation

When we look at the relationship between animacy and definiteness (Table 2), we see that the vast majority of PAM-marked referents are human and definite (N = 398, 86%). The table shows different levels of individuation, which correspond to different levels of object markedness on the dimensions of animacy and definiteness (Aissen 2003). It is clear that object marking with PAM is very infrequent with referents with a low degree of individuation. Of the total occurrences

of indefinite objects, both specific and non-specific (N = 29), the majority of these (N = 25, 86%) were human. There were thus only four occurrences in the entire corpus of objects marked with PAM that rank very low on the individuation scale (inanimate and indefinite).

	Definite	Specific	Non-specific
Human	398 (86%)	12 (2%)	13 (3%)
Animate non-human	3 (1%)	0 (0%)	0 (0%)
Inanimate	32 (7%)	2 (0.5%)	2 (0.5%)

Table 2: Distribution of use of PAM based on individuation (animacy and definiteness) of object referent.

5.1.4 Affectedness

For the occurrences of PAM in the corpus, the results are consistent with Bross's (2020) proposal in that the majority of verbs occurring with PAM were verbs with objects of medium affectedness (classes 3–5, Tsunoda 1985) (N = 391, 85%) (**Figure 13**). In contrast, verbs with highly affected objects (classes 1–2) were much less prevalent in clauses with PAM (N = 70, 15%) and there were no occurrences of PAM in clauses with low-affected objects (classes 6–7).

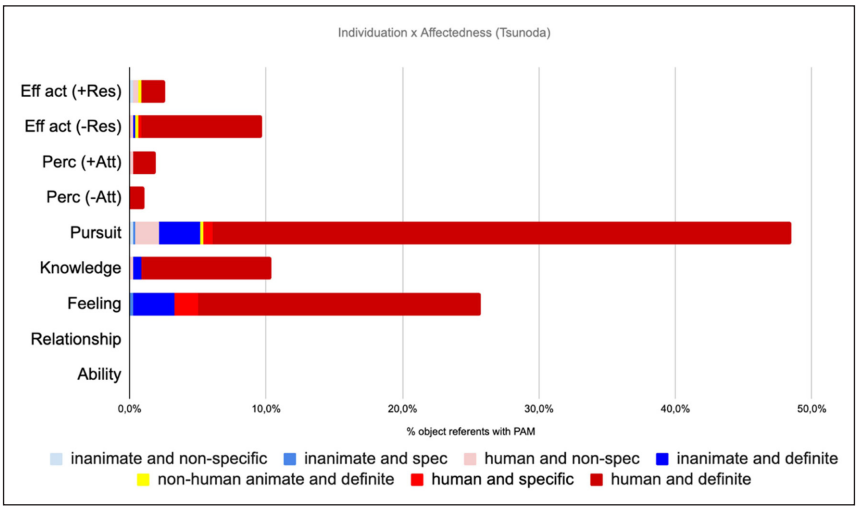

Figure 13: Occurrences of PAM based on Tsunoda's (1985) verb classes and different levels of object individuation.

When we code verbs based on Beavers' (2011) scale (based on a semantic notion of affectedness), we see that PAM occurred primarily in clauses with verbs considered to be low in affectedness (underspecified for change: N = 408, 89%) (**Figure 14**). Only a few cases were observed with verbs higher on the scale (potential change: N = 41, 9%; change with non-specific result state: N = 6, 1%; change with specific result state: N = 6, 1%). Recall from the

comparison of scales presented in **Figure 10** that verbs with a potential change of the object (e.g. hit; Beavers 2011) are high on Tsunoda's scale with respect to object affectedness (class 1B, non-resultative effective action, e.g. hit). The bump in PAM use high on Tsunoda's scale is seen on the scale by Beavers to reflect a continuous (though sudden) drop in the use of PAM as we move up the scale.

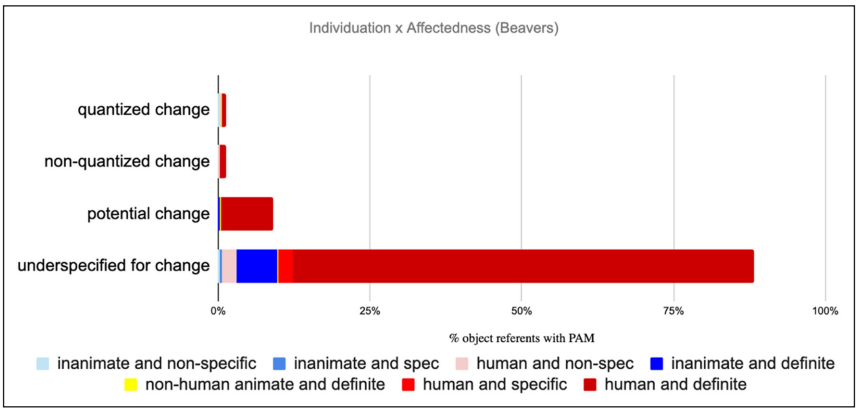

Figure 14: Occurrences of PAM based on Beavers' (2011) verb classes and different levels of object individuation.

In summary, the first analysis has shown that the use of PAM is highly motivated by animacy, with a very strong tendency to be used with human objects. However, PAM-marking is not fully restricted to animate objects, since inanimate objects, with various degrees of relationships to humans, were also marked with PAM. Moreover, the vast majority of objects marked with PAM were both animate and definite, and thus likely to be highly individuated. The results of coding for affectedness (differences between the two scales used notwithstanding) suggest that higher degrees of affectedness do not increase the likelihood of object marking with PAM. In the next section, we turn to the results of the second analysis, which provides further information regarding the behavior of different verbs, different levels of affectedness, and the use of PAM.

5.2 Results of the Second Analysis

5.2.1 Affectedness

In the second analysis, we look at the influence of object affectedness on the use of PAM and specifically test claims by Bross (2020) that PAM is obligatory for medium-affected verbs, i.e. with verbs of pursuit, knowledge, and feeling or, as alternately termed by Bross (2020), with verbs with emotionally/mentally affected animate objects. Here again, we investigated all verbs listed in Bross (2020) as falling into these categories (see **Table 1**), and categorized according to the scales by Tsunoda (1985) and Beavers (2011). as falling into these categories (see Table 1).

As in the first analysis, the results show that the use of PAM is more common with medium-affected verbs (classes 3–5) than high-affected verbs (classes 1–2) (**Figure 16a**). However,

looking here just at animate human PAM-marked objects, it is clear that the use of PAM with verbs in classes 3–5 (primarily mentally and emotionally affected objects) seem to be far from obligatory. Out of 290 sentences with medium-affected verbs and animate human objects, only a total of 41 objects were marked with PAM, representing only 14% of the occurrences, while the vast majority of sentences with these verbs did not have their human objects marked with PAM. **Figure 19** shows an example from the corpus with an emotion verb (class 5) that occurs with a human animate object and is not marked with PAM. When we look at the use of PAM as distributed across the affectedness levels defined by Beavers (2011), we see that almost all occurrences of PAM are with verbs that are underspecified for change, i.e. whose objects are essentially unaffected (**Figure 16b**).

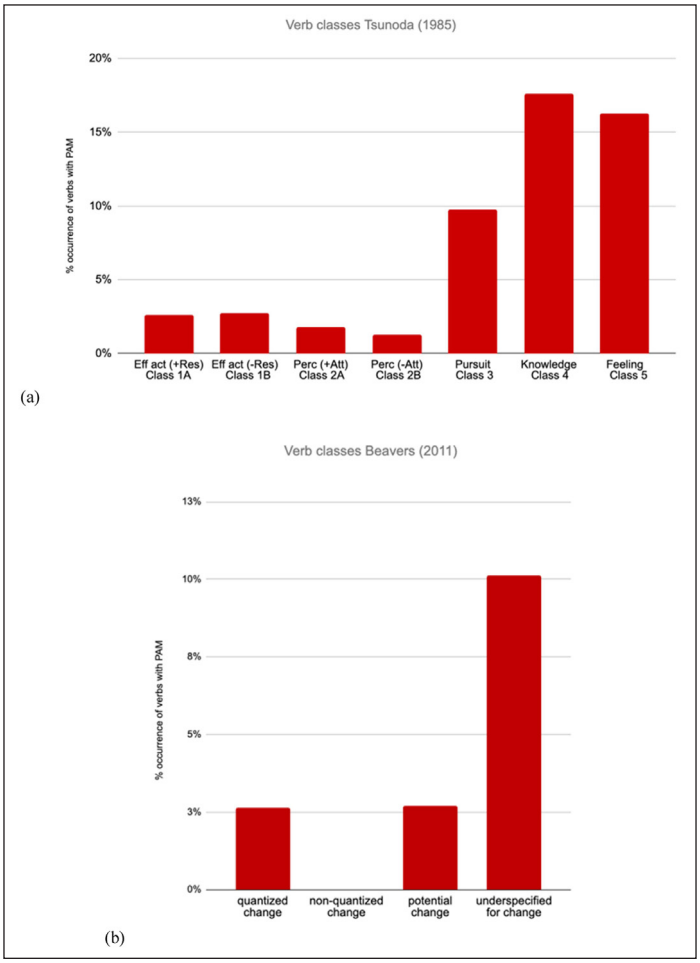

Figure 15: (a) Results for the presence of PAM with verbs in verb classes based on Tsunoda (1985). (Note that Relationship, class 6, and Ability, class 7, are not represented in the graph here, because verbs from these classes were not included in the data set.) (b) Results for presence of PAM with verbs with affectedness levels based on Beavers (2011).

Figure 16: Example of verb with an emotionally-affected (class 5, verb of feeling, Tsunoda 1985) human definite object not marked with PAM (dgskorpus_stu_08 | 61 + f).

5.2.2 Definiteness and affectedness

We also test Bross's claim that the use of PAM with verbs higher on Tsunoda's scale, i.e. verbs of effective action and perception, forces a definite reading of the object. Looking at the relationship between definiteness and affectedness, we should see the use of PAM to mark objects with verbs in these classes occurring only with definite objects. **Figure 17** shows the distribution of animate human definite vs. indefinite objects occurring with vs. without PAM-marking across Tsunoda's verb classes. As shown in **Figure 15**, the use of PAM to mark objects in clauses with these verbs is low overall. Of a total of 247 clauses with verbs in Tsunoda's effective action and perception classes, there were only five occurrences of PAM-marking on an animate human object, and four of these occurrences were with a definite object. For comparison, **Figure 18** shows the distribution of marking for definite vs. indefinite human objects for Beavers' levels of affectedness. The one example of the use of PAM with an indefinite object is shown in **Figure 19**.

Consistent with claims by Bross (2020), we see that animate human objects occurring without PAM can be definite or indefinite. We have one counterexample for the claim that verbs in Tsunoda's (1985) classes 1–2 force a definite reading with PAM. We see a similar pattern in verbs associated with classes 3–5, suggesting that verb affectedness does not have a strong role to play with respect to definite effects. We see, as already in the first analysis, that the majority of objects marked with PAM are definite. However, we also see that the majority of objects are definite overall, regardless of marking with PAM.

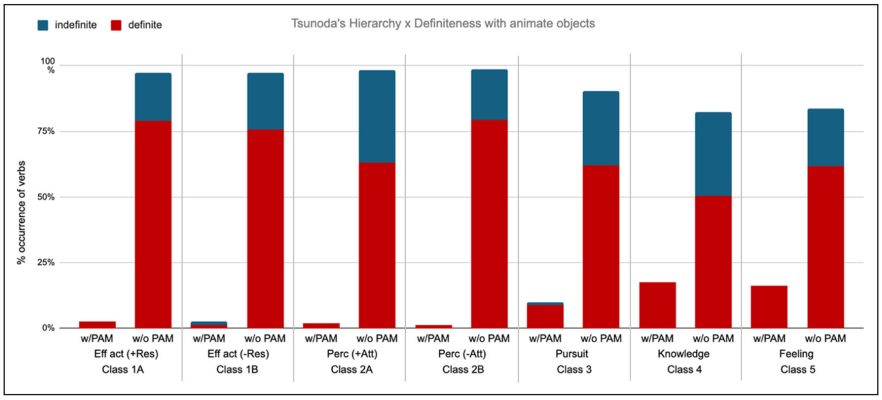

Figure 17: Definite vs. indefinite animate human objects occurring with and without PAM-marking across Tsunoda's (1985) verb classes (with high-affected, classes 1–2, and medium-affected, classes 3–5, objects).

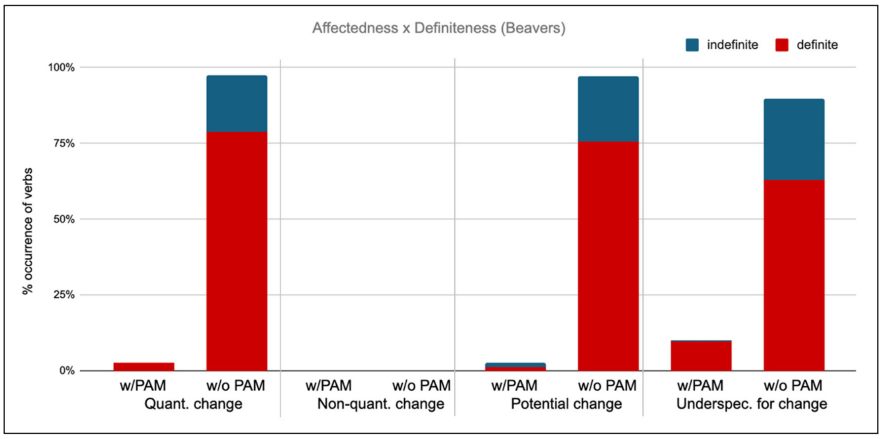

Figure 18: Definite vs. indefinite animate human objects occurring with and without PAM-marking across Beaver's (2011) levels of affectedness.

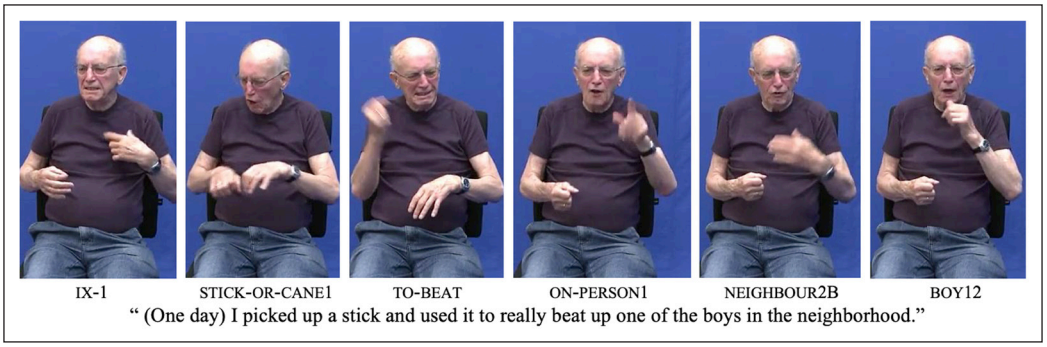

Figure 19: Example of an occurrence of PAM with an indefinite object with a Tsunoda class 1B verb (TO-BEAT) (dgskorpus_mst_11 | 61 + m). (The signs corresponding to the translation "one day" are not pictured; nor is a further representation of the verb TO-BEAT at the end, which contributes to the translation as "to really beat up".)

6 Discussion

In this paper, we have presented a corpus analysis of the use of PAM in DGS, testing claims made by Bross (2020) that PAM functions as a differential object marker, triggered by animacy, definiteness, and affectedness. We found that the use of PAM strongly favors both animate and definite objects, thus supporting marking of highly individuated objects. In addition, we found some evidence for a preferential use of PAM with verbs that have mentally and emotionally affected objects. This preference is in comparison to verbs with more highly affected objects. However, we found no obligatory marking of animate objects with verbs with mentally and emotionally affected objects, as suggested by Bross (2020). As such, we find little evidence that affectedness (as a verbal, semantic property) systematically influences object marking with PAM. Below, we expand on a discussion of our findings and relate them to an analysis of PAM as exhibiting differential object marking.[8] We also relate our findings and the behavior of PAM to the notion of prominence as a structuring principle of language.

6.1 Individuation

The findings presented in this study point to a close relationship between the animacy and definiteness of objects and PAM-marking, suggesting that object individuation affects the use of PAM. Referents with a high degree of individuation (i.e. animate and definite) occurred with PAM to a much greater extent than objects low in individuation. This result is consistent with previous descriptions of the use of PAM in DGS (Rathmann 2003; Pfau & Steinbach 2007; Murmann 2012; Macht 2016; Bross 2020). It is also consistent with descriptions of similar signs in other sign languages, notably Swedish Sign Language and other sign languages of Scandinavia (Börstell 2019) and ISL (Meir 2003). The findings are moreover in line with markedness or discriminatory approaches to DOM, where the grammatical marking (usually case-marking) of an object reflects its atypical and thus marked status as an object, i.e. an object exhibiting features typically associated with a subject (Aissen 2003; Comrie 1989). On this account, a prototypical subject is highly individuated (animate and definite) and moreover agentive, volitional, and in control, while a prototypical object is not this, and rather inanimate, indefinite and affected by the subject's action (Comrie 1989; Næss 2004). However, the DOM account is inconsistent with our finding that PAM marking also occurred – albeit to a small degree – with inanimate objects.

The use of PAM with inanimate objects was unexpected given previous accounts specifying its use with animate, mainly human arguments (see also Proske 2020, Steinbach 2022). However, results from Murmann (2012) on the acceptability of sentences with PAM with non-human animate and inanimate referents provides some indication that the use of PAM with inanimate

[8] We currently have no evidence that PAM may function as both an auxiliary and a differential object marker depending on it morphosyntactic behavior, as proposed by Steinbach (2022). We present an analysis of the behavior of PAM with respect to clause position and spatial modification (for subject and/or object arguments) in a separate paper.

objects is not impossible. Murmann (2012) asked participants to view sentences and to rate on a scale of 1–5 whether they could imagine that other signers (friends or acquaintances) might sign the sentence in this way. Non-human animate referents were tested on the assumption that human animate referents are known to be acceptable, and two types of inanimate referents were included: inanimate-personal and inanimate non-personal referents. Inanimate-personal objects were objects that were considered to be of particular interest to the subject and to exhibit a close relationship with the subject due to being of material and/or personal value. The category of inanimate-personal objects included things like a computer, a certificate, and a car, while inanimates of lower or no personal value included referents like a bottle, a box, and a candle. Assignment of objects to these two categories was based on the intuition of the author. The results of the study showed that participants accepted sentences with inanimate-personal objects marked with PAM as sentences they might see signed. In contrast, the use of PAM with non-personal inanimates was indicated as being much less, or not, acceptable. Similarly, in our analysis, we have seen instances of PAM production in the DGS corpus used to mark inanimate objects that have a close relationship to human referents in the sense of metonymically representing a group of people (e.g. the television representing the football players being watched on the screen) or being representative of the people at an institution (e.g. the people working at a bank or a school). This is different from the close personal or material relationship ascribed by Murmann (2012), but taken together the findings suggest that while the use of PAM shows a clear animacy bias, it is not fully restricted to animate objects (noted also by Macht 2016 with reference to a handful of counterexamples). Rather, the degree of connection between inanimate referents and humans may modulate the use and acceptability of PAM. Future research is needed to identify the precise nature of restrictions on the type and nature of inanimate objects that may be marked with PAM. The relationship between personal qualities of objects and marking with PAM is discussed again below with respect to the relationship between the signs PAM and PERSON (section 6.4).

The corpus analysis also showed a strong relationship between the use of PAM and definiteness. However, there were also occurrences of PAM-marking with indefinite referents, and more data and further analysis are needed to understand the influence of definiteness on the use of PAM. Our definition of definiteness was based primarily on familiarity and thus relied to a large extent on coreferentiality within the discourse. As such, definite object referents were mostly given (i.e. maintained from the previous utterance) and, for most occurrences of PAM, were not realized nominally. Marking of the object thus occurred only with PAM in most cases. Conversely, most cases of indefinite objects marked with PAM were newly introduced into the discourse and were realized nominally. We do not have a good explanation for this, but reference to the object with both PAM and a nominal may serve to highlight the object for pragmatic reasons, similarly to what has been suggested for agreement marker analyses of PAM (Steinbach & Pfau 2007 for DGS;

Krebs et al. 2020 for ÖGS, historically related to DGS, Abner et al. 2024, Power et al. 2020). In addition, we cannot exclude the possible influence from German for some uses of PAM. The example shown in **Figure 19** may indeed be such a case, as the German preposition "auf" may be used in the expression "auf jemanden einschlagen" (to beat somebody).

Overall, we can observe a relationship between the use of PAM and object individuation, since PAM is found predominantly with highly individuated objects. Taking into account the relative markedness of referents on the dimensions of animacy and definiteness (Aissen 2003), PAM shows a clear preference for occurrence at the higher – most marked for objects – end of the scale, i.e. occurrence with human, definite objects. There are some occurrences with human, indefinite (both specific and non-specific) objects and nearly no occurrence for inanimate, indefinite objects. As discussed above, the use of PAM with inanimate definites may be related to metonymic relationships with people or to personal qualities (see also Murmann 2012), and may explain the deviation in marking that would be expected from the hierarchy proposed by Aissen (2003). This also requires further research. In terms of a DOM analysis of PAM, the results suggest that the use of PAM with highly individuated or marked objects is not obligatory, however. Rather, its use seems to be optional, but with a clear tendency to be used the higher an object is on the scale of markedness.

6.2 Affectedness

The affectedness of the object – that is, the degree to which the object undergoes change due to the event – is a further parameter discussed in relation to the phenomenon of differential object marking. We have investigated it here as a verbal property, based on the semantics of verbs, relevant to DOM in conjunction with nominal properties of the object. Specifically, we tested claims made by Bross (2020) for the use of PAM in DGS. We found partial support for Bross (2020) in that PAM-marking of the object, across its instances of occurrence in the corpus (first analysis), was much more common with verbs in the mid-range of affectedness, specifically for verbs of Pursuit, Knowledge, and Feeling (Tsunoda 1985) – also called verbs with mentally and emotionally affected objects by Bross. The highest incidence of marking with PAM occurred with verbs categorized as Pursuit (Class 3) verbs, including *wait*, *search*, but also verbs like *thank*, *greet*, *advise*, *trust*, *accuse*, *insult* (alternatively classed as interaction verbs; Blume 1998, Malchukov 2005). This was followed by use of PAM with verbs of Feeling (Class 5), and then verbs of Knowledge (Class 4). However, as presented in the second analysis, the use of PAM with these verbs was far from obligatory; in fact, the majority of verbs in these classes occurred without PAM-marking of the object (over 80%).

We also did not find evidence in the data for Bross's (2020) claim that PAM serves as a definite marker in verbs high in object affectedness. The use of PAM with these verbs was very infrequent overall, with one instance (in the second analysis) of PAM-marking with an indefinite

object. It is possible that this is related to the low frequency of verbs with high affectedness in the corpus, in general, regardless of the nature and marking of their objects. We looked at a comparatively small number of verbs considered to be high in affectedness by Bross (2020); an even smaller subset of these fall into the category of high affectedness (quantized change) according to Beavers (2011) (see Table 1).

Overall, the analysis of corpus data presented here does not support Bross's (2020) claims regarding the influence of affectedness on object marking with PAM, nor claims regarding the interaction between affectedness and definiteness, specifically that the use of PAM marks definiteness in high affectedness verbs. Using Tsunoda's (1985) scale, the fact that the spike in the use of PAM is situated in the middle of the hierarchy is unexpected, and in itself points against a usage pattern determined by affectedness. Typologically, a differential object marking element is more likely to occur at the higher end of the affectedness scale, where verbs rank high in object affectedness. If marking occurs lower on the scale, then by hierarchical implication, it should occur also higher on the scale. (Bross 2020 does not offer an explanation for the typologically unexpected obligatory marking for verbs only in the middle of the scale.) However, as explained in section 2.3.1, Tsunoda's scale is a hierarchy developed to capture case-marking behavior across languages, a phenomenon not exhibited by DGS. Using a hierarchy more specifically targeting affectedness as the degree of change undergone by the patient (Beavers 2011), we see that the vast majority of verbs that appeared with PAM are low in affectedness (with objects unspecified for change and thus not affected). We may thus say that PAM is more likely to occur the less affected an object is by the verb's action. This is also in line with a markedness approach to DOM, where the grammatical marking with PAM reflects the atypicality (and thus marked status) of the object, i.e. as not being a typical patient affected by the agent's action.

6.3 Selectional constraints on verbs occurring with PAM: comparison with ISL

An affectedness account, with PAM marking for atypical unaffected patients, does not give a story that is fine-grained enough to capture the different nature of verb types that occur with PAM. It is interesting to compare our results for DGS with claims made by Meir (2003) for ISL. Recall that Meir also proposes restrictions on verbs classes for the use of the object-marking pronoun $\text{PRO}_{[bC]}$, identifying three categories of verbs: psych verbs (e.g. *worry*); negative effect verbs (e.g. *gossip about*); and content verbs (e.g. *tell*; effectively interaction verbs, Malchukov 2005). Meir also notes that the verbs taking $\text{PRO}_{[bC]}$ impose selectional restrictions not just on their objects, but also on their subjects. Both arguments must be human, and subjects are either non-agentive experiencers (with psych verbs) or volitional agents (with negative effect verbs, where the agent's intention is harm or negative impact, or content verbs).

Nearly 75% of PAM occurrences in our DGS data fit into Meir's (2003) classification. All of Meir's psych verbs fall into Tsunoda's classes 4 (Knowledge) and 5 (Feeling) and her verbs of negative effect and content verbs belong to class 3 (Pursuit).[9] This demonstrates a very similar semantic behavior between PAM and $\text{PRO}_{[bC]}$, especially when we also consider the object-related restrictions on PAM and $\text{PRO}_{[bC]}$ with respect to the nominal semantic parameter of animacy. Meir also notes considerable variability in the use of $\text{PRO}_{[bC]}$ with different verbs across her verb types. While a considerable proportion are indicated as taking $\text{PRO}_{[bC]}$ obligatorily, many are specified as occurring either with $\text{PRO}_{[bC]}$ or INDEX or as exhibiting inter-signer variability with respect to the use of $\text{PRO}_{[bC]}$. In the DGS data analyzed here, there seems to be no obligation to use PAM in any of the semantic contexts. However, further research is needed to understand both grammatical, individual, or regional variability.

It is striking that Meir's (2003) description of object-marking in ISL provides an account that captures object-marking with PAM in DGS so well. The potential relationship between the two forms has not been mentioned in previous literature. There is evidence, however, of a historical relationship between ISL and DGS (Meir & Sandler 2008). Based on a glottochronological comparison of signs from ISL and DGS, Meir & Sandler (2008) conclude that while ISL cannot be said to have developed from DGS, there is a clear impact of DGS on ISL, due to the fact that "most of the original leaders of the Israeli Deaf community either came from Germany or studied in Germany, and that the teachers at the first schools for the deaf also came from Germany" (Meir & Sandler 2008: 219). The vocabulary of ISL and DGS are thus clearly related, however, there has been no investigation of morphosyntactic similarities. The formal and functional similarities between $\text{PRO}_{[bC]}$ and PAM are considerable, however, and may indeed be due to the historical relationship between the two languages. Similar forms, with similar grammaticalization paths (from PERSON) and similar functions have also been described for other sign languages, e.g. for the sign languages of Scandinavia (Börstell 2019) and, notably, for ÖGS (Krebs et al. 2020, anaylzed as an agreement marker), which is also related to DGS. Further research is needed to understand the effects of convergent evolution vs. language contact in the existence and use of these forms (Börstell 2019). (Previous) analyses of these forms as agreement auxiliaries (Sapountzaki 2012) are motivated by the phonological properties of plain verbs, which cannot themselves move through space to indicate their arguments. Across sign languages, the iconic-metaphoric connection between mental processes with the (fore)head and emotions with the body means that psych verbs are likely to be plain verbs (see Oomen 2017 for a discussion of the influence of iconicity in psych verbs). This may be one factor, for example, driving convergent evolution across sign languages.

[9] See Malchukov (2005) for instructive commentary on the class of Pursuit verbs as involving verbs with an action directed at someone or something.

6.4 A prominence account of object-marking with PAM

The classes described by Meir (2003) for ISL thus seem fruitful for the description of the behavior of PAM in DGS. We use these insights to propose a theoretical path that relates the use of PAM to the concept of prominence. Recall that on a prominence account, the two event participants are both candidates to be the center of attention, generating competition for prominence between elements of equal status. We provide an overview of the semantic role properties and verb type/ class correspondences that characterize the occurrences of PAM in the present data set in Table 3.

Subject (semantic role)	**Object (semantic role)**	**Verb type (Meir)**	**Verb class (Tsunoda / Beavers)**	**Example of verb**	**% with PAM**
Experiencer	Stimulus (causer)	Psych verbs	Class 4, Knowledge & Class 5, Feeling / underspecified for change	*love*	38%
Agent (volitional)	Stimulus (causer)	Miscellaneous	Class 2B, Attained Perception & Class 3, Pursuit / underspecified for change	*listen; search*	9%
Agent (volitional)	Recipient	Content	Class 3, Pursuit / underspecified for change	*advise*	28%
Agent (volitional)	Patient	Negative effect	Class 3, Pursuit / underspecified for change	*insult*	10%
Agent (volitional)	Patient	na	Class 3, Pursuit / underspecified for change	*help*	3%
Agent (volitional)	Patient	na	Class 1A&B, (Non-) Resultative Effective Action / Quantized change, Potential for change	*kill; beat*	12%

Table 3: Overview of argument properties predominantly associated with the use of PAM.

Across all semantic role and verb type relationships, the object is predominantly highly individuated (human animate, definite, specific). On a markedness account, the individuation of the object makes it agent-like and brings it into (syntagmatic) competition with the subject. We can see that a large portion (47% in total) of objects marked with PAM function as a stimulus, causing or initiating the state that is brought about by the event. In the case of psych

verbs (38%), this state is brought about in the experiencer subject. That is, PAM is used in an experiencer-stimulus frame (Malchukov 2005), with the stimulus object causing a change in the mental/emotional state of a (non-volitional) experiencer subject (e.g. *love*, see **Figure 2a**). In a substantially smaller proportion of cases (9%), the stimulus object occurs in an agent-stimulus frame, with a volitional agentive subject whose action is in some way initiated by the object (e.g. *search for*). The attribute of causing (and thus in some sense controlling) the event is prototypically agentive (Dowty 1991). There is one interesting case of a psych verb, the verb glossed as sign type TROUBLE1^ in the corpus. The verb is special in allowing PAM-marking of the object both as the cause or stimulus of the event denoted by the verb (with the subject as the affected party) (**Figure 20a**, with the lexeme gloss ANNOYING1) and as the affected argument (**Figure 20b**, with the lexeme gloss EXHAUSTING1).

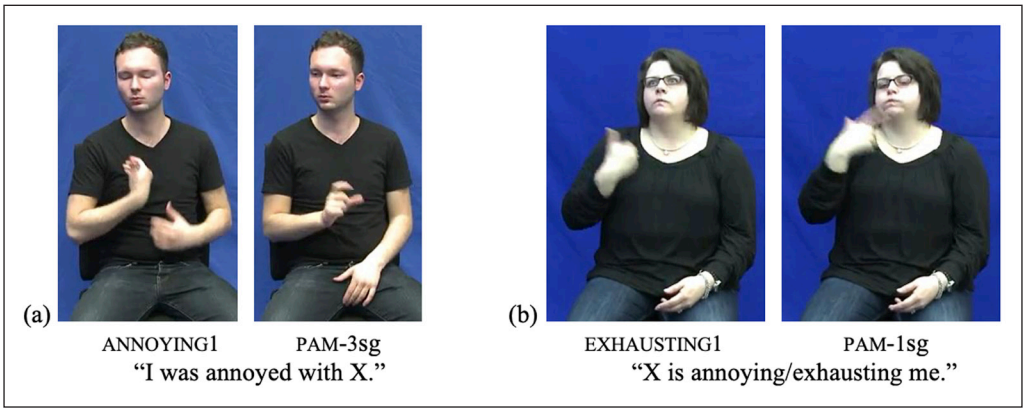

Figure 20: Example of the verb glossed as sign type TROUBLE1^ in the corpus exhibiting both PAM-marking patterns, in (a) with a non-agentive affected subject caused by a stimulus object (lexeme glossed as ANNOYING1) (dgscorpus_ber_01 | 18-30m) and in (b) with an affected object caused by an agentive subject (lexeme glossed as EXHAUSTING1) (dgscorpus_fra_06 | 31-45f). (Translations for these examples are our own.)

The next largest group of verbs with PAM corresponds to interactional or what Meir (2003) calls content, verbs (e.g. *recommend*), i.e. verbs that take a content theme object (28%). In these cases, it is the recipient object that is marked with PAM. These are thus ditransitive verbs where the competition for prominence lies not in the relationship between the subject and object, but between the direct (content) and indirect (recipient) object arguments. PAM marks the recipient as the typically more individuated and agent-like referent. The verb type that Meir (2003) calls negative effect is also represented in the DGS data (10%). Consistent with Meir's classification, these are verbs that have a non-physical negative impact on the object (e.g. *insult*). There is also a small group of verbs that have a non-physical positive (or neutral) effect (e.g. *help*) that we have classified separately in the table. Finally, though PAM is predominant with verbs that do not

impinge on their objects in the sense of affectedness, there are occurrences of PAM (12%) with verbs that are high in affectedness (verbs of effective action in Tsuonda's terms; verbs resulting in quantized change in Beavers' terms). Interestingly, the majority of this group (8%) can be characterized in terms of negative impact on the object (e.g. *beat*). If we combine verbs causing physical and non-physical negative impact, this increases the proportion of verbs of negative effect (in Meir's terms) to 18%. Like in ISL, there seems to be a connection in DGS between PAM and the subject argument's negative intent with respect to the action on the object. Meir (2003) describes the use of $\text{PRO}_{[bC]}$ in ISL as targeting the object argument's qualities as a person. In both languages, negative effect seems to favor attention centering of the object. This has some resemblance to the use of demonstratives to reflect a negative attitude of the speaker to the person referred to, as described e.g. for Scandinavian languages (Johannessen 2008) as well as for German (Patterson et al. 2022). Interestingly, Davis & Potts (2010) show that the affective use of demonstratives shows both a positive and negative bias, a pattern which may also be (at least weakly) reflected in DGS use of PAM.

Taken together, the properties that PAM-marked arguments exhibit in order to be treated as an attentional center can be summarized as: being highly individuated (animate, definite); being a stimulus/causer rather than a patient; not being (very) affected by the verbal action; and, in the case of affectedness, being negatively affected by the verbal action. There seems to be no obligation to use PAM in any of the semantic contexts analyzed here, which may reflect the dynamic nature of prominence relations in discourse. The individuation of the object is shared across all contexts, giving the object agent-like properties. Recall, however, from the results of the first analysis that not all objects are animate definite referents. Inanimate definite referents were most likely to occur with psych verbs in an experiencer-stimulus frame (e.g. love something, rather than someone) (10% of psych verb occurrences) and with content verbs (e.g. tell the insurance company something) (5% of content verb occurrences). Even with inanimate objects, the agent-like qualities of being a stimulus/causer and of being a recipient (rather than theme) may be strong enough to attract marking with PAM.

6.5 Animacy and the relationship between PAM and PERSON

The importance of animacy in determining object marking with PAM was discussed already above (section 6.1) in relation to individuation. It is worth highlighting the role of animacy specifically with respect to the relationship between PAM and PERSON. Assuming the grammaticalization of PAM from the sign PERSON (Pfau & Steinbach 2007), whose lexical meaning is clearly linked to animacy, it makes sense that animacy is the main factor correlated with the use of PAM. Meir (2003) notes for $\text{PRO}_{[bC]}$ in ISL, also assumed to have grammaticalized from a similar sign PERSON, that the object pronoun retains some of its original meaning. Specifically, Meir (2003) notes that $\text{PRO}_{[bC]}$ has retained the feature [+human] from its source

PERSON. This is evident, in particular, in the constraints on its use, i.e. its occurrence only with human objects and its restriction to verb classes whose object argument refers to qualities as a person.

We may see a similar effect in DGS. The grammaticalization of PAM from PERSON seems also to privilege the feature [+human], leading to a strong connection between PAM and animacy. As we have seen, the use of PAM does not seem to be fully restricted to human referents. There was some use of PAM with animate, non-human referents (animals), but more notably, also use of PAM with inanimate referents. When the use of PAM with inanimate referents is allowed, a strong connection to humans tends to be given, as discussed above. An expansion of the animacy feature, such that entities contextually related to human objects may be marked with PAM, may be unique to the grammaticalization of PAM from PERSON in DGS. However, exceptions may also be possible in ISL. Meir's (2003) analysis was not based on naturalistic data, so the full range of uses may not have been observed. Against the background of the historical relationship between ISL and DGS, with data collection not too far apart in time (Meir's data from roughly 2003; the DGS corpus data from 2010–2012), it is possible that $\text{PRO}_{[bC]}$ may also occur with inanimates with strong connections to humans. In general, the similarities between form and function here are interesting to consider.[10] The grammaticalization from PERSON to an agreement auxiliary or object marker is attested across a range of sign languages, independent of historical connections (Börstell 2019; Steinbach & Pfau 2007), and comparative investigation to understand similarities and differences in patterns of use is an important avenue for future research.

Finally, it bears mentioning that many of the forms that we excluded from analysis – i.e. that were annotated as ON-PERSON1 in the corpus, but identified by us as being PERSON instead – are probably not occurrences of the noun form PERSON (shown in **Figure 7**). Rather, there may be an additional form, which we may preliminarily gloss as PERSON_{dom}, also grammaticalized from the noun PERSON. If this is the case, DGS may exhibit an object-marking alternation depending on properties of the object. As described for the examples in **Figures 8** and **9**, the use of PERSON_{dom} seems determined by two main factors that hinge centrally on the relationship between the subject and object arguments: an assessment of the attributes of the object referent; a perception of distance to the object referent, due either to reverence (e.g. a famous and respected person) or uncertainty. It is interesting in this respect that Meir (2003) also stresses the relationship between the subject and object and notes an alternation between the use of INDEX and $\text{PRO}_{[bc]}$ as being modulated by the degree of familiarity between the arguments (as described in section 2.3.2).

[10] We thank an anonymous reviewer for this suggestion.

7 Conclusion

This paper has sought to describe the behavior of PAM in DGS and to investigate how its use may be related to the concept of linguistic prominence. Proceeding from recent previous analyses, we examined whether the use of PAM is linked to object individuation and affectedness. Through a corpus analysis of the use of PAM, we have provided some support for and some evidence against previous claims for PAM (in particular, by Bross 2020). Specifically, we have found evidence that the use of PAM exhibits strong animacy and definiteness effects. From the perspective of object markedness – taking animate, definite objects to be marked in comparison to more typical inanimate, indefinite objects – we may conclude that PAM indeed contributes to marking linguistic prominence. The use of PAM serves as a contextual addition of information that can serve to distinguish the object from the subject by highlighting (or marking) the object. We also found that PAM occurs predominantly with verbs low on the affectedness hierarchy, and that we can further identify selectional constraints that PAM imposes on verb classes and on subject and object arguments with respect to semantic roles and properties.

Based on the types of verbs that PAM occurs with, we can assume contexts with animate (human) experiencer or agentive volitional subjects with PAM marking an agent-like, animate definite object, highlighting the prominence of the object with respect to the subject. By highlighting the object and bringing active attention to it, PAM in DGS may be described as marking linguistic prominence.

The findings of the present study with respect to object-marking with PAM can be summarized as follows:

1. The use of PAM is not mandatory in DGS in any of the contexts analyzed;
2. The use of PAM is strongly linked to the individuation (animacy and definiteness) of the object, as less prototypical patients, but the use of PAM with inanimate and indefinite objects is not prohibited;
3. The use of PAM can confer prominence to the (individuated) recipient with (ditransitive) content verbs;
4. The use of PAM confers prominence to the agent-like stimulus objects of psych verbs with (non-volitional, non-agentive) experiencer subjects;
5. The use of PAM can confer prominence to human, agent-like stimulus objects also in contexts where subjects are volitional agents, given the prototypical agentive, event-initiating properties of the object;
6. Finally, the use of PAM seems to lend prominence to highly individuated objects that are impacted negatively by a volitional agentive subject, whether the impact is physical or non-physical.

Taken together, our findings suggest that an analysis of PAM as a differential object marker is on the right track. In terms of Himmelmann and Primus (2015), highly individuated objects draw active attention, making them more prominent than agents because they exhibit behavior very different from inanimate objects. The exact criteria for its use, and the precise nature of its interaction with prominence remain to be more closely determined. In addition, it is necessary to understand what other syntactic phenomena contribute to marking linguistic prominence in DGS and how these influence the use or not of PAM. It may be, for example, that PAM does not mark all human objects because there are other ways of additionally marking the object in DGS, including spatial modification of indicating verbs, different orders of constituents, and the use of constructed action. For example, similar to the passive construction, the order of constituents may serve to give prominence to the object, alternative to the use of PAM. The use of constructed action, whereby an animate referent is mapped onto the signer's body, may influence the use of PAM due to its very different nature of representation (anonymous, in preparation). Constructed action involves complex and non-linear predicates, while PAM is a grammatical sign that aligns more clearly with more linearly ordered predicates (Jantunen 2017). The modification of indicating verbs, finally, may also influence the realization of PAM, as both types of modification serve to spatially indicate, and thus highlight arguments, and both may be influenced by relations of prominence (Fenlon et al. 2018).

Appendix

List of complete links for examples from the DGS Public Corpus. The number at the end of the link corresponds to the timestamp of the video. For example, in the link for **Figure 1a**, “t00134820” indicates a timestamp (t) of 13:48:20 (13 min : 48 sec : 20 msec).

Figure 1a: https://www.sign-lang.uni-hamburg.de/meinedgs/html/1209495-10594836-11212321_en.html#t00134820

Figure 1b: https://www.sign-lang.uni-hamburg.de/meinedgs/html/1209495-10594836-11212321_en.html#t00134633

Figure 1c: https://www.sign-lang.uni-hamburg.de/meinedgs/html/1427158-11470746-12015917_en.html#t00110010

Figure 1d: https://www.sign-lang.uni-hamburg.de/meinedgs/html/1250721_de.html#t00012107

Figure 2a: https://www.sign-lang.uni-hamburg.de/meinedgs/html/1419265_en.html#t00050135

Figure 2b: https://www.sign-lang.uni-hamburg.de/meinedgs/html/1212176_en.html#t00100022

Figure 4: https://www.sign-lang.uni-hamburg.de/meinedgs/html/1413485_en.html#t00011802

Figure 6: https://www.sign-lang.uni-hamburg.de/meinedgs/html/1419265_en.html#t00050211

Figure 7: https://www.sign-lang.uni-hamburg.de/meinedgs/html/1413485_en.html#t00012537

Figure 8: https://www.sign-lang.uni-hamburg.de/meinedgs/html/1292086_en.html#t00022443

Figure 9: https://www.sign-lang.uni-hamburg.de/meinedgs/html/1246772_en.html#t00000722

Figure 11a: https://www.sign-lang.uni-hamburg.de/meinedgs/html/1429781-13002707-13070302_en.html#t00045705

Figure 11b: https://www.sign-lang.uni-hamburg.de/meinedgs/html/1419265_en.html#t00050142

Figure 11c: https://www.sign-lang.uni-hamburg.de/meinedgs/html/1181397_en.html#t00010207

Figure 12: https://www.sign-lang.uni-hamburg.de/meinedgs/html/1427158-11470746-12015917_en.html#t00110010

Figure 16: https://www.sign-lang.uni-hamburg.de/meinedgs/html/1181397_en.html#t00010142

Figure 19: https://www.sign-lang.uni-hamburg.de/meinedgs/html/1291636_en.html#t00002138

Figure 20a: https://www.sign-lang.uni-hamburg.de/meinedgs/html/1413451-11105600-11163240_en.html#t00023116

Figure 20b: https://www.sign-lang.uni-hamburg.de/meinedgs/html/1212416_en.html#t00002205

Abbreviations

BSL = British Sign Language, DSL = Danish Sign Language, DGS = German Sign Language, FinSL = Finnish Sign Language, FinSSL = Finland-Swedish Sign Language, ISL = Israeli Sign

Language, LSE = Lengua de Signos Española (Spanish Sign Language), ÖGS = Österreichische Gebärdensprache (Austrian Sign Language), SSL = Swedish Sign Language.

Glosses conventions

GLOSS	glosses for signs given in capital letters
GLOSS#GLOSS	compound sign indicated by # between the two elements of the compound
1sg / 2sg / 3sg	first / second / third person singular reference
GLOSS3a	subscript indicates location associated with third person referent at location a
IX or INDEX	index, i.e. pointing sign, with pronominal meaning
PAM	acronym stemming from Person Agreement Marker

Metadata conventions

ber	Berlin
fra	Frankfurt
goe	Göttingen
koe	Cologne (Köln)
mst	Münster
nue	Nuremberg (Nürnberg)
stu	Stuttgart
m	male
f	female
18–30	age group for signers aged 18–30 years old
31–45	age group for signers aged 31–45 years old
46–60	age group for signers aged 45–60 years old
61 +	age group for signers aged over 61 years old

Ethics and consent

The study obtained ethical consent from the University of Cologne, Germany (ref: PPHF00065). Analyses are based entirely on data from the DGS Public Corpus, which was collected with the informed consent of the participants and in compliance with the appropriate ethical guidelines.

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Competing interests

The authors have no competing interests to declare.

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Research Article

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Interaction of the differential object marker PAM with other prominence hierarchies in syntax in German Sign Language (DGS)

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Abstract: There has been growing debate about the special status of object marking in sign languages. In this article, we contribute evidence for the existence of a differential object marker in DGS (German Sign Language). Based on data from the Public DGS Corpus, we investigate the behavior of this sign, glossed as PAM, in different morphosyntactic environments to understand its interaction with different morphosyntactic phenomena involved in marking argument structure. We focus on constituent order, verb modification, and argument realization as phenomena sensitive to relations of prominence among arguments. Although the accumulation of different markers of prominence, e.g., argument marking with PAM and through verb modification, may occur, we argue that PAM occurs primarily when other markers of object prominence – in particular, changes in constituent order and verb modification – do not occur, and see the main motivation for the use of PAM in the prominence-lending semantic properties in the nominal and verbal domains. In addition, based on our analyses, we argue against the existence of two related PAM signs, with distinct agreement marking and differential object-marking function. We also argue against an analysis of PAM as a preposition-like element. Instead, we propose an analysis of PAM in terms of differential argument indexing, sensitive to semantic and pragmatic features of both subject and object arguments.

Keywords: German Sign Language (DGS), differential object marking, prominence, constituent order, argument realization, verb modification, agreement

1 Introduction

The meaningful use of space is one of the defining modality-specific features of the grammatical organization of sign languages. A central debate has revolved around the nature of spatial modification to indicate argument roles, as happens, for example, in verbs that are specified for path movement. The debate centers around the nature of the linguistic phenomenon, whether it is agreement, cliticization, or a hybrid gestural form (Lillo-Martin and Meier 2011, Nevins 2011, Pfau et al. 2018, Schembri et al. 2018). In addition, many sign languages have signs that commonly appear with verbs not specified for path movement. These signs have been analyzed as agreement auxiliaries, on the assumption that they agree with (or indicate) arguments through spatial modification when the verb cannot (Sapountzaki 2012). For German Sign Language (DGS), recent discussion has centered around the nature of the sign

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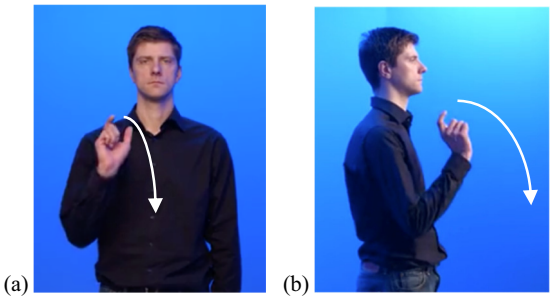

Figure 1: Example of the sign PAM from the Public DGS Corpus, front view in (a) and side view in (b) (doi: 10.25592/dgs.corpus-3.0-type-15599).

glossed as PAM (Figure 1), specifically its status as an agreement auxiliary/marker or differential object marker (Bross 2020, Steinbach 2022, de Souza Santos et al. 2025; see also Börstell 2019).

Bross (2020) and de Souza Santos et al. (2025) argue for an analysis of PAM as a differential object marker, based on semantic properties of animacy, definiteness, and object affectedness – albeit with substantially different conclusions regarding the role of these properties, as explained in more detail in the following. Steinbach (2022) argues for the existence of two versions of PAM, with differing syntactic distribution: a postverbal agreement marker, glossed as $_{x}$PAM$_{y}$, and a preverbal differential object marker, glossed as PAM$_{x}$. In this article, we contribute to this debate by investigating the behavior of PAM in different morphosyntactic environments. We provide additional arguments for an analysis of PAM as a differential object marker, based on the interaction of PAM with different syntactic phenomena involved in marking argument structure. In particular, we focus on constituent order, verb modification, and argument realization.

This article is structured as follows. We provide the theoretical background in Section 2, starting with a description of the different morphosyntactic phenomena we consider relevant to understanding the behavior of PAM and important to informing an analysis of PAM, including an overview of the current state of the debate on the analysis of PAM in DGS. We link these phenomena to prominence effects, assuming prominence to motivate the realization of argument structure, in general, and highlighting the role of prominence for a differential object-marking account of PAM. We present our specific research questions in Section 3 and outline our methodology in Section 4. The results of our analysis are presented in Section 5. We lay out our arguments in support of a differential object-marking analysis of PAM in Section 6 and conclude the article in Section 7.

2 Theoretical framework

2.1 Sign order

Sign languages described to date have been shown to exhibit primarily subject-verb-object (SVO) or subject-object-verb (SOV) constituent orders. Some languages have been described as having either SVO or SOV basic underlying order (see Leeson and Saeed 2012 for a review); however, it has been suggested that most sign languages are characterized by both SVO and SOV (Napoli and Sutton-Spence 2014; Napoli et al. 2017). Based on a literature review of constituent order data from more than 40 sign languages, Napoli and Sutton-Spence (2014) argue that constituent order is determined to a large extent by modality-specific phonological considerations, in particular, that O will precede V if it affects the form of the verb. For example, the handshape and position of the hands differ in *carrying a box* compared to *carrying a suitcase*, corresponding to their different semantics. The argument also applies to verbs that move through space to indicate arguments: the relevant arguments should already be introduced if the addressee is to make sense of the path of movement of the predicate (i.e., to identify the arguments associated with the beginning and end locations of the verb).

Pressures that have to do with avoiding potential ambiguity of grammatical roles, i.e., pressures that are not modality-specific, are also noted by Napoli and Sutton-Spence (2014), notably that SVO is favored in reversible sentences (see also Hall et al. 2013, Schouwstra et al. 2022 for similar evidence from silent gesture). In addition, Napoli et al. (2017) argue that event type affects constituent order, showing for Libras (Brazilian Sign Language) that verbs with extensional objects (i.e., objects that exist; *eat an apple*) are preferably realized with SOV constituent order, while verbs with intensional objects (i.e., objects that are presupposed (not) to exist; *want an apple*) are more likely to be realized with SVO order. They also note the relationship between constituent order and definiteness cross-linguistically (Tomlin 1986) and point out the more likely combination of extensional verbs with definite objects and intensional verbs with indefinite objects, respectively, and that more research is needed to understand the relationship between event type, constituent order, and definiteness.

For DGS, the basic sign order is generally assumed to be SOV (Happ and Vorköper 2006, Steinbach and Herrmann 2013, Oomen 2021, Steinbach 2022). However, based on an analysis of DGS corpus data, Oomen (2021) finds that constituent order is influenced by verb type, which is consistent with observations by Napoli and Sutton-Spence (2014). Specifically, Oomen (2021) finds that body-anchored plain verbs favor SVO constituent order, while agreement (or indicating) verbs (i.e., verbs that move between locations in space) as well as neutral plain verbs (i.e., verbs without movement, but produced in the space in front of the signer's body) favor SOV constituent order. Oomen (2021), nevertheless, assumes that SOV is the basic constituent order in DGS, based on the possibility of being able to syntactically derive SVO order from an underlying SOV order and assumptions in the previous literature (see also Bross and Hole 2017, Bross 2018, Pfau et al. 2018). In the present study, we aim to shed light on the different constituent orders found in naturalistic data by bringing in the notion of prominence and the interaction with other phenomena, in particular, verb type, spatial modification behavior, and the use of PAM.

Both of the dominant constituent orders share a subject-first position. The preference for a subject-first order reflects a more general agent-first principle (e.g., Primus 2001) and can be further described in terms of a prominence-based approach to constituent order and its alternations. The prototypical agent is human and the initiator of events. As such, the agent is an inherently prominent element, grounded in both cognitive and evolutionary explanations (Himmelmann and Primus 2015). The prominence of the agent is reflected cross-linguistically by being placed in first position in clauses. In the association between agents, subjects, and humans as the best candidates for the first syntactic position, there is some potential circularity: the subject is inherently prominent because it occupies the first position, and the first syntactic position is inherently prominent because it is occupied by the subject. It is the prominence of the agent that is at the root here: the agent is understood cognitively as the most important element of the event, as the initiator and causer of the event, with volition, control, and autonomous movement.

Building on these assumptions, linguistic contexts can be imagined where these three elements (agent, human, and subject) come into opposition, essentially resulting in argument competition in syntax (Himmelmann and Primus 2015). Argument competition occurs when two or more arguments compete for prominence, i.e., compete to be the center of linguistic (and cognitive) attention. On the one hand, there are inherently prominent elements (associated with the agent), as mentioned earlier. However, prominence can be attributed to other elements, attracting attention, in certain linguistic contexts. An example of this are passive constructions, where the agent is demoted to the object position while the (initial) subject position is occupied by the patient. Here, a clear competition between arguments is evident, with the agent, being inherently prominent, losing syntactic prominence to the patient, which in turn occupies the subject position, and in most cases, the first position in the sentence. It is worth noting that the notion of subject and object is not clear on independent grounds for the most part in the syntax of sign languages. An investigation of grammatical categories based on consistent syntactic behavior has been carried out for only a few sign languages (e.g., Jantunen 2008 for Finnish Sign Language [FinSL]; Johnston 2019 for Australian Sign Language [Auslan]). In both of these studies, there was little evidence of strict grammatical structures or morphosyntactic markers that would allow the attribution of argument status as subject and object, independent of semantic roles and constituent order. Based on the association between agent and subject as reflecting prominence in semantic and syntactic terms, we assume that arguments in first position are more prominent than arguments in non-first position and that agents are typically subjects.

2.2 Verb modification

Although the analyses vary, from agreement to cliticization to hybrid gestural accounts (Pfau et al. 2018), there is consensus that verbs can be spatially modified in different ways, through changes in palm orientation and/or direction of movement of the hand(s), to reflect their arguments. There are different accounts of how arguments may be realized or identified, including association of the location of the hands with locations associated with referents (Lillo-Martin and Meier 2011); the use of eye gaze directed at referents, in particular, the object referent (Neidle 2000); and the use of the body to represent referents, in particular, the subject referent (Meir et al. 2007). Verbs that have been called agreement or indicating verbs in the literature (Pfau et al. 2018) undergo spatial modification, i.e., movement in space, in relation to both the subject and the object referents. For DGS, the modification of verbs that move through space for argument marking has been analyzed as being obligatory (Oomen 2021, Steinbach 2022). Note, however, that this is based on corpus analysis findings by Oomen (2021) that roughly 93% of spatially modifiable verbs are "at least congruent" (p. 227) with their subject and object arguments, where congruent means that locations in space coincide with the citation form production of the verb forms. For British Sign Language (BSL), in contrast, verb modification has not been found to be obligatory and has been described as depending on semantic factors, such as animacy (Fenlon et al. 2018). With respect to the spatial modification of verbs to indicate the patient/object argument, in particular, Fenlon et al. (2018) found that verbs are modified more frequently when the patient is human than when the patient is inanimate. The BSL data also contain proportions of verbs that are clearly modified or congruent with citation form production, but as Oomen (2021) notes, the proportion of clearly unmodified tokens is higher in the BSL data (roughly 30%) reported by Fenlon et al. (2018). Interestingly, Pfau et al. (2018) note a lack of investigation of the nature of argument marking for DGS, but assume similar factors motivating analyses of optional marking (as for BSL; also for Australian Sign Language by De Beuzeville et al. 2009) to hold for DGS, as well.

From the perspective of prominence, the modification of the verb to indicate the patient can be seen as providing additional information that generates active attention to the patient (Himmelmann and Primus 2015). On an assumption of optional marking, as in BSL, modification is additional morphosyntactic marking that happens only in certain contexts. For BSL, these contexts are conditioned by features traditionally relevant to prominence, namely, the animacy of referents. The behavior of the verb is thus influenced by the animacy of the object, reflecting prominence-lending features of the object. Based on these findings, we assume that the spatial modification of verbs to indicate arguments is a prominence-marking device. In particular, the spatial modification of verbs to indicate the object can be interpreted as attributing prominence to the object.

2.3 Omission of arguments

Many sign languages have been described as allowing argument omission, akin to pro-drop languages (Lillo-Martin 1991, Glück and Pfau 1998, McKee et al. 2011, Jantunen 2008, Johnston 2019, Oomen 2021). This phenomenon is related to a large extent to verb types. On the one hand, agreement (or indicating) verbs are said to license argument omission (e.g., Lillo-Martin 1991). Similarly, due to an association of the body with the subject (Meir et al. 2007), body-anchored plain verbs have been described as licensing omission of subjects (Oomen 2017, Oomen and Kimmelman 2019). Specifically, Oomen (2017) shows that body-anchored psych verbs in Sign Language of the Netherlands (NGT) allow null subjects only for first-person subjects, but not for non-first-person arguments, due to the iconically motivated association between first person and the body of signer. The same pattern is found by Oomen and Kimmelman (2019) for all types of body-anchored verbs in DGS and Russian Sign Language, with the same iconicity-based (body as first person) explanation. Other plain verbs, on the other hand (i.e., neutral plain verbs, which do not move through space, but which can agree with (or indicate) an argument through placement in space), allow all types of null subjects. On this account, we can infer that a non-overt first person as subject is easy to recover, but that the same may not be true for (non-overt) objects. Proske (2022) shows that body-anchored transitive verbs rarely omit the object. She refers to Oomen (2021) to explain that in body-anchored verbs, the body-as-subject phenomenon is particularly strong

(Meir et al. 2007). With the subject mapped onto the signer's body, the object tends to be realized overtly to saturate the sentence. The possibility of subject omission arises from the understanding that the signer's body can be interpreted as the realized subject (Meir et al. 2007). In the same vein, subjects that are not first person tend to be marked morphologically, to preclude the interpretation that the signer is first person.

In terms of prominence, it is possible to consider how the overtness of an argument can give it more or less prominence. From a discourse perspective, given and definite referents are more prominent than new and indefinite referents. Argument drop is thus also linked to how a referent can be recovered in discourse. The higher the discursive prominence of a referent, the greater the possibility of its omission (e.g., Ariel 1990). On a prominence account, prominent elements license linguistic operations (Himmelmann and Primus 2015). A prominent referent based on discourse cues may be zero-marked (and non-overt arguments may be higher in prominence than overt arguments), while a prominent element based on semantic cues (e.g., animacy) may receive special morphosyntactic marking (and a referent with marking may be more prominent than a referent without marking, as with differential object marking). There is no one-to-one correspondence between the prominence of referents and the linguistic expression or operation that marks the prominence.

2.4 Analysis of PAM in DGS

The original analysis of the sign glossed as PAM in DGS as an agreement auxiliary is reflected in its name: PAM stands for Person Agreement Marker (Rathmann 2000) and denotes a sign that functions as a subject–object agreement auxiliary (Steinbach and Pfau 2007), or simply agreement auxiliary, in contexts where the verb cannot move through space to indicate its arguments. In a new analysis, based on acceptability judgments and sentence translations from German, Bross (2020) suggests that PAM is not an agreement auxiliary, but rather a preposition-like element that is used as a differential object marker and related to animacy, definiteness, and affectedness. He finds that PAM is used obligatorily with emotionally/mentally affected animate objects and that PAM forces a definite reading of the object when used with verbs of (effective) action and perception (verbs high on Tsunoda's (1985) affectedness hierarchy). Syntactically, Bross (2020) assumes that two usage patterns associated with PAM exist, a clause-internal pattern (i.e., either S-PAM-O-V or S-V-PAM-O) and a clause-final pattern (i.e., S-O-V-PAM). Furthermore, he notes a preference for clause-internal patterns by the signers consulted for the study. Bross (2020) leaves open the possibility that PAM may function as an auxiliary in some dialects of DGS, stressing the applicability of his analysis to what he calls Southern DGS. Although not focusing specifically on the use of PAM, Proske (2022) and Oomen (2021) find support for Bross' (2020) differential object marking account for the use of PAM on the grounds of animacy restrictions (see also Murmann 2012, Macht 2016, de Souza Santos et al. 2025). In addition, Proske (2022) finds that the use of PAM in preverbal position (a clause-internal pattern) shows spatial modification only for the object argument, which is consistent with a differential object-marking analysis.

Based on a review of previous literature on the behavior of PAM, Steinbach (2022) concludes that two versions of PAM exist. The first is an agreement marker, glossed by Steinbach (2022) as $_{x}$PAM$_{y}$, and the second is a differential object marker, glossed as PAM$_{x}$. Steinbach (2022) distinguishes their use based on different syntactic behavior (and structure): the agreement marker occurs postverbally and agrees with (or indicates) both the subject and object arguments (through spatial modification), while the differential object marker occurs preverbally and marks only the object argument. Steinbach (2022) notes that an animacy constraint applies to the use of both forms, given that both forms are assumed to be grammaticalized from the nominal sign PERSON. On Steinbach's (2022) derivation, the postverbal position of $_{x}$PAM$_{y}$ allows agreement with (modification for) subject and object arguments in the same way as agreement (indicating) verbs. In contrast, preverbal PAM$_{x}$ only marks the object and is DP-internal or PP-internal (thus remaining neutral on the word class of PAM$_{x}$). Steinbach (2022) notes that the different structures associated with $_{x}$PAM$_{y}$ and PAM$_{x}$ are compatible with the co-occurrence of agreement (indicating) verbs inflected for subject and object arguments. On the original account of PAM as an agreement auxiliary, this behavior is unexpected, as the auxiliary was assumed to be used to mark arguments when the verb could not. However, a 'doubling up' of argument marking – using both spatially modifiable verbs and PAM – has been previously noted in the literature (Rathmann 2003, Steinbach and Pfau

2007, Bross 2020, Proske 2022). In fact, Proske (2022) found PAM used more frequently with indicating verbs than with plain verbs (that do not move through space). However, Proske (2022) found PAM to be used primarily preverbally, which would suggest PAM_x (the differential object marker) and not $_x\text{PAM}_y$ (the agreement marker) in Steinbach's (2022) terms.

Overall, the verbs that occurred with PAM in Proske (2022) – using a sentence repetition task, in which spontaneous instances of PAM insertion were observed – are consistent with findings by Bross (2020) and de Souza Santos et al. (2025) supporting a differential object-marking analysis. Both Bross (2020) and de Souza Santos et al. (2025) discuss evidence for the use of PAM being related to object affectedness, albeit in substantially different ways. Bross (2020), as mentioned previously, relates the use of PAM to affectedness based on Tsunoda's (1985) verb hierarchy. Specifically, he claims that the verb classes of Pursuit, Knowledge, and Feeling (alternatively: verbs with mentally/emotionally affected objects) occur obligatorily with PAM, while verbs higher in object affectedness result in a definite reading of the object when occurring with PAM – i.e., PAM marks highly affected definite objects. De Souza Santos et al. (2025) also observe the strong connection between animacy and definiteness traits: PAM is predominantly associated with human and definite, i.e., highly individuated (Aissen 2003), objects, but with little evidence of affectedness playing a systematic role. Instead, they argue that the degree to which the object argument exhibits semantic properties prototypically attributed to the agent is important. In particular, their corpus analysis of PAM reveals three main contexts in which PAM is used: (i) verbs with stimulus objects (Malchukov 2005) causing a change in the mental/emotional state of an experiencer subject (e.g., *love*); (ii) interactional content verbs where PAM marks the recipient (indirect object) of information (e.g., *recommend*); and (iii) verbs with non-prototypical, animate, agent-like patients (e.g., *help*). De Souza Santos et al. (2025) suggest that the use of PAM is related to the linguistic prominence of the object. Under this view, the use of PAM as a differential object marker is interpreted as an element that assigns syntactic prominence to the verb's object, particularly in the case of highly individuated objects (animate and definite). PAM is thus a marker associated with arguments with more prominent characteristics, such as individuation and initiation, which, according to Himmelmann and Primus (2015), are characteristics of the agent, which is inherently prominent, drawing passive attention. Therefore, when the patient, in certain cases, has some of the agent's characteristics, it becomes more prominent than the agent, attracting active attention.

3 Present study

In the present study, we aim at extending our understanding of the use of PAM by investigating its interaction with other means of marking argument roles and structure as outlined in the previous section. In doing so, we also aim at a more comprehensive understanding of prominence relations: assuming a relationship of PAM with semantically prominent elements, it is necessary to explore the notion of prominence in syntax. We ask whether it is possible to understand the interaction of the use of PAM with sign order, verb modification, and argument omission on a prominence-based account, assuming these other mechanisms to themselves be sensitive to prominence relations. Regarding constituent order, we assume that the (linearly) first syntactic position is more prominent than non-first position. In terms of verb modification, we assume that modified is more prominent than non-modified (Fenlon et al. 2018). For argument realization, following assumptions about accessibility hierarchies, we assume that non-overt arguments are more prominent than overt arguments. For PAM itself, we assume that marking with PAM is more prominent than no marking with PAM. Our overall objective is to investigate the interaction of different syntactic factors in sentences with PAM in DGS, focusing on the behavior of constituents, verbs, and arguments in sentences with PAM. In addition, we seek further evidence for or against the existence of two related, but separate forms, i.e., an agreement marker and a differential object marker (Steinbach 2022), and discuss the syntactic function of PAM as a preposition-like (Bross 2020) or other type of element.

We hypothesize that PAM is a differential object marker whose main syntactic function is to mark the object. We further hypothesize that PAM marking of prominent objects (i.e., highly individuated and event-initiating objects; de Souza Santos et al. 2025) is a sufficient marker of prominence, in the sense that it does not depend on an accumulation of prominence marking along other dimensions (i.e., sign order, verb modification, or argument realization).

4 Methodology

4.1 Data: Public DGS corpus

Our analysis is based on naturalistic data available in the Public DGS Corpus (Konrad et al. 2020). The public corpus consists of 50 hours of video recordings, comprising data collected from pairs of signers engaged in free-form dialogues on various topics from across Germany (Berlin, Brandenburg, Bremen, Hamburg, Hesse, Lower Saxony, Mecklenburg-Vorpommern, North Rhine-Westphalia, Rhineland-Palatinate, Saarland, Saxony, Saxony-Anhalt, and Schleswig-Holstein) and balanced across four age groups (18–30 years; 31–45 years; 46–60 years; and 61 and above) (Schulder et al. 2024). All data were collected in a recording studio with a blue background, using three cameras positioned to the side of and in front of the interlocutors. The corpus is composed of a range of textual genres, including narratives and free conversations about topics such as experiences of being deaf or discussions about well-known individuals. All videos from the public corpus are available for download, accompanied by ELAN files containing data annotations. These annotations include glosses of the signs in English and German, separately for the right hand and left hand for each of the signers in the dyad, as well as translations (roughly on an utterance level) into English and German.

4.2 Data selection for the analysis

Data analyses were carried out through comprehensive searches in ELAN (version 6.6 2023) and the corpus website. For the initial analysis, all the ELAN files in the corpus were downloaded, and a structured multiple search was performed within the software to identify instances of PAM (which is glossed in the corpus as ON-PERSON1), yielding 669 occurrences in the corpus. All occurrences were checked by members of the research team, including two native DGS signers. This resulted in the identification of erroneous glossing of ON-PERSON1 in the corpus, based primarily on native signer intuition. These signs were reclassified as being (a version of the sign) PERSON, pronominal pointing signs (INDEX), or other phonologically similar, but unrelated signs (e.g., the verb SAY) (n = 233; see de Souza Santos et al. 2025). The erroneous glossing can be attributed to similar formational properties between these different sign types, with coarticulation effects obscuring phonetic distinctions, and a need for additional research, as in the case of PERSON.[1] Going the other way, and for similar reasons of phonological similarity, we identified (mainly by chance) additional occurrences of PAM that were annotated as other signs (e.g., INDEX) in the corpus (n = 14). A total of 450 occurrences of PAM were included in the final analysis.

4.3 Data coding

4.3.1 Sign order

We coded the order of constituents in all clauses in which PAM occurred, taking into account the position of the verb, its core arguments, and PAM. We did not annotate temporal or locative adverbials or additional adjuncts. In contexts where PAM appeared connected to a subordinate clause, we considered only the subordinate clause. We coded arguments of clauses with two core arguments as A1 and A2, coding the argument associated with the final location of PAM as A2 and the other argument as A1. In clauses with three core arguments, the other non-PAM-marked object argument was coded as A3. Complement clauses of verbs of saying and telling were also coded as A3. We have noted earlier (in Section 2.1) the difficulty of attributing grammatical relations and do not assume stable mappings between grammatical relations and semantic roles. Given the default assumption of subject-first constituent order for DGS and the association with PAM with the object, we assigned A1 and A2

1 The analysis of the sign reclassified as PERSON is ongoing. We assume this to be a second object-marking sign, grammaticalized (like PAM), but different from the nominal sign PERSON. Steinbach (2022) describes the existence, but not use, of an indexical sign glossed as PERSON_x. Whether the signs identified as being PERSON in the corpus correspond to PERSON_x also remains to be determined.

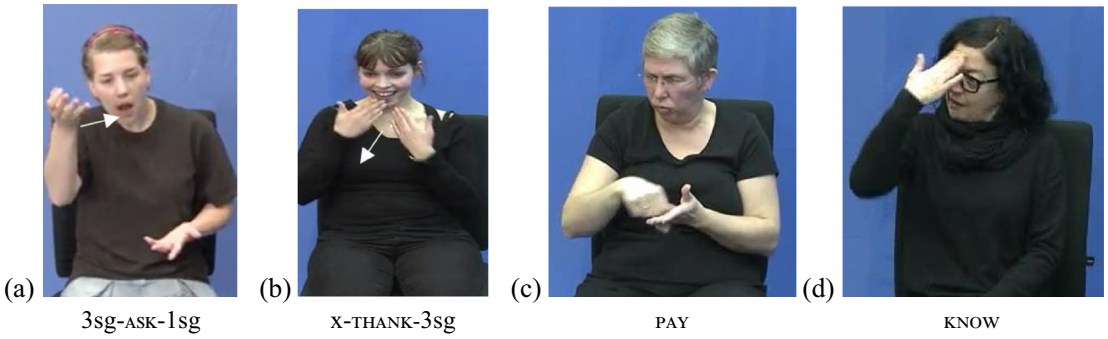

Figure 2: Example of DGS verbs coded as (a) BOTH: verbs that can move to indicate both subject and object arguments, as with ASK (dgscorpus_nue_08 | 18-30f); (b) AWAY: verbs that move from a fixed initial location on the body to indicate (non-first) object arguments, as with THANK (dgscorpus_koe_01 | 18-30f); (c) NEUTRAL-PLAIN: verbs produced in neutral space that can be modified to agree with one argument, as with BREAK (dgscorpus_koe_02 | 46-60f); and (d) BODY-PLAIN: verbs that cannot be moved through or localized in space, as with LOVE (dgscorpus_koe_16 | 46-60f).[4]

codes, respectively, for these arguments. In terms of semantic roles, A1 was typically the agent or experiencer of the verb, and A2 was the patient or recipient.[2] In cases where A1 or A2 was repeated, we annotated only the first realization of the argument. After annotating all possible orders with combinations of A1, A2, A3, V, and PAM, we coded whether A1 occurred first or non-first, whether PAM appeared preverbally or postverbally, and whether PAM was adjacent or not to the verb. We also coded for clause-internal and clause-final patterns of the use of PAM as defined by Bross (2020).[3]

4.3.2 Verb type and modification

We first coded all verbs occurring in clauses with PAM based on their ability to move through space to indicate arguments. Verbs that can move to indicate both subject and object arguments were coded as BOTH (e.g., the DGS signs ASK, GIVE; Figure 2a). Verbs that have a fixed initial location on the body and can be spatially modified only to indicate (non-first) object arguments were coded as AWAY (e.g., the DGS signs THANK, SAY; Figure 2b). Verbs that are executed in neutral space, but whose location can be modified to agree with one argument, either the subject or the object, were coded as NEUTRAL-PLAIN (e.g., the DGS signs PAY, BREAK; Figure 2c). Body-anchored verbs that cannot be moved through or localized in space were coded as BODY-PLAIN (e.g., the DGS sign KNOW, LOVE; Figure 2d). Clauses with non-lexical, constructed action or predicates from the productive lexicon, including classifier predicates (Brentari and Padden 2001), were coded as PRODUCTIVE (Figure 3a), while single-sign predicates that represent quoted content were coded as QUOTATION (Figure 3b). Finally, we coded as NO-VERB clauses that did not have an explicit verb sign associated with PAM (Figure 3c). This includes

2 De Souza Santos et al. (2025) provide an example of an experiencer-object construction in DGS, with the verb glossed as EXHAUSTING1 (Public DGS Corpus) (see Frederiksen and Mayberry 2021 for a description of experiencer-object constructions in ASL).
3 Bross (2020) notes that PAM was used in his data in both clause-internal (i.e., A1-PAM-A2-V or A1-V-PAM-A2) and clause-final (i.e., A1-A2-V-PAM) patterns. Citing a marked preference for the use of clause-internal patterns, he points to the fact that claims regarding the function of PAM as an agreement marker have been made primarily for a clause-final pattern and leaves open the possibility of dialectal variation concerning the status as an agreement marker vs a differential object marker. Steinbach (2022), in contrast, makes a distinction between preverbal PAM_x (differential object marker) and postverbal ${}_xPAM_y$ (agreement marker). This distinction between preverbal and postverbal does not, however, neatly map on to the distinction between clause-internal and clause-final patterns, as clause-internal PAM may appear postverbally (as shown in the A1-V-PAM-A2 order). Steinbach's (2022) discussion of Bross's (2020), in fact, seems to equate clause-internal with preverbal PAM, overlooking the postverbal clause-internal pattern that Bross describes.
4 All DGS examples in the manuscript are extracted from the Public DGS Corpus (Konrad et al. 2020). Examples are accompanied by a label in the form 'dgscorpus_[city]_[dyad] | [age group][gender]' that links directly to the corpus. For some examples, for purposes of illustration, glosses used in the manuscript deviate from glosses used in the corpus.

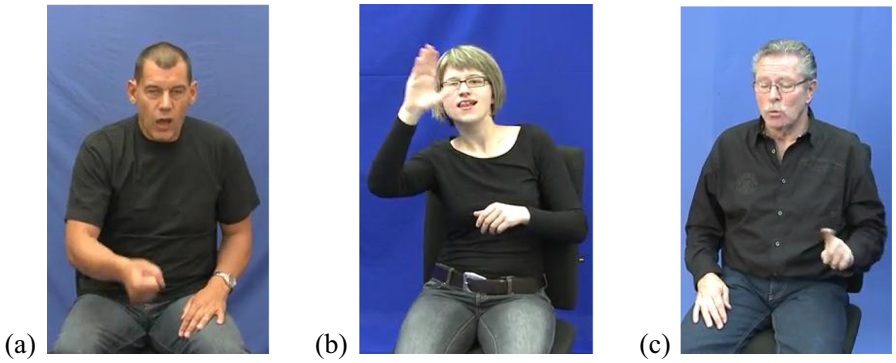

Figure 3: Example of predicates coded as: (a) PRODUCTIVE: verbs that are not in the established lexicon (dgscorpus_mue_13 | 46-60m); (b) QUOTATION: single-sign predicates that represent quoted content (dgscorpus_goe_07 | 18-30f); (c) NO-VERB: for clauses with no explicit verb sign (dgscorpus_koe_13 || 61+m). In the example in (c), PAM appears before the manual sign NOT and is accompanied by the mouthed verb *verlassen* (to leave someone) in a context meaning 'I do not leave her (alone)'.

Figure 4: Example of quotation (constructed dialogue) as a complement argument of a verb of saying/telling, but without an explicit verb sign (dgscorpus_mst_10 | 46-60f).

utterances with larger quotations (or constructed dialogue), coded as A3 (Section 4.3.1), when no verb was mentioned (Figure 4).

For the verb types that could be modified to indicate arguments (i.e., BOTH, AWAY, NEUTRAL-PLAIN), we then coded whether they were in fact modified, and if so, how. We followed the coding scheme proposed in Fenlon et al. (2018). Verbs that were spatially modified for the object/patient or for both subject/agent and object/patient arguments were coded as 'modified'. This was based on the use of locations in space that were associated with subject and/or object referents. Verbs that were not spatially modified in accordance with referent–location associations were coded as 'unmodified'. The 'congruent' label was used to mark cases where the realization of the verb looked the same as the citation form of the sign, such that it was not possible to interpret the verb form as being clearly modified or not.

4.3.3 PAM modification

We coded the spatial modification of PAM similarly to our coding of verb modification described earlier, following Fenlon et al. (2018). We coded PAM as 'modified' when it was spatially modified, based on the use

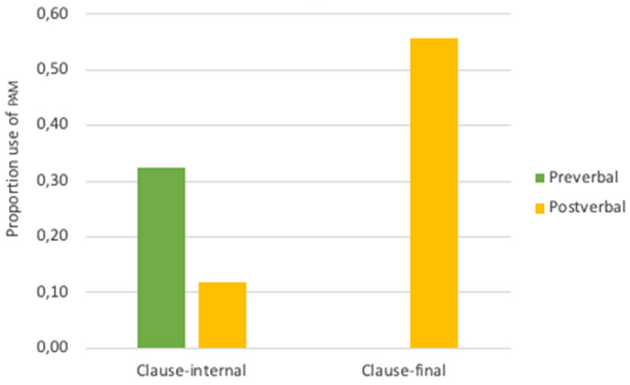

Figure 5: Proportion of clauses with PAM occurring preverbally or postverbally.

of locations associated with referents, to indicate the object argument, or both subject and object arguments (as predicted for an analysis of PAM as an agreement marker). Occurrences of PAM were coded as 'unmodified' when its movement did not correspond to referent locations associated with arguments. The label 'congruent' was used for cases in which PAM looked like its citation form (i.e., movement away from the body; Figure 1) and for which it was not possible to clearly interpret the form as being modified to indicate arguments. We also coded the modification of PAM for person. We coded for modification from first to non-first person, non-first to first person, and non-first to non-first person.

4.3.4 Argument realization

As noted earlier in our description of sign order coding, we coded the agent or experiencer (typically subject) argument of the verb as A1, the patient or recipient (PAM-marked object) argument as A2, and the second object argument of ditransitive verbs as A3. We coded occurrences of core arguments as overt if they were realized with either a nominal or pronominal (i.e., INDEX) sign, or with a combination of a nominal and pronominal (e.g., WOMAN INDEX).[5]

5 Results

5.1 PAM and constituent order

With respect to the use of PAM and constituent order, we are particularly interested in the relationship between PAM and the verb. Accordingly, we determined whether PAM occurred preverbally or postverbally. We were also interested in understanding the relationship between preverbal and postverbal occurrences and clause-internal and clause-final patterns (as described by Bross 2020), as these categories do not overlap (footnote 3). In Figure 5, we see that the majority of occurrences of PAM are postverbal (67% in total; n = 295), comprised of all clause-final orders (56%; n = 243) and about one-quarter (12%; n = 52) of clause-internal orders. The remaining clause-internal orders (33%; n = 142) make up the proportion of preverbal PAM occurrences.

Because Bross (2020) notes that the dominant pattern in his data elicitation with signers from the south of Germany is clause-internal, interpreted by Steinbach (2022) as corresponding to a dominant preverbal pattern, it is interesting to compare the distribution of preverbal vs postverbal as well as clause-internal and clause-

5 Note that we did not count the use of PAM itself as an overt realization of the object argument. We address the syntactic function of PAM in the discussion.

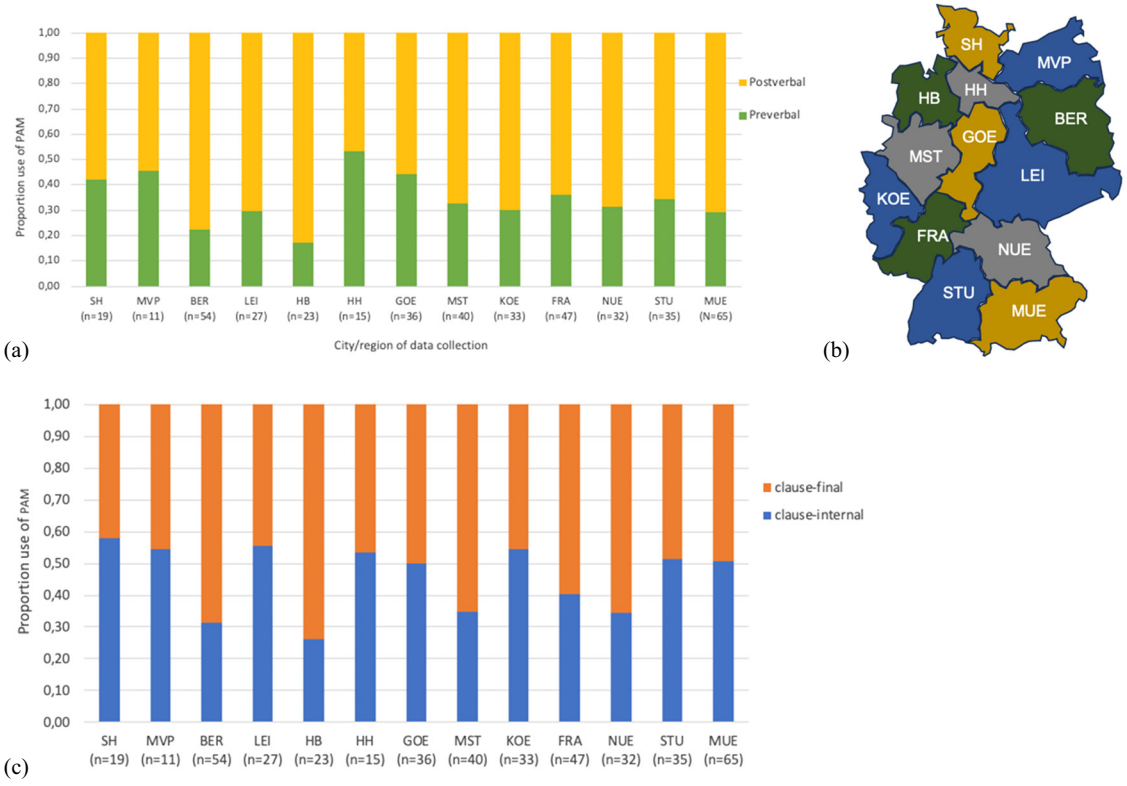

Figure 6: Distribution of preverbal and postverbal (in a) and clause-internal and clause-final (in c) occurrence of PAM in 13 different regions of data collection across Germany, showing the acronym and the total number of occurrences of PAM for each city/region and (in b) the location of each city/region within Germany. Key to the city/region acronyms: SH = Schleswig-Holstein; MVP = Mecklenburg-Vorpommern (city: Rostock); BER = Berlin; LEI = Leipzig; HB = (Hanseatic) Bremen; HH = (Hanseatic) Hamburg; GOE = Göttingen; MST = Münster; KOE = Köln (Cologne); FRA = Frankfurt; NUE = Nürnberg (Nuremberg); STU = Stuttgart; MUE = München (Munich).

final occurrences of PAM across the different regions of data collection in the DGS corpus project (Figure 6). The difference between preverbal and postverbal PAM does not seem to differ for regions in the south of Germany compared to other parts of Germany; certainly, the proportion of preverbal placement of PAM is not higher in the southern areas of DGS corpus data collection. When we group cities into the major regions of North (SH, HB, HH), East (MVP, BER, LEI), West (GOE, MST, KOE, FRA), and South (NUE, STU, MUE) (following Macht 2016), we see a relatively even distribution of preverbal and postverbal occurrences of PAM, as shown in Table 1. The use of preverbal PAM, however, seems somewhat lower in the eastern regions of Berlin (BER) and Leipzig (LEI), but also in Bremen (HB), and comparatively high in Hamburg (HH). Note that this differs from findings by Macht (2016), whose analysis of DGS corpus data revealed a higher proportion of use of preverbal PAM in the south of Germany (see also the summary in Steinbach 2022). When we look at the distribution of clause-final and clause-internal PAM, we see that both structures are equally favored in the southern regions of STU (Stuttgart) and MUE (Munich), which correspond most closely to signer origin in the data analyzed by Bross

Table 1: Preverbal and postverbal placement of PAM grouped by the four major geographical regions North, East, West, and South

Region	% Preverbal PAM	% Postverbal PAM
North (SH, HB, HH)	35% (*n* = 20)	65% (*n* = 37)
East (MVP, BER, LEI)	27% (*n* = 25)	73% (*n* = 67)
West (GOE, MST, KOE, FRA)	36% (*n* = 56)	64% (*n* = 100)
South (NUE, STU, MUE)	31% (*n* = 41)	69% (*n* = 91)

(2020). This does not differ substantially from most other regions in Germany; however, the clause-final pattern seems more strongly favored in some regions, e.g., BER (Berlin) and LEI (Leipzig).

We also looked at whether PAM occurs adjacent to the verb or not. In both preverbal and postverbal positions, PAM placement is predominantly immediately adjacent to the verb, i.e., right before or right after the verb, with only a small proportion occurring with intervening material (6% preverbal, n = 25; 3% postverbal, n = 14). Looking at PAM and A2, taking into consideration only clauses with overt realization of A2 (n = 112), we also predominantly find adjacency between PAM and A2 (78%, n = 87). In more than half of these cases (62%; n = 54), PAM is also adjacent to V. This is nearly always a V-PAM-A2 order, i.e., the postverbal, clause-internal (not clause-final) pattern, which makes up one-third of occurrences, as noted earlier. Finally, we looked at the position of A1 and whether A1 appeared in first or non-first position in each clause. The first thing to note is that close to half of all clauses did not have an overt A1 (43%; n = 199). When it was overt, A1 occurred in first position in the vast majority of cases (92%; n = 243). In only very few cases was A2 in first position, by means of either an overt nominal or a pronominal INDEX form (3%; n = 13). There were, however, a considerable number of cases in which A2 was associated with first position by virtue of object marking with PAM, i.e., where PAM itself appeared in first position (16%; n = 75). We discuss argument omission again in Section 5.3.

5.2 PAM and verb modification

In this subsection, we first present the distribution of different verb types that were coded (Figure 7). We see that body-anchored plain verbs (BODY-PLAIN), which cannot move through space to indicate arguments, represent the largest proportion of verbs (42%; n = 192). A similar proportion is represented by verbs that can move through or be located in space to indicate (or agree with) at least one of their arguments (i.e., BOTH, AWAY, and NEUTRAL-PLAIN verbs; 43%, n = 195). Of these, 19% represent verbs that can be spatially modified for both subject and object arguments (BOTH), while 9% represent verbs that allow movement only away from the body and whose movement can thus indicate only the object argument (AWAY). Verbs with no movement, but whose execution at a location in space can indicate (or agree with) an argument – either subject or object, but more typically the object – represent 15% of occurrences (NEUTRAL-PLAIN). The remaining verb types comprise the final 15% of clauses with PAM (QUOTATION: 4%, n = 20; PRODUCTIVE: 6%, n = 30; NO-VERB: 5%, n = 25).

When we look at the use of PAM together with verbs that can be modified for arguments, we see that these verbs do also get modified in contexts of occurrence with PAM. For BOTH verbs, which can be modified for both subject and object arguments, we find modification for both A1 and A2 arguments in about one-third of cases. In another one-third of cases, the verb form was coded as congruent with its citation form, such that it is

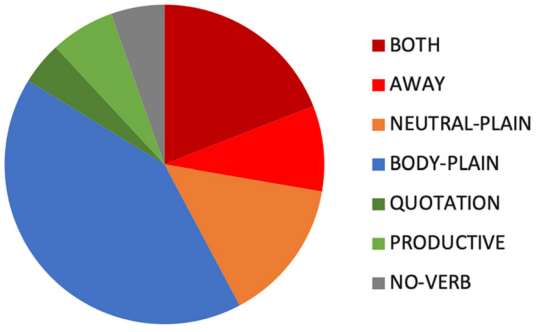

Figure 7: Distribution of verb types across clauses with PAM.

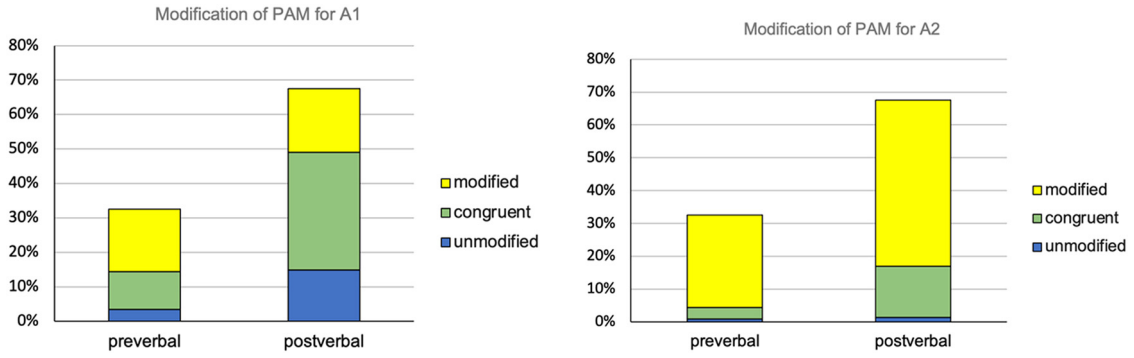

Figure 8: Modification behavior of PAM for A1 and A2 arguments by preverbal and postverbal occurrence.

difficult to say whether there is modification or not. For verbs that agree only with the object (AWAY verbs), there was a similar occurrence of clear modification for A2 in about one-third of cases.

We now turn to the spatial modification behavior of PAM itself. Of particular interest here is any differential modification behavior of PAM in preverbal or postverbal placement. In Figure 8, we see the proportion of modification of preverbal and postverbal PAM for A1 and A2 arguments. Unsurprisingly, we see modification for A2 in the majority of cases for both preverbal and postverbal PAM. For cases labeled as congruent, there is no independent spatial evidence for the spatial modification of the sign to indicate its arguments. If we collapse congruent with modified, however as also done by (Fenlon et al. 2018), there are only very few cases in which PAM is not spatially inflected (i.e., unmodified). For the A1 argument, the picture is slightly different. Here, we see comparatively more cases of unmodified PAM in postverbal position. For A1, occurrences of PAM coded as congruent are more frequent; clear modification for A1 is more difficult to determine, especially for first-to-non-first arguments. If we consider the predominance of PAM modification for A2, it is interesting to look specifically at the modification behavior for A1 in these cases and the relationship to preverbal and postverbal occurrence of PAM, as shown in Table 2. When PAM occurs preverbally (and is modified for A2), A1 is more likely to be modified (64%; n = 79).

When we look at the distribution of arguments in terms of person for A1 and A2 across clauses with PAM, the majority of clauses were either first-to-non-first person (39%; n = 181) or non-first-to-first person (41%; n = 189). The remaining clauses had non-first-to-non-first-person arguments (20%; n = 92). In terms of the modification of PAM for person, PAM was most likely to be modified in cases of non-first-to-first person. Here, PAM was modified for first-person A2 in all cases and for non-first-person A1 in 81% of cases (n = 153). For first-to-non-first clauses, PAM was clearly modified for non-first A2 in over half of cases (59%; n = 106) and only clearly unmodified in 3% (n = 6) cases; otherwise, the coding was congruent for A2 and always congruent for first-person A1. For non-first-to-non-first clauses, spatial modification of PAM for A2 was clearly apparent in a majority of cases (78%; n = 72) and only unmodified in very few cases (4%; n = 4); otherwise, it was congruent. For the non-first A1s here, however, PAM was substantially more likely to be unmodified (52%; n = 48), with only 27% clear modification (n = 25). An overview of these results is given in Table 3.

Table 2: Modification behavior of PAM for A1 and A2 arguments by preverbal and postverbal occurrence for cases of A2 modification (total N = 344)

A1 PAM modification	A2 PAM modification	Preverbal PAM	Postverbal PAM
Modified	Modified	64% (n = 79)	36% (n = 79)
Congruent	Modified	24% (n = 29)	39% (n = 87)
Unmodified	Modified	12% (n = 15)	25% (n = 55)
		100% (n = 123)	100% (n = 221)

Table 3: PAM modification for A1 and A2 arguments based on person (first and non-first)

Person	A1			A2		
	Modified	**Congruent**	**Unmodified**	**Modified**	**Congruent**	**Unmodified**
First to non-first	0 (0%)	181 (100%)	0 (0%)	106 (59%)	69 (38%)	6 (3%)
Non-first to first	153 (81%)	0 (0%)	36 (19%)	189 (100%)	0 (0%)	0 (0%)
Non-first to non-first	25 (27%)	19 (21%)	48 (52%)	72 (78%)	16 (17%)	4 (4%)

5.3 PAM and argument omission

In this subsection, we look at the omission of arguments in clauses in which PAM occurred. Due in part to the prevalence of argument omission, there were a total of 29 different sign orders in the data. A very large proportion of utterances with PAM occur without overt encoding of A2 with a nominal and/or pronominal INDEX (77%; $N = 346$). Depending on the analysis of PAM, it may itself count as an overt realization of A2. We return to this point in the discussion. The most frequently represented clause type was A1 V PAM, with overt encoding of A1 and A2 marking only with PAM ($N = 112$; 25%). Equally frequent was a clause consisting only of V PAM, with omission of both A1 and A2 ($N = 110$; 24%).

6 Discussion

The results regarding the order of signs demonstrate that PAM is more likely to occur postverbally than preverbally, with about two-thirds postverbal occurrence. Comparing across cities and major regions of data collection across Germany, the predominance of postverbal PAM was quite consistent overall, although there might be a slight tendency for more preverbal use in eastern regions (especially Berlin and Leipzig), but not in southern regions, contrary to previous reports (Bross 2020, Steinbach 2022). It may be that differences in methodology – translation-based elicitation (in Bross 2020) vs corpus-based data – play a role here. The analysis by Macht (2016), however, showing more preverbal occurrence of PAM in the southern regions of Germany, is also based on DGS corpus data, but represents a subset of the data analyzed in the current study.[6] Looking also at the distribution of PAM in clause-final vs clause-internal position, we found that just over half of all PAM occurrences are in clause-final position. Postverbal and clause-final thus overlap most, but not all of the time. In both preverbal and postverbal orders, PAM is very likely to be adjacent to the verb, i.e., directly after or directly before the verb. PAM is also likely to occur adjacent to A2, with PAM occurring between A2 and the V, i.e., adjacent to both, about half the time. The predominant order in this case is V-PAM-A2, a postverbal, clause-internal pattern.

We investigated these three parameters (post-/preverbal; adjacent/non-adjacent; clause-internal/-final) due to the non-overlapping definitions in the literature. Bross (2020) describes a clause-final pattern and two clause-internal patterns. The clause-final order (A1-A2-V-PAM) and one of the clause-internal orders (A1-V-PAM-A2) are postverbal, with the verb and PAM directly adjacent. In the other clause-internal order (A1-PAM-A2-V), PAM is in preverbal position, with A2 intervening between PAM and the verb (i.e., non-adjacent). Bross (2020) assumes both the clause-final and clause-internal patterns to exemplify PAM as a differential object marker and notes that the majority of DGS signers with whom he consulted preferred a clause-internal structure for PAM. He does not specify, however, whether signers showed a preference for one (postverbal PAM) or the other (preverbal PAM) of the clause-internal orders. Steinbach (2022) summarizes findings about the behavior of PAM (including Bross 2020, but also Murmann 2012, Macht 2016, Oomen 2021, Proske 2022) and puts forward the

6 In addition, the signs that we excluded from analysis as potentially representing a separate differential object-marking sign (a version of the sign PERSON) would not have been excluded by Macht (2016) and may not show the same distributional properties as PAM.

proposal that there are two versions of PAM: a postverbal agreement marker $_{x}$PAM$_{y}$ and a preverbal differential object marker PAM$_{x}$. Steinbach (2022) describes the postverbal agreement marker as agreeing obligatorily with subject and object arguments (i.e., as obligatorily indicating subject and object arguments through spatial modification).

If Steinbach (2022) is right, then the majority of occurrences of PAM in the corpus are agreement markers that mark both subject and object arguments. To adjudicate here, it is necessary to look at the modification behavior of PAM. We see the modification of PAM for A2 in the majority of cases in both preverbal and postverbal positions. What is of most interest here is the modification behavior of PAM for A1, and in particular, in postverbal position. We should see A1 modification of PAM in postverbal position if the form in question here is what Steinbach (2022) describes as the $_{x}$PAM$_{y}$ agreement marker. This is not, however, what we see for A1. We see unmodified A1 predominantly in postverbal PAM and very little unmodified A1 in preverbal PAM. This goes against the assumption by Steinbach (2022) that postverbal PAM exhibits obligatory modification for (or agreement with) both A1 and A2, while preverbal PAM is modified for (or agrees with) only A2.

With respect to the modification of PAM in terms of person marking, the results showed that non-first-to-first-person modification made up 40% of occurrences of argument marking with PAM. In these cases, PAM reliably marked both first-person A2 (100% of the time) and non-first-person A1. Marking of first-person A2 was very clear. However, with respect to spatial marking of A1, from a non-first location in space, there is a potential confound from coarticulation. In many cases, the starting location of PAM is at the same location in space as the preceding sign, e.g., a sign for A1. It is not clear whether the modification of PAM for A1 in these cases is really a spatial modification or a phonetic coarticulation effect. The same issue is a confound for the non-first-to-non-first cases (20% of occurrences).

Finally, looking at the verb types that PAM occurs with, we see the majority of uses with plain body-anchored verbs that do not themselves move through space. The proportion of use of PAM with verbs that can move through or be located in space to indicate arguments (including neutral plain verbs) is equal in proportion to its use with body-anchored plain verbs. This suggests that PAM is not primarily fulfilling the function of marking arguments when the verb cannot and supports previous reports that PAM may occur with indicating (or agreement) verbs (as also noted by Steinbach and Pfau 2007; Rathmann 2003).

An important question concerns whether the patterns that we have described thus far are the result of marking with PAM. Do clauses without PAM exhibit similar or different patterns? To address this question, we compared our data with the data analyzed by Oomen (2021), also using the Public DGS Corpus.[7] The patterns look quite similar overall, but there are some interesting differences that suggest an interaction with PAM. The distribution of verb types overall is very similar to the distribution in clauses with PAM: Oomen (2021) reports 39% body-anchored plain verbs, compared to our 42%; 28% agreeing (comprised of agreeing and agreeing-spatial), compared to our 28% (comprised of BOTH and AWAY verbs); and 14% neutral plain verbs, compared to our 15%. To compare omission and position of arguments, we used the available data files in Oomen (2019). Here, we see that the proportion of non-overt A1 in our data (43%), focusing on clauses with PAM, is similar to the proportion of non-overt subject arguments (46%) reported in Oomen (2021). In contrast, the proportion of non-overt A2 arguments was comparatively higher in our data (75%), compared to non-overt object arguments (62%) in Oomen (2021). We can speculate that this is related to the presence of PAM, where A2 is not encoded with a (pro)nominal form, but is rather marked with PAM. Along these lines, it is interesting to note a different pattern in the proportion of occurrence of A2-first and PAM-first clauses: in the clauses with PAM analyzed here, we find a very low proportion of A2-first (4%), but a relatively high proportion of PAM-first (16%) clauses. The low proportion of A2 may seem surprising, given the possibility of topicalization in DGS (Happ and Vorköper 2006, Oomen 2021). Indeed, the corpus data analyzed by Oomen (2021) paint a different picture in this respect, reporting 13% (topicalized) object-first clause orders. The low occurrence of A2 in first position may be related to the presence of PAM in the clause.

7 The analysis in Oomen (2021) is based on a total of "1,063 clauses containing 107 different DGS verb forms representing 58 verb meanings [from the ValPaL list (Hartmann et al. 2013)]" (p. 332).

The comparison with Oomen's (2021) data suggests some influence of PAM on other syntactic hierarchies. The high(er) proportion of clauses with PAM in first position suggests additional syntactic prominence marking (i.e., through constituent order). Similarly, the high proportion (75%) of marking with PAM occurring with a non-overt A2 argument suggests a doubling of prominence-marking operations: zero marking as a cue to discourse prominence and PAM marking as a cue to prominence based on semantic features of the referent (de Souza Santos et al. 2025). As argued in de Souza Santos et al. (2025), the use of PAM is primarily semantically determined (i.e., through agent-like properties of the object) and can be described in terms of prominence.

A prominence-based account of argument marking provides support for the behavior of PAM as a differential object marker. As de Souza Santos et al. (2025) report (see also the summary in Section 2), PAM occurs almost exclusively with highly individuated (i.e., human, definite) objects. Moreover, PAM occurs to give prominence to a stimulus object in an Experiencer-Stimulus frame, where the object is the initiator of a change in the state – in terms of mental/emotional experience – of a (non-volitional) experiencer subject (e.g., the verb *love*). Albeit less often, PAM also occurs in more typical Agent-Stimulus frames, where the subject is volitional and agentive, but the event is still initiated by the object to an important extent (e.g., the verb *wait*). The current findings provide additional evidence for the role of prominence in the behavior of PAM through the investigation of the interaction of PAM with other syntactic phenomena sensitive to prominence relations. Following standard accounts, we take sentence-initial position to be privileged in terms of prominence (e.g., Comrie 1989). We also take verb modification to be indicative of prominence relations, as described by Fenlon et al. (2018) for BSL. Fenlon et al. (2018) found that indicating (agreement) verbs were more likely to be modified to indicate the patient argument for animate compared to inanimate referents. On accessibility and givenness accounts, the more marking material is needed for a referent, the less accessible the referent is taken to be (e.g., Ariel 1990). If we equate accessibility with prominence, non-overt arguments would be particularly prominent. However, on the assumption that prominence markers bring active attention to a referent (or other type of element) competing for prominence (Himmelmann and Primus 2015), the overt realization of A2 may be an additional cue to prominence. Taking these different syntactic phenomena into account, we find that although it is possible for signals of prominence to accumulate, PAM marking of A2 typically occurs as the only syntactic marker of prominence, i.e., we find PAM most often when A1 is in first position and when verbs cannot themselves do the work of indicating arguments (in particular, body-anchored plain verbs). This evokes standard accounts of the use of PAM as an agreement auxiliary, filling the 'agreement gap' with verbs that cannot move through space (Steinbach and Pfau 2007). However, PAM occurs to an equally substantial degree with verbs that can indicate their arguments spatially, either through movement or through placement. We find that the use of PAM occurs together with verb modification in about one-third of cases, essentially doubling up on argument marking (also reported by Proske 2022, Steinbach 2022). The use of PAM with indicating (or agreement) verbs has been noted in accounts of PAM as an agreement auxiliary, with, e.g., a pragmatic function of emphasis (Steinbach and Pfau 2007). The high proportion of PAM use with verbs that move through space, however, points to a non-auxiliary function of PAM and calls for a more systematic investigation of the notion of emphasis. In terms of prominence, the use of PAM together with verb modification is a doubling up on prominence markers. Compared to single marking with PAM, double marking of prominence (with PAM and verb modification to mark the object) is used comparatively infrequently (in about 30% of cases of 20% of all verbs). These results align with the assumption that active attention does not need to be marked by different kinds of additional information. In this case, verb inflection for the object as a prominence marker does not happen as frequently in sentences with PAM because PAM is itself a marker of syntactic prominence that also serves the grammatical function of argument marking.

With respect to the competition for syntactic prominence between A1 and A2, we see that the use of PAM marks object prominence without the need for movement of A1 to a less prominent syntactic position. A1 was realized in initial position in over half of all cases (with the other nearly half of cases being instances of non-overt A1). By contrast, overt realization of A2 (separately from PAM) in initial position occurred only very rarely. Drawing active attention to the object referent to attribute prominence seems to rely primarily on the use of PAM as a single marker, or additional piece of morphosyntactic machinery. In some cases (16%), both with and without additional overt realization of A2, PAM appeared in initial syntactic position. The reasons for the prominence-marking element itself to assume prominent initial position are left for further research.

The status of PAM in terms of its syntactic category has also been a matter of debate. Bross (2020) describes PAM as a preposition-like element based on the fact that it does not disappear in a nominalization. In all examples for the use of PAM given by Bross (2020), the A2 argument is overt. If PAM is indeed a preposition-like element (that functions as a differential object marker), we would not expect it to occur without an overt realization of A2. We see the use of PAM without further overt marking of A2, however, in over three-quarters of cases. The use of PAM alone to mark A2 would be consistent with a pronominal account. Indeed, Meir (2003) describes an object-marking sign in Israeli Sign Language (ISL) that looks very similar to PAM, shares a grammaticalization from the noun sign PERSON, and shows remarkable distributional similarities to PAM in terms of nominal and verbal semantic features (as described in de Souza Santos et al. 2025). A similar sign is also described by Börstell (2017, 2019) for Swedish Sign Language (SSL) as a differential object marker. Both the ISL and SSL signs are analyzed as pronouns, with Börstell (2017) explicitly saying that the object marker replaces the entire noun phrase and Meir (2003) noting a paradigmatic relationship with the pronominal INDEX form. Although the distributional similarity with ISL, and given the historical relationship between DGS and ISL (Meir and Sandler 2008), makes a pronominal account of PAM attractive, the occurrence of PAM with (pro-) nominally overt A2 arguments makes the account morphosyntactically more difficult to defend. On an analysis of PAM as a pronoun, the omission of further identifying material for A2 would be expected. As discussed earlier, we also cannot uphold an analysis of PAM as an (agreement) auxiliary, given the high proportion of occurrence of PAM with indicating verbs, which suggests that PAM is not primarily motivated by the morpho-phonological properties of the verb it occurs with. Steinbach (2022) does not commit to an analysis, but specifies that the preverbal differential object marker PAM_x is a nominal marker in the domain of PP or DP, in contrast to the postverbal agreement marker ${}_x\text{PAM}_y$ in the verbal domain, but with both having grammaticalized from PERSON via determiner-like (indexical) elements (van Gelderen 2011). The observed morphosyntactic behavior of PAM is not, however, compatible with this account: we see less (instead of obligatory) modification of A1 with postverbal PAM, and we see more modification of A1 (instead of none) with preverbal PAM. Thus, we do not follow Steinbach (2022) in the claim that there are two agreement marker versions of PAM: one obligatorily marking the subject and object (${}_x\text{PAM}_y$) and a differential object marker (PAM_x).

Cross-linguistically, however, there is a significant amount of variation in the syntactic behavior of adpositions, pronouns, and auxiliaries. Adpositions can sometimes occur without overt complements when the referent is recoverable from the context, as seen in English ('I'm inside') or German ('Ich bin draußen' – 'I am outside'), although such omissions are mainly attested in intransitive or locative contexts. Similarly, pronouns can sometimes appear together with overt noun phrases, as in Portuguese ('nós estudantes') or German ('wir Lehrer'), and exceptional constructions like Icelandic Pro[NP] structures (Sigurðsson and Wood 2020) demonstrate that pronouns can enter into complex relations with overt noun phrases under specific syntactic configurations. Furthermore, extended exponence – the realization of a single syntactic feature by multiple morphological exponents – is attested in languages like Lavukaleve (Hamann 2010), providing evidence that multiple overt markers for the same argument are possible under certain grammatical conditions. Therefore, while the evidence presented here suggests that PAM does not straightforwardly fit into the categories of preposition, pronoun, or auxiliary, further research is needed to systematically investigate its syntactic behavior, distribution, and potential historical developments.

What can we say then with respect to PAM? There are two main things to account for: the fact that PAM sometimes also marks the subject argument and the fact that marking of arguments is not obligatory. The first fact is difficult to account for on an analysis specifically as a differential object marker, and the second is difficult on an analysis as an agreement marker, in general. We suggest that an analysis in terms of differential indexing may be the most appropriate. As Haig (2018) notes, differential indexing depends on pragmatic and semantic factors, and he specifically reserves the term 'agreement' for marking that is obligatory. As Just (2024, 296) stresses, "indexing, contrary to agreement, does not presuppose any syntactic relationship between the marker and the referential noun phrase, nor whether the latter is obligatorily expressed." While differential object indexing has been more widely studied, differential subject indexing also exists, although seems to be more restricted cross-linguistically than differential object indexing (Haig 2018). Because we see the primary motivation for the use of PAM best described in terms of (nominal and verbal) semantic properties (de Souza Santos et al. 2025), we see potential in an analysis assuming differential argument indexing. PAM may be able to

differentially mark the subject, based also on semantic features, in addition to differential marking of the object. We expect the relevant semantic features triggering marking of the subject (together with the object) to be explainable with respect to prominence relations. In fact, when we look at the semantic properties of A1 arguments marked with PAM, we see that the vast majority (nearly 90%) are animate referents and that unmodified A1 arguments are more likely to be inanimate referents. The simultaneous differential marking of both arguments in a single form is typologically unexpected, but may be a modality-specific property of argument indexing. Differential argument indexing has been described primarily in terms of reference-tracking functions (Iemmolo 2011, Just 2024). We see this as compatible with a prominence-based account, tracking referents in terms of prominence as cued by semantic features and discourse properties.

7 Conclusion

Overall, we have observed that, in sentences with PAM, the subject tends to be in the initial position and the object tends to be in a non-initial position. Moreover, the subject is overt in over half of cases, while the object is non-overt (besides its marking with PAM) in over three-quarters of cases. The modification of verbs toward the object occurs in only about one-third of cases. These observations regarding the behavior of other morphosyntactic phenomena in the context of PAM use leads us to draw the following conclusions with respect to prominence and PAM:

1. PAM is additional information of active attention that confers more prominence than the passive attention afforded to inherently prominent elements and behaviors in syntax (e.g., first position and subject);
2. It is not common for PAM to co-occur with other additional information bringing active attention (or prominence) to the object;
3. The accumulation of different markers of prominence on the object is not prohibited, however, as PAM can co-occur with other markers (e.g., verb modification to indicate the object);
4. We do not find clear evidence for two types of PAM, with a functional divide between agreement marking and differential object marking; instead, the behavior of PAM in the corpus points to a differential marking of both subject and object arguments. We propose an analysis in terms of differential argument indexing based on the primarily semantic motivation and non-obligatory nature of marking with PAM.

Further research is also needed to better understand the relationship between constituent order and verb modification in marking linguistic prominence, in particular through the comparison of clauses with and without PAM. The relatively infrequent occurrence of PAM in the corpus may be due to more frequent use of object marking, in the sense of bringing active attention to the object, through changes in constituent order and verb modification. These other contexts, i.e., of utterances without PAM, but with verb modification and constituent order alternations, need further investigation. In addition, further research is needed to explore the relationship between the marking of prominence in utterances employing constructed action (as depictions or quotations) and the relationship of PAM with constructed action. The interaction with prominence-lending semantic properties in the nominal (human, definite) and verbal (positive or negative affectedness of the object) domains brings about a reliance on PAM in these contexts, without the need or possibility for prominence marking in other ways.

Abbreviations

GLOSS	glosses for signs given in small capital letters
1sg/2sg/3sg	first/second/third person singular reference
GLOSS_{3a}	subscript indicates location associated with third person referent at location 3a
INDEX	index, i.e., pointing sign, with pronominal meaning

PAM	acronym stemming from Person Agreement Marker
goe	Göttingen
koe	Cologne (Köln)
mst	Münster
mue	Munich (München)
nue	Nuremberg (Nürnberg)
f	female
m	male
18–30	age group for signers aged 18–30 years old
46–60	age group for signers aged 46–60 years old
61+	age group for signers aged 61 years old

Links to the examples used from the Public DGS Corpus are given in the format 'dgscorpus_[CITY]_[DYAD NUMBER] | [AGE GROUP][GENDER]'.

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Looking at verb modification in German Sign Language (DGS) through the lens of prominence

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This study investigates the nature of verb modification in German Sign Language (DGS), examining its relationship to linguistic prominence. Drawing on annotated data from the Public DGS Corpus, we analyze a set of indicating verbs to assess whether factors such as argument structure, animacy, coreference, and syntactic role influence the occurrence of spatial verb modification. Our results reveal a tendency for less prominent arguments—particularly subjects with low agentivity or non-coreferential objects—to be more frequently marked through verb modification. Moreover, person features and the use of Constructed Action (CA) show a strong impact: subject modification is systematically observed in CA contexts, and the involvement of first person in argument structure significantly increases modification. These findings challenge the assumption that verb modification in DGS constitutes syntactic agreement and instead support a gestural-morphemic account, in which modification operates as a discourse-based strategy for referent tracking and spatial anchoring. Additionally, the lack of obligatory modification and the variation in vertical verb alignment reinforce the view that the phenomenon is shaped by cognitive and interactional factors rather than rule-governed syntax. While the study does not provide conclusive evidence of argument competition based on prominence, it contributes to ongoing debates about the interaction between spatial morphology and referential structure in sign languages and highlights the relevance of discourse context and mental space in shaping morphosyntactic patterns.

Keywords: German Sign Language (DGS), Indicating verbs, prominence, constructed action, coreference.

1 Introduction

The use of space has been identified as a fundamental resource for establishing syntactic relationships in sign languages. The signing space includes the area in front of and around torso and is used to locate referents and indicate them through verbs, nouns, pronouns and prepositions. Spatial indication serves as an anaphoric resource at the discourse level, as referents can be retrieved by directing verbs or pronouns toward the spatial location where the referent was previously established. The spatial modification of verbs between locations can clarify the syntactic function of arguments (who does what to whom). Showing an argument's role through spatial indication is possible because some verbs can indicate subject and object positions based on movement; thus, the initial point of movement, as seen in ASK (see Figure 1a), is linked to the subject's spatial position, while the final point corresponds to the object's spatial position.

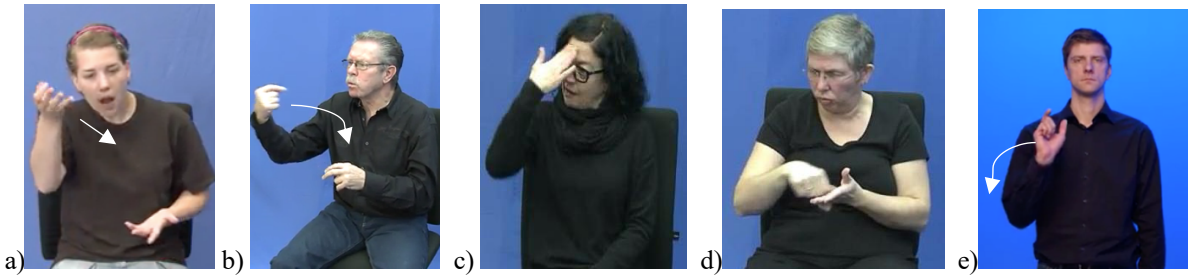


Figure 1: Examples of verbs in DGS: (a) Directional verb ASK, (b) Verb with spatial movement COME, (c) Body-anchored plain verb KNOW, (d) Neutral-space verb PAY, and (e) Example of the sign PAM from the DGS Public Corpus, which can indicate subject and object, or only the object.

Padden (1988) proposes a classification of verbs in sign languages based on their ability to mark arguments through movement. She distinguishes between agreeing verbs, in which the movement indicates the subject and object (as in ASK, showing who is asking whom); spatial verbs, in which the movement indicates spatial locations associated with the argument (as in COME, indicating movement from a place X to a place Y); and plain verbs, which do not show directional movement. Among plain verbs, there is a further distinction between body-anchored verbs (such as KNOW) and those produced in neutral signing space (such as PAY), also referred to as neutral verbs. Some studies (see Lourenço & Costello, 2018) suggest that even neutral verbs can show modification toward one of the arguments. Following a formal tradition established by Padden (1988), several researchers have argued that spatial modification in sign languages represents syntactic agreement (e.g., Meir, 2002; Lillo-Martin, 2006; Pfau et al., 2018). However, there are studies that present an alternative interpretation. Liddell (2003), for example, argues that verbs modified in space to indicate their arguments are better described as *indicating verbs*, rather than agreement verbs. In his view, the directionality observed in these verbs is not the result of syntactic agreement; the interpretation of who is being referred to depends on the discourse context, rather than being governed by abstract syntactic rules. Fenlon et al. (2018), in a study on British Sign Language (BSL), pointed out that the modification of indicating verbs is not obligatory; that is, verbs that can be modified do not always do so, and the modification is motivated by semantic factors such as animacy. These findings led the authors to challenge the interpretation of verb modification as syntactic agreement, particularly given that agreement, in formal terms, is typically understood as obligatory. Costello (2015) offers a nuanced account of this issue in his study of Spanish Sign Language (LSE), proposing that spatial modification does not reflect a monolithic agreement system, but rather a set of mechanisms—some syntactic, some discourse-driven—that interact with modality-specific features such as iconicity and spatial structure. His analysis highlights the optionality and variability of agreement-like phenomena across sign languages, suggesting that what may appear to be syntactic agreement could also result from pragmatic or phonological constraints.

We assume that verb modification in DGS is not obligatory and does not constitute verb agreement in the traditional sense. Rather, we treat it as a phenomenon tied to mental representations at the interface between language and cognition. To better understand which factors may influence verb modification, we introduce a new perspective on the phenomenon: linguistic prominence. Drawing on Himmelmann and Primus (2015), we adopt a view of prominence as a cognitive-pragmatic principle that influences syntactic structure. According to their framework, semantic features such as agentivity and animacy contribute to the cognitive prominence of a referent, which can then affect its syntactic realization and its salience in discourse. Prominence, in this view, is not merely an interpretive effect, but a structuring principle underlying various morphosyntactic mechanisms such as passive voice, case marking, and constituent order. Applying this framework to DGS, we explore whether indicating verbs—whose spatial modification encodes referential roles—serve as a locus for realizing linguistic prominence. We expect that animate objects, due to their higher cognitive salience, are more likely to be targets of verb modification than inanimate ones. This prediction is in line with findings from Fenlon et al. (2018) for BSL, where animacy was shown to correlate with the marking of syntactic arguments. While the role of prominence in DGS verb modification remains underexplored, we treat modification as a potential structural attractor for prominent referents. Additional evidence for the role of prominence

in DGS comes from recent findings concerning the use of the sign PAM (see Figure 1d). Originally analyzed as an auxiliary that spatially marks the arguments of anchored verbs (Rathmann, 2003; Steinbach & Pfau, 2007), PAM has been reinterpreted by Bross (2020) as a Differential Object Marker (DOM) sensitive to features such as animacy, definiteness, and affectedness. A recent study by de Souza Santos et al. (2025) supports this analysis, showing that PAM is sensitive to linguistic prominence, and is more frequently used with objects that exhibit proto-agent properties (Dowty, 1991), or in constructions with lower transitivity (cf. Iemmolo, 2011; Just, 2024). Another factor that may help us understand how verb modification is sensitive to prominence is by examining coreferentiality at the discourse level. Fenlon et al. (2018) point out that in BSL, beyond animacy, coreferentiality was also a significant factor in verb modification. The authors show that previously unexpressed referents are more likely to be modified by the verb and argue that verb modification serves to reintroduce referents. Heusinger and Schumacher (2019) suggest that, at the discourse level, the principle of dynamicity enables less prominent elements to gain prominence within the discourse. More accessible referents tend to be more prominent, but elements used to reintroduce less accessible referents can be sensitive to this shift in prominence. We hypothesize that both agentivity at the syntax-semantics interface and accessibility at the discourse level may be related to verb modification in DGS.

The structure of this article is as follows: the next section presents the theoretical framework and is divided into two parts, one dedicated to spatial modification in DGS, conceptualizing verbal modification, the use of PAM, and the use of Constructed Action (CA). The second part is dedicated to linguistic prominence. We present the basic concepts of this approach and how semantic hierarchies such as animacy and accessibility will be used to investigate prominence in the data analysis. Section three presents the questions, objectives, and hypotheses of the present study, and the fourth section presents the methods of data collection and analysis. In section 5, we show the quantitative results and the analysis of the results. Finally, we discuss the results and present conclusions.

2 Theoretical Framework

2.1 The use of space in DGS

In DGS, as in other sign languages, the use of space plays a crucial role in both morphosyntactic structure and discourse organization. Spatial structures are not merely visual or gestural artifacts—they serve grammatical functions, such as marking referential relationships, and pragmatic functions, such as organizing information in the discourse. This section focuses primarily on the spatial modification of verbs, which is the central object of analysis in this study. However, we also address the role of CA, given that it systematically affects spatial structures and, consequently, how verbs are used and interpreted. Finally, subsection 2.1.3 discusses theoretical issues concerning verb modification—specifically, whether it should be analyzed as an instance of syntactic agreement or as a gestural phenomenon, and whether it is obligatory or optional.

2.1.1 Verb modification

In this section, we explore how verb modification is realized and how arguments may or may not be indexed through this process. We adopt the term *indicating verbs* rather than *agreeing verbs*, following a more descriptive tradition that avoids assuming the theoretical status of such modifications. This terminology aligns with work such as Liddell (2003), who distinguishes *indicating verbs*—which typically involve spatial modification to indicate arguments—from other verb types. This choice allows us to remain open to different interpretations regarding the nature of the phenomenon, which will be further explored in section 2.1.3. Padden (1988) offers a foundational classification of verb types in sign languages, distinguishing between three main categories: (i) agreeing verbs, in which movement indicates person agreement (e.g., ASK, where the direction of movement shows who is asking whom); (ii) spatial verbs, which indicate physical locations (e.g., GO); and (iii) plain verbs, which lack spatial modification (e.g., KNOW). Among indicating verbs, transitivity is typically expressed either through the direction of movement (as in ASK) or through palm orientation (as in LOOK, Figure 2a), allowing both subject and object referents to be indexed. Although studies such as Neidle et al. (2000) have demonstrated that eye gaze can also play a role in marking arguments, our study focuses exclusively on

the manual modification of verbs. Spatial verbs like COME, which encode movement from one location to another, are excluded from our analysis. These verbs primarily indicate location rather than argument structure. We follow Fenlon et al. (2018) in narrowing our scope to focus on verbs that allow for competition between arguments of the same type—typically animate referents—so that we can more clearly examine patterns related to linguistic prominence. Neutral plain verbs such as PAY do not encode transitivity through directionality. However, they may be modified toward a single argument, especially in contexts involving contrast. For example, PAY can be directed toward the right-hand side of the signing space to indicate either the subject (*the person*$_{\text{right}}$ *paid*) or the object (*I paid the person*$_{\text{right}}$), depending on the discourse context. These modifications, while not fully bi-directional, still reflect argument selection and may reveal prominence effects. Body-anchored plain verbs, such as KNOW, are restricted by phonological constraints and do not allow spatial modification. Lourenço and Costello (2018) argue that verbal classification is shaped primarily by such phonological properties: verbs anchored to the body are prevented from modifying not due to syntactic limitations, but because of articulatory requirements. In contrast, verbs that are not body-anchored are generally available for modification. This supports the view that spatial modification may be the default in sign languages, and its absence is often phonologically conditioned.

Some verbs exhibit mixed or exceptional behavior. For instance, THANK (Figure 2b) begins at a body-anchored point (the chin) but allows the endpoint of the movement to be modified toward the object referent. TRUST (Figure 2c) follows a fixed directionality—from the body outward or vice versa—but cannot be produced from one non-body location to another. In third-person-to-third-person contexts, this directional constraint may result in only the object being marked. Additionally, *backward* verbs like INVITE (Figure 2d) reverse the more typical movement pattern, starting at the object's spatial location and ending at the subject's location.

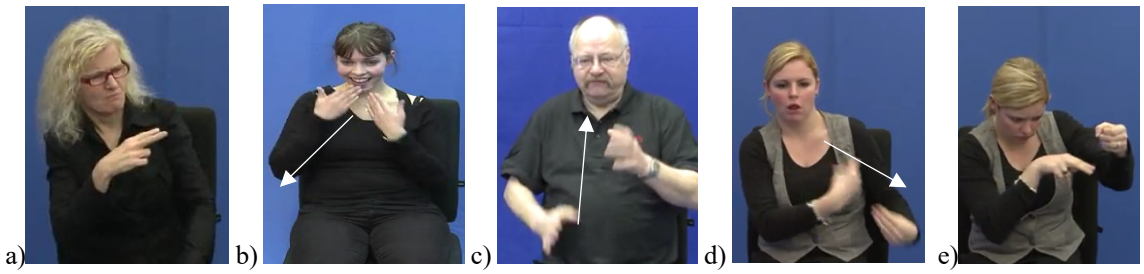


Figure 2: Examples of DGS verbs: (a) Indicating verb that can be modified through palm orientation to indicate both subject and object referents, as in LOOK; (b) Indicating verb with partial phonological restriction, anchored at the body but modifiable at the endpoint, as in THANK; (c) Verb with fixed directional movement limited to body-internal paths, as in TRUST; (d) Backward verb that moves from the object's location to the subject's, as in INVITE; (e) Depicting verb/sign (DS) that incorporates object information into its form, here depicting the action of cutting grapes.

In addition to the verb types described so far, there is another category known as depicting verbs (Liddell, 2003). These verbs (e.g., depicting cutting grapes, Figure 2e) are structurally complex, as they can simultaneously represent both action and state, and may incorporate information about the object into the handshape or movement path. Due to these properties, this category of verbs was excluded from our analysis. Our dataset includes indicating verbs such as ASK and LOOK, as well as verbs with partial phonological restrictions, such as THANK and TRUST. Spatial verbs, neutral verbs, body-anchored verbs, and depicting verbs were not included.

2.1.2 Constructed Action (CA)

The use of space in sign languages extends beyond verb modification, since referential space is not limited to grammatical abstraction but also incorporates the physical signing space. In addition to real space—such as when pointing signs are used to refer to physically present discourse participants—and abstract space, where referents are associated with specific loci (e.g., to the signer's right), there is also the phenomenon of Constructed Action (CA). CA occurs when the signer enacts a referent, using their

body and facial expressions to represent actions, thoughts, or emotions. This brings the abstract referential structure into the physical, performative dimension of the signer's body.

The term CA was introduced by Metzger (1995) and has been extensively studied under other names as well, such as role shift or body classifiers (see Cormier et al., 2015, for a list of studies on this phenomenon). Metzger suggests that the use of CA has levels that range from more direct to more indirect. Based on these levels, Cormier et al. (2015) propose a terminology for analyzing CA in sign languages. The classification is oriented by the use of two roles in discourse: the narrator and the character. The most direct use proposed by Metzger is understood by Cormier and colleagues as the 'overt' use of CA, as the signer is lending their entire body (including the hands, torso, head, face, gaze) to the character. The opposite of this is when the signer is solely the narrator of the story, characterizing no use of CA. Intermediate levels are formed based on which role is more salient in the signer's body. When most of the signer's body is enacting the character, but there is still a small part of the body as the narrator, the use of CA is considered 'reduced'. However, when only a small part of the body is enacting the character, the use of CA is considered 'subtle'.

A different analysis of CA was proposed by Fischer and Kollien (2006a, 2006b) in their investigation of DGS. The authors aimed at teaching DGS as a foreign language, since the use of CA in sign languages presents a particularity in the visuo-gestural modality that non-signers find very difficult to learn. The use of CA for Fischer and Kollien can be 'pure' or 'parallel'. Pure corresponds to Cormier et al.'s 'overt', referring to instances in which the signer's entire body represents a character and is thus fully in CA, whether representing an experience, an action, or utterances of the character. 'Parallel' corresponds to 'reduced' and 'subtle', defined as when other elements besides the enactment are present, such as lexical signs, classifiers, or mouthings. Regarding the use of quotations, the authors employ a different term called Constructed Dialogue (CD), which refers to a specific type of Constructed Action (CA) used when someone is enacting something that another person is saying—be it a sentence, mouthing, or when the signer pretends to be speaking a spoken language. In CD, only the use of signs that are not part of the quotation are perceived as parallel. For example, if a signer is telling a story in which a referent A is talking to B, the direct speech of what A is saying to B is a constructed dialogue. However, if the signer uses a sign that is not part of what A is saying to B, such as signing that A looked away while signing (using the sign LOOK), this constructed dialogue will no longer be pure, but parallel, because in addition to signing the quotation, the signer has also provided information from the narrator's point of view.

2.1.3 Theoretical Issues

The general question regarding verb modification in sign languages (SL) that has drawn the attention of researchers in recent years concerns the nature of this modification, which has been interpreted either as agreement (Padden, 1988; Meir, 2002; Lillo-Martin, 2006; Nevins, 2011; Costello, 2015; Lourenço, 2018; Pfau et al., 2018) or as gestural-morphemic (Liddell, 2000, 2003; Beuzeville et al., 2009; Fenlon et al., 2018; Schembri et al., 2018). The nature of the modification is interpreted with in a more formal framework as the realization of verb agreement with its arguments.

Other authors, while maintaining the analysis of modification as agreement, have proposed refinements to account for verb variation. For example, Meir (2002) analyzes verb modification as determined by both semantic and phonological factors, and introduces a distinction between *path* and *facing* in modification: path movement corresponds to thematic agreement (linked to thematic roles), whereas facing direction reflects syntactic agreement. This distinction is especially useful in explaining the behavior of so-called backward verbs. Differently, Sandler and Lillo-Martin (2006) interpret the modification as an affix to the verb root, sensitive to agreement with its arguments. Similarly, Nevins (2011) argues that modification is actually the result of a cliticization process, where pronominal elements such as pointing signs are initially grammaticalized to occur close to the verb, and at a later stage, their indexical element is incorporated by the verb. Some authors also reclassify Padden's (1988) division, interpreting spatial verbs as also being agreement verbs. Costello (2015) for LSE and Lourenço (2018) for Libras claim that the modification mechanism in spatial verbs is the same as in agreement verbs and that in fact, modification as agreement is a common mechanism to all verbs but is phonologically blocked for some groups of verbs, such as body-anchored verbs. Finally, Pfau et al.

(2018) present a strictly syntactic analysis of verb modification in sign languages. Drawing on generative theory, they argue that path movement results from an Agree relation between the verb and its arguments. As part of their evidence, they point to the behavior of agreement auxiliaries—such as the PAM sign in DGS—whose distribution and syntactic constraints, according to the authors, reflect purely grammatical agreement processes rather than thematic or gestural motivations.

Alternatively, the nature of verb modification is interpreted as being gestural-morphemic. Liddell (2000, 2003) initiates this line of analysis, arguing that verb modification has a gestural rather than syntactic basis. He reclassifies the so-called agreement verbs as indicating verbs and proposes that signers use three types of spatial reference during signing: token space, real space, and surrogate space. Token space refers to the conventional signing space immediately in front of the body, where entities—called tokens—are imagined and assigned spatial characteristics such as size and orientation. For instance, a standing person might be associated with a tall vertical token (e.g. ☝), while a lying person would be mapped onto a shorter horizontal one (e.g.). Beyond token space, signers also direct signs toward physically present referents in real space, and toward imagined referents in surrogate space. Surrogates are conceived as being physically present, though they are not actually there, and can occupy any location in the environment. Signers treat them as real participants—interacting with them as if they were physically present. One of the clearest manifestations of surrogate space is Constructed Action (CA), where the signer takes on the role of a referent and enacts their perspective through body shifts, facial expressions, and the use of space. Verb modification can operate in both real and surrogate space, demonstrating its gestural and context-dependent nature. This flexibility challenges the syntactic agreement view, particularly what Liddell calls the problem of listability: it would be impossible for an internal grammatical system to predefine all the real and surrogate spatial locations with which a verb might combine (cf. Lillo-Martin and Meier, 2011).

Liddell's approach is tested by Beuzeville et al. (2009) in a corpus study of AUSLAN. The authors criticize previous studies on verb modification for being based on grammaticality judgments and propose a corpus study to verify the functioning of verb modification. The authors confirm Liddell's proposal based on the behavior of verbs in AUSLAN. The non-obligatory nature of verb modification in AUSLAN is seen by the authors as evidence that the language contains a strong iconic and gestural structure, which does not easily grammaticalize, leading them to reject the formal agreement analysis. Other studies also show that verb modification is not obligatory for the subject (Padden, 1988; Liddell, 2003, for ASL; Meir et al., 2007, for ISL).[1]

The same pattern is observed in the corpus study of BSL. In their study on indicating verbs in BSL, Fenlon et al. (2018) used videos of free conversations between deaf individuals from the BSL corpus. They coded the first 500 signs from each of the 101 participants, generating a total of 1,436 valid tokens, i.e., sentences with an indicating verb and two arguments, averaging 14 tokens per participant. The results indicated that modification appears to be optional in BSL, as at least 35% of the time, the verb was not modified for either the object or the subject. The authors point to several linguistic factors that may be associated with this lack of modification. Firstly, when the transitivity of the sentence involved two non-first persons, modification for the agent and patient was very low, unlike in nonfirst-to-first constructions, where the number of modifications for both agent and patient was relatively high. Another factor analyzed as relevant was the use of constructed action. Although the results concerning agents in constructed actions are blurred by what the authors call congruent realization (see the Methodology section below), a more precise analysis was possible regarding modification for the patient. The authors found significantly higher modification for patients when the sentence was in CA. The explanation for this is that participants interact more with absent referents when in surrogate space. The same applies to the influence of animacy, which only showed significantly different results for patients, namely, animate patients favor verb modification, while inanimate patients disfavor verb modification. Finally, the results suggest that verb modification tends to occur more following sentences with null arguments or when the argument of the target sentence is not mentioned in the previous sentence.

Schembri et al. (2018) utilize the notion of linguistic construction to better address the results described above. Following Liddell's argument that indicating verbs are signs with a gestural characteristic, the authors draw on gesture studies (Andrén, 2010; Kendon, 2004; Ferrara and Hodge,

[1] See Oomen (2021) for an extensive list of studies on other sign languages.

2018) to delve into gesturality to understand the phenomenon of modification. They characterize construction in linguistics as the pairing between form and meaning. This pairing can be purely compositional (like a word) or schematic at various levels, from partial to complete. Two roles for the formation of constructions are entrenchment and chunking. In multimodal schemes involving gestures in spoken languages, entrenchment is observed in how gestures are linked to the morphosyntactic structures of the spoken language through recurrence and idiosyncrasy. These factors are observed by Schembri et al. (2018) in the analysis of indicating verbs in BSL, such that verb modification accounts for 70% of all indicating verbs, meaning that modification is very common. However, this modification is not standardized across all verbs, as some verbs are modified much more than others, which is interpreted by the authors as an effect of idiosyncrasy.

Based on this background, the authors argue that indicating verbs are constructions, but unlike the interaction between gestures and spoken languages, in sign languages, indicating verbs are not multimodal constructions but unimodal. This arrangement is only possible in sign languages since they feature gestures and lexicalized signs in the same modality. They argue that multimodal constructions with pointing signs are observed in the literature (see Kendon, 2004; Cooperrider, 2011, among others), and thus, the behavior of indicating verbs is closer to the use of pointing signs in co-speech gestures than to verbal agreement in spoken languages. The authors then analyze a context where the referents are both present and exhibit physical characteristics (such as height) that influence verb modification, concluding that verb directionality is governed not by formal traits but by the mental representation of the referent's spatial position (real or surrogate). This characteristic is even more evident in constructed actions, as CA precisely establishes the location of referents, favoring modification.

To conclude this theoretical discussion, we follow authors who have questioned the adequacy of a strict agreement-based analysis for verb modification in sign languages. Based on cross-linguistic observations and typological reflections found in the literature, we propose that a cognitively oriented approach may offer a more comprehensive account. Rather than viewing modification as syntactic agreement per se, we consider it a discourse-oriented mechanism that serves to indicate referents while also functioning at the morphosyntactic level to show verbal arguments relationship. From this perspective, we investigate whether linguistic prominence could be one of the underlying factors influencing verb modification. The following section introduces the concept of linguistic prominence and outlines how this framework will support our analysis of indicating verbs in DGS.

2.2 Linguistic Prominence

The concept of prominence in language studies is broad and is commonly associated with prosodic and phonological studies. However, linguistic prominence has recently been studied as a structuring principle of language, affecting all levels, from phonetics to conversational discourse. Himmelmann and Primus (2015) argue that, at the interface between language and cognition, cognitive prominence, linked to attention, systematically influences linguistic structure. Elements such as animacy, agentivity, and familiarity are cognitively prominent, and this prominence is reflected in linguistic structures. For example, human agents who are familiar will be more prominent and thus receive more immediate cognitive attention compared to unknown inanimate patients.

Himmelmann and Primus (2015) argue that once this phenomenon becomes linguistic, it operates within language according to specific characteristics, governed by three foundational principles: competition, dynamism, and structural attraction. They take these principles—originally applied to prosodic prominence—and extend them to propose a broader notion of *linguistic structural prominence*, which applies to morphosyntactic and hierarchical relations within language. In the morphosyntactic domain, prominence is perceived through competition between arguments of the same nature—for example, between subject and object—within the clause structure. Building on this perspective, von Heusinger and Schumacher (2019) apply these same principles to the domain of discourse, where *discourse prominence* involves competition between discourse referents, shaping their relative salience across segments of discourse. In our investigation of verb modification in DGS, we will explore how this modification is sensitive to morphosyntactic and discourse prominence, understood as two types of prominence that operate through different forms of competition.

Himmelmann and Primus explain that, semantically, human agents are inherently prominent when competing with inanimate patients. However, they are only considered prominent because they may not

be contextually so; otherwise, there would be no competition. This criterion of prominence being contextual is what the authors refer to as dynamism. In discourse, the prominence of a given element may change over time, as a topic in discourse may shift, and another element may become the new topic. Additionally, a newly introduced referent may be less prominent initially, but can become accessible through the use of anaphoric elements and gain a prominent status. In syntax, the subject is inherently prominent, but the object can receive special marking, such as DOM, which is a (case) marking only for objects with specific semantic properties, like animacy and definiteness (Aissen, 2003), making it more prominent than the subject. It is worth noting that prominence-sensitive mechanisms operate across different levels simultaneously and can sometimes move in opposite directions. In discourse, the less material a referent receives, the more accessible and prominent it is, whereas in syntax, a marked object with DOM is more prominent than an unmarked object. It is possible, in a given context, for a referent marked with DOM to be prominent at the syntactic level but not at the semantic level if it competes with another referent that has no overt realization (null). This is an example of how an element can be analyzed as non-prominent in terms of discourse prominence while being syntactically prominent. It shows how the types of prominence operate in different ways (and potentially seemingly opposite ways).

The third characteristic of a prominent element is its role as a structural attractor, meaning it becomes a determining factor for the functioning of other linguistic structures and allows for more operations than non-prominent elements. Accessibility, according to Heusinger & Schumacher (2019), is also a factor sensitive to prominence. They use this concept, developed by Ariel (1990), to illustrate how prominence can operate at the discourse level. Ariel (1990) had already linked this concept to prominence, claiming that more salient or prominent elements are more likely to be associated with more accessible anaphoric resources. Ariel proposes a scale that defines proper names and descriptions as having low accessibility, personal and demonstrative pronouns with intermediate accessibility, and third-person pronouns, gaps, and agreement with high accessibility. Heusinger & Schumacher (2019) explain that it is not the scale itself that is prominent, but rather that this scale is sensitive to prominence in discourse. To analyze prominence in discourse, one should not observe the competition between a pronoun and a proper name but between the referents present in the discourse. The more accessible referent, referenced with a pronoun or a null form, tends to be more prominent than other referents, because non-prominent referents must be referred to with full descriptive terms, whereas prominent referents can be referenced by any resource on the accessibility scale.

It is common for semantically prominent elements to also be prominent in syntax. This is why agents are commonly the subjects of sentences. However, when the patient becomes more prominent in context, this can lead to a passive structure, where the patient occupies the syntactically more prominent subject position. Additionally, morphological markings may be activated specifically for semantically prominent elements, such as the use of DOM in Turkish, which is sensitive to the specificity of the object (von Heusinger et al., 2019). In the following sections, we will explore how prominence-sensitive factors relate to verb modification in DGS and how these factors will be analyzed in our corpus.

2.2.1 Animacy and Agentivity

The role of the agent is presented by Himmelmann and Primus (2015) as a key example of an inherently prominent element. Agentivity is a set of traits that grants a referent central cognitive and linguistic status. The concept of the proto-agent, developed by Dowty (1991), is crucial for linking agentivity to prominence. Dowty explains that the ideal agent has volition, causality, and autonomous movement, making the agent the center of the event. As mentioned, the agent is typically realized as the subject of the clause and occupies the initial syntactic position, being understood as the origin of the action. Conversely, the patient appears in final position and is interpreted as the entity affected by the event. Because of its high inherent prominence, the agent receives what Himmelmann and Primus (2015) describe as passive linguistic attention — its prominent role is assumed and does not require overt marking. This distinction becomes especially relevant for our analysis of verb modification in DGS. In morphosyntactic terms, prominence is often linked to greater marking. However, since subjects are typically agents — and thus inherently prominent — they may not require explicit marking. When the subject lacks agentive features (as in experiencer constructions with verbs like BE-SAD or HATE in

DGS), this default prominence is weakened, and ambiguity may arise between subject and object roles (see de Souza Santos et al. 2025). In such cases, increased marking of the subject through verb modification may help disambiguate referential roles. On the other hand, when the patient (object) displays characteristics usually associated with the agent — such as animacy or discourse accessibility — it may gain prominence and require marking to reflect its atypical status in the clause. In this sense, what prompts the marking of the object is precisely what the subject prototypically already is: agentive, animate, and prominent. Verb modification in DGS allows for the marking of both subject and object referents. This makes it possible to track how prominence is distributed between arguments depending on their semantic and discourse features. Based on this, we hypothesize that subjects will receive more marking when they are less agentive, while objects will be more likely to receive marking when they are more animate and discourse-accessible — that is, when they deviate from the prototypical features of a patient. In this way, verb modification may reflect not only grammatical relations, but also the relative prominence of referents in the clause.

2.2.2 Coreferentiality

Analyzing co-referentiality will help us relate verb modification in DGS to discourse prominence. Coreference occurs when a referent that has already been introduced in the discourse is either maintained or reintroduced. Maintaining a referent, typically the subject, means mentioning it in a sentence after mentioning it in the previous sentence, while reintroducing a referent refers to mentioning a referent that has already been introduced in the discourse but not in the immediately preceding sentence. The first mention of a referent is classified as new since there is no co-referentiality at the time of that mention. A maintained referent tends to be more accessible, as it is easier to recall. Therefore, maintaining a referent often does not require much material, which is why pronouns or agreement markers are often sufficient to maintain it. On the other hand, reintroducing a referent involves referencing something that may be less accessible, requiring more material. Finally, new elements demand even more material, such as descriptions (full noun phrases), because they have not yet been introduced into the discourse. Given this, one might expect that verb modification would primarily be used for maintained referents, where reference tracking is crucial — especially for subjects, which are more often tracked grammatically. However, Fenlon et al. (2018) show that verb modification in fact occurs significantly with reintroduced referents. The authors argue that verb modification is not merely an agreement mechanism; rather, it involves gestural material connected to the verb that makes it referentially rich enough to retrieve a previously mentioned referent. As stated, discourse prominence tends to align with more accessible referents, but the reintroduction of a referent via verb modification can confer a status of prominence to the reintroduced referent. This is because the verbal marking is spatial, implying that it mentally repositions a referent in space. Thus, unlike other forms of reintroduction, such as using names or descriptions, verb modification — like the use of pointing signs — can be an additional marking that shifts prominence in reintroduction or maintains prominence when used for referent maintenance.

3 Current Study

This study aims to analyze the nature of verb modification in DGS through the lens of linguistic prominence. More specifically, we seek to understand how discourse-level and morphosyntactic-level prominence may be related to the modification of indicating verbs. The way verb modification interacts with prominence-sensitive elements, such as agentivity, animacy, and accessibility, may provide insights into the nature of verb modification in DGS. We assume that verb modification in DGS does not reflect obligatory agreement marking in the traditional grammatical sense. Instead of analyzing it as a purely morphosyntactic mechanism, we approach verb modification as a discourse-related strategy, particularly involved in referent tracking. In this view, modification is used to manage referential continuity and prominence within the discourse, rather than to fulfill syntactic agreement requirements. Accordingly, we focus on cases where referents are not explicitly realized in the clause — whether they are reintroduced after a gap in mention, or maintained through null arguments. In such contexts, we expect verb modification to play a more central role in tracking referents and maintaining their

prominence across discourse segments. At the same time, we also examine the relationship between syntactic arguments to explore whether modification can serve as a marker of morphosyntactic prominence, which would suggest a syntactic interpretation of modification. However, our hypothesis is that verb modification in DGS is not sensitive to syntactic prominence, as we argue that modification operates as a discourse-driven phenomenon. To test these hypotheses, we conduct a statistical analysis of the influence of animacy, agentivity, coreference, the use of Constructed Action (CA), the relationship between verb person marking, verb positioning, and the interdependence between subject and object modification.

4 Methods

4.1 Data: DGS corpus

Our analysis draws on naturalistic data from the Public DGS Corpus (Konrad et al., 2020). This corpus comprises approx. 50 hours of video recordings featuring pairs of signers engaged in unscripted dialogues on a variety of topics, gathered from different regions across Germany (including Berlin, Brandenburg, Bremen, Hamburg, Hesse, Lower Saxony, Mecklenburg-Vorpommern, North Rhine-Westphalia, Rhineland-Palatinate, Saarland, Saxony, Saxony-Anhalt, and Schleswig-Holstein). The participants are evenly distributed across four age groups (18-30 years; 31-45 years; 46-60 years; and 61 years and older) (Schulder et al., 2024). The recordings were conducted in a studio setting with a blue background, utilizing three cameras positioned to capture the signers from the front and side angles. The corpus encompasses a variety of textual genres, such as narratives and spontaneous conversations on topics like experiences of being deaf or discussions about notable figures. All videos from the public corpus are available for download and are accompanied by ELAN files with annotations. These annotations include glosses of the signs in both English and German, separately for the right and left hands of each signer in the pair, along with translations (approximately at the utterance level) into English and German.

4.2 Data selection for the analysis

4.2.1 Data Selection

We used all the videos of free conversation from the DGS public corpus, following the methodology of Fenlon et al. (2018). We analyzed 31 videos of dyadic conversations and a total of 56 deaf participants. Two videos featured participants who were already present in other videos, and in one video, there were no occurrences of indicating verbs. Table 1 summarizes the profile of the research participants.

Table 1: Participant Profiles

Region	City	Gender		AGE							TOTAL
		M	F	young	young-adult			adult		old	
				18-30	18-45	31-45	31-60	46+	46-60	61+	
North	Schleswig-Holstein	2	0							2	2
	Hamburg	2	0							2	2
West	Cologne	6	4	6		2				2	10
	Frankfurt	3	5			4	2		2		8
	Göttingen	2	0			2					2
	Münster	3	5	2	2	2			2		8
East	Leipzig	4	0	2		2					4
	Berlin	4	2				2	2	2		6
	Rostock	0	2			2					2

South	Munich	0	4			2				2	4
	Stuttgart	2	6	2					4	2	8
	Total	28	28	12	2	16	4	2	10	10	56

We analyzed the first 500 signs produced by each participant. We used the gloss counts from the ELAN files provided by the corpus. We summed the glosses from the existing tiers "lexeme_sign_r" and "lexeme_sign_l", which represent the signs produced with the right and left hands, respectively. We marked as tokens all sentences containing an indicating verb. At the end of the data collection, we identified 758 tokens, with an average of 13,54 tokens per participant. The highest number of tokens of verb modification per participant was 36, and the lowest was 2, showing a high variability of use of indicating verbs across participants. We coded the sentences for sign order, phonological modification, verb modification, constructed action, coreference, person, animacy, and thematic role. In the following subsection, we detail our coding for each token of verb modification.

4.3 Data coding

4.3.1 Verb position

We first annotate the order of the arguments related to the indicating verb. We did not note any adverbial or adnominal adjuncts, nor did we include repetitions of the verb or its arguments. Thus, when an argument was repeated, we only recorded its first occurrence in the sentence. We also noted when PAM was present in the sentence. We labeled the two main arguments as A1 and A2, with A1 being the agent or experiencer of the verb, commonly referred to as the subject, and A2 being the patient or recipient of the verb, commonly referred to as the object. In ditransitive verbs, we recorded the recipient as A2 and the content/theme as A3. After that, we annotate the position of the verb, whether it was in final position (Final), non-final (Nonfinal) position or alone (Only), following the Fenlon et al. (2018) annotation.

4.3.2 Verb modification

We documented verb modification in two ways: first, in a phonological and descriptive sense, and second, in a morphological and analytical sense. For each verb, we recorded whether there was a modification along the vertical axis. When the direction of the hand (as well as the body and gaze) was upwards, we noted it as "high," and when downwards, as "low." If there was no vertical change, we noted it as "center." This annotation can help us understand how verb modification is also related to pragmatic factors, such as the position of the referent towards which the verb is directed. We also recorded horizontal modification, labeling it as "ipsi" when the modification was towards the same side as the hand performing the sign (in two-handed signs, we considered the side of the signer's dominant hand) and "contra" when the modification was in the opposite direction to the hand performing the sign. This annotation could be useful in understanding whether the (non-)modification of the verb might be influenced by the referent's position relative to the signer, as "ipsi" modifications requires less energy than "contra" modifications. It is possible that modification occurs less frequently when the referent is in the "contra" position.

Regarding morphological modification, we noted whether the verb was modified in the direction of argument A1 and A2. In determining this direction, we took into account whether the referent was already established at that location (e.g., through prior discourse), physically present (such as the addressee), or introduced into that location via the modification itself.. Following Fenlon et al. (2018), we recorded for each verb if it was modified for each argument as "modified" or "unmodified" if it was not. However, when A1 was the first person and A2 was the second person, the modified verb would be identical to its citation form. In these cases, we labeled each argument as "congruent" if it aligned with the citation form's position. We also coded as "incongruent" when the verb was modified to a different position than where the argument was located, and "NA" (Not Applicable) when the verb could not be modified for an argument, as in the case of SEE, which only modifies towards A2 (due to phonological constraints). This annotation will be crucial for understanding how indicating verbs are modified in DGS.

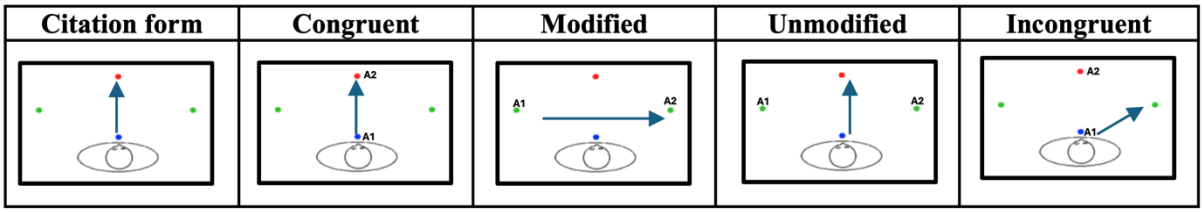


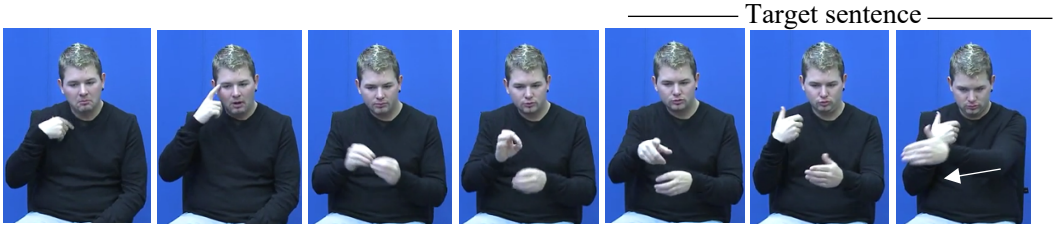
Figure 3: Annotation scheme for verb modification. In the example, the citation form starts at the signer's body and ends in the space in front of the body. When A1 is the first person and A2 is the second person, or a referent located in front of the body, we say that both A1 and A2 are **congruent**. When A1 and A2 are in different positions from the citation form, and the verb points in their direction, we say that both A1 and A2 are **modified**. When A1 or A2 are in a different position from the citation form, but the verb is produced in its citation form, we say the verb is **unmodified**. Finally, when the argument is in one position and the verb points to another, we say the modification (to A2 in the figure) is **incongruent**.

4.3.3 Constructed Action

We annotate the presence of constructed action in both the verb and the arguments. This means that in some cases, the constructed action could be associated with the verb and argument A1, or with the verb and argument A2. For instance, when a participant signs that they gave a gift using constructed action, A1 is in constructed action, but when a participant signs that they received a gift, A2 is in constructed action. The presence or absence of constructed action was marked as "yes" or "no" and is essential for understanding the spatial relationships between referents, as in constructed action, the referents occupy a space relative to the mapped referent, as discussed in section 2.1.2. Additionally, this allows us to observe whether the use of CA is common or rare with modified verbs and how CA influences prominence relations within the sentence.

4.3.4 Coreference

Following the approach of Fenlon et al. (2018), we also considered the sentence preceding the target sentence to annotate coreference. A sentence was defined as a unit containing one main predicate, used as the basis for identifying its arguments (Johnston, 2016). First, we annotate the form of the argument in the target sentence (FORM), which could be a noun, an index sign (a pointing sign used pronominally), a relative pronoun (like SELF), PAM, PERSON[2], CL (for classifiers), null, or possible combinations of these (e.g., PERSON + noun). For the preceding sentence (REFERENTIAL FORM), we annotated the same categories, adding N/A when the target referent was not present in the preceding sentence and "sentence" when an entire sentence served as the referent for the argument in the target sentence. We then categorized the type of coreference (COREFERENCE). When the referent was explicitly expressed in the sentence prior to the target sentence (i.e., not null or N/A), we marked the coreference as "Maintain." If the referent had been previously introduced but was not expressed (null or N/A) in the preceding sentence, we marked it as "Re-Intro" (reintroduced). If the referent was introduced for the first time in the target sentence, we marked it as "New." This annotation will allow us to investigate whether verb modification is related to degrees of accessibility.



[2] PERSON refers to a nominal sign meaning 'person', which is annotated separately due to its grammatical function, including spatial anchoring of referents. For discussion of the grammatical use of PERSON and its relation to PAM, see Pfau and Steinbach (2013).

1sg THINK MATCH FOR / 2SG BOYFRIEND VISIT
"I thought it'd be good because then you can visit your boyfriend."

a) Annotation	A1	A2
Form	2sg: Index pronoun	BOYFRIEND: noun
Referential form	N/A	N/A
Coreference	Re-intro	New
Target sentence verb modification	Modified	Modified

Figure 4: Example of coreference and modification annotation. In the example, the verb VISIT is modified from the reintroduced second person (index pronoun) to a new referent (BOYFRIEND).

4.3.5 Person

We also followed Fenlon et al. (2018) for the annotation of person. The authors mark person in two ways: first by indicating first, second, or third person and number (singular or plural), and second by showing only the relationship between arguments in terms of the use of the first person. Our analysis will consider only the second annotation, allowing us to focus on verb modification independently of the distinction between second and third person. Therefore, we annotate whether the semantic direction of the sentence is "First-to-nonfirst," "Nonfirst-to-first," or "Nonfirst-to-nonfirst," independently of the morphological distinction between second and third person. Specifically, we annotate each clause according to whether the semantic direction is "First-to-nonfirst," "Nonfirst-to-first," or "Nonfirst-to-nonfirst." Here, 'nonfirst' refers to both second and third person referents. Crucially, this annotation is based on the semantics of the participants in context, not on the morphological realization of the verb. That is, we identify whether the subject and object referents are first or nonfirst person based on the discourse, regardless of how the verb is produced. For example, in Figure 4a, the verb HELP is produced in its citation form (from the body to the neutral space in front), without visible modification. Nonetheless, we annotate this case as "Nonfirst-to-nonfirst," because semantically, the subject is the referent WHITE RING and the object is a group of VICTIMS—both third person referents.
Additionally, we mark "yes" or "no" if morphological alterations for number and aspect are observed, but we do not annotate number from a semantic perspective. Morphological changes potentially related to number or aspect were noted, as they might influence how verb modification occurs with respect to the arguments. For instance, a verb form indicating multiple recipients (e.g., paying several people) or repeated action (e.g., paying multiple times) may involve movement toward different argument locations, or at least deviate from the citation form—both of which can affect how modification is interpreted. These cases were annotated in order to later investigate whether such distinctions have an effect on modification patterns. The first/nonfirst relationship is crucial for understanding the influence of person on verb modification, particularly the impact of the first person.

4.3.6 Thematic Role

We annotated the thematic roles of arguments A1 and A2 for each sentence containing indicating verbs. For A1, we marked it as either "Agent" or "Experiencer." The fundamental difference between these two roles lies in the semantic parameter of volition (see Dowty, 1991), with non-volitional agents being classified as experiencers, as in the verbs SEE (experiencer) and LOOK (agent) in DGS. For A2, we noted either "Patient" or "Recipient." Specifically, in ditransitive verbs (e.g., GIVE), regardless of the presence of a third argument, A2 was marked as recipient. In monotransitive verbs (e.g., SEE in DGS), the object was marked as patient. Annotating these thematic roles helps us understand the relationship between verb modification and the concept of linguistic prominence.

4.3.7 Animacy

Animacy was annotated for A1 and A2 arguments following de Souza Santos et al. (2025). We distinguished between "Inanimate", "Human" and "Non-human animates", assigning a higher degree of animacy to humans than to other animals. Inanimate elements were marked as those that are not animals, even if they have some connection to humans, such as "school" or "deaf association" (institution). Groups of people, such as "parents" or the "deaf community," were classified as human.

Animacy is a key factor in analyzing the relationship between verb modification and prominence, as animacy is a well-tested factor sensitive to linguistic prominence.

4.3.8 Social factors

We used the corpus metadata to annotate social factors. Each entry includes a specification of gender, age group, and the city/region of the video participants. For the analysis, we grouped the cities into regions and collapsed across age groups so that the model would not have an excessive number of categories. The corpus itself does not include a predefined segmentation by hemispheres, but we adopted the regional division used in Macht (2016) for our analysis. Thus, the final stratification is shown in Table 2.

Table 2: Conventions for social factors

Region	City/Region from the corpus	Tokens	Age	Age group from the corpus	Tokens
North	SH, HH	64	Old	61+	120
East	MVP, BER, LEI	138	Adult	46-60, 46+	191
West	GOE, MST, KOE, FRA	192	Young-adult	18-45, 31-60, 31-45	299
South	STU, MUE	364	Young	18-30	148

4.4 Statistical Analysis

For the statistical analysis, we followed the methodology used by Fenlon et al. (2018). We employed the Rbrul script within R Studio to analyze the factors that may or may not favor verb modification. The logistic regression model was constructed using the gmler package, with the dependent variable defined as the modification of the verb for the subject in the first analysis and for the object in the second analysis, using the categories "modified" and "unmodified." To maintain a binomial dependent variable, we conducted two sub-analyses for each argument: the first, incorporating the congruent category into the modified category, and the second, excluding the congruent category from the analysis. Additionally, in the statistical analysis of subject modification, we excluded the N/A category (for verbs that cannot be modified for the subject, such as THANKS). The independent variables were: Modification of the other argument (i.e., in the subject analysis, whether object modification favors subject modification), CA, Person, Form, Animacy, Role, Coreference, and Referential Form, along with the social factors of Region, Gender, and Age. The random effects, as in Fenlon et al. (2018), were the verbs and the participants. Initially, the model indicates the significance of each factor; factors that are not significant will not be further analyzed. We then examined the log odds and the factor weight of the significant categories to determine which ones favor or disfavor modification, considering categories with positive log odds and a factor weight above 0.5 as favoring modification, and those with negative log odds and a factor weight below 0.5 as disfavoring modification.

5 Results

5.1 Quantitative results

5.1.1 Linguistic factors

After searching for and annotating the indicating verbs in 31 free conversation videos, we identified 758 occurrences of indicating verbs with at least two arguments. These occurrences spanned 107 different verbs, the most recurrent being the verb TO-LET-KNOW[3], which accounted for 13.5% (N = 102) of the cases. Thirty-three verbs appeared only once. The top 10 most frequent verbs represent

[3] We removed additional number and letter codes from the glosses in the corpus (e.g., TO-LET-KNOW1A was reduced to TO-LET-KNOW) for counting and statistical analysis. These codes follow the DGS Corpus glossing convention: a number (e.g., 1) indicates a lexical variant, a letter (e.g., A) indicates a phonological variant, and an asterisk marks that the sign form of the token differs from the citation form of the type or subtype (Konrad et al. 2020).

52.37% of the occurrences, while the top 50 account for 89.05%. The overall results indicate a higher rate of modification for objects than for subjects, with subject modification at 27% compared to 69% for objects, as shown in the Table 3. As described above, only clear deviations from the citation form were counted as instances of modification. Arguments marked as N/A due to phonological constraints were excluded from the calculation of modification rates.

Table 3: Results for verb modification to subject and object

	Subject		Object	
Modified	200	26%	521	69%
Congruent	370	49%	170	22%
Unmodified	78	10%	67	9%
N/A	110	15%	-	-
Total	758	100%	758	100%

When cross-referencing the subject and object results, the most frequent occurrences were modified objects with congruent subjects (32%, N = 245) and modified objects with modified subjects (25%, N = 187). The lowest proportions were observed for modified subjects with unmodified objects (N = 6) or congruent objects (N = 7), each at 1%. The statistical analysis results will provide insights into the influence of one argument's modification on the other. Due to the large number of congruent cases (particularly for subjects), the total counts differed between the statistical analyses. For the analysis of subject modification with congruent cases included as modified, a total of 648 tokens was counted (excluding 110 N/A cases, see Table 3). When congruents were excluded, the total dropped to 278 (648 – 370 congruents). For objects, with congruents counted as modified, all 758 tokens were included; when congruents were excluded, 588 tokens were analyzed.

We began the analyses with the social factors Region, Gender, and Age, as well as the linguistic factors Argument Modification, CA, Animacy, Form, Person, Referential Expression, Coreference, Verb Position, and Role. The results for CA and Person in subject modification displayed no internal variation and were therefore from the statistical model. Figure 3 illustrates this absence of variation, showing that all cases of CA were associated with subject modification (100%), while all First-to-nonfirst person combinations showed no modification (0%). In this context, for modification, we refer specifically to whether the verb was spatially modified toward the subject. For first-person subjects, modification is generally not observed because the starting point of the verb's citation form is already anchored to the signer's body. As a result, even if the verb is directed toward the object, its initial point remains the same as the citation form, making it indistinguishable from an unmodified verb. These cases were therefore annotated as congruent, and First-to-nonfirst combinations showed 0% modification and 81.6% congruent tokens, with the remaining 18.4% marked as N/A due to phonological constraints. A similar effect can be observed in the distribution of CA. Although 100% of CA cases were either congruent or modified, the majority (71%) were congruent. This is because, when the signer enacts a referent through CA, that referent is typically interpreted as first person, aligning the subject with the signer's body and the citation form. Consequently, most verbs in CA contexts do not show visible modification toward the subject and are therefore annotated as *congruent*. Nonetheless, we observed a meaningful subset of CA cases (13%) in which the verb was modified toward the subject. These cases generally involved the object being enacted through CA, while the subject was a third person referent—requiring modification toward the subject's assigned spatial location. The remaining 16% of CA cases were marked as N/A. In contrast, when CA was not present, the distribution across categories was more balanced: 31% modified, 42% congruent, 13% unmodified, and 14% N/A.

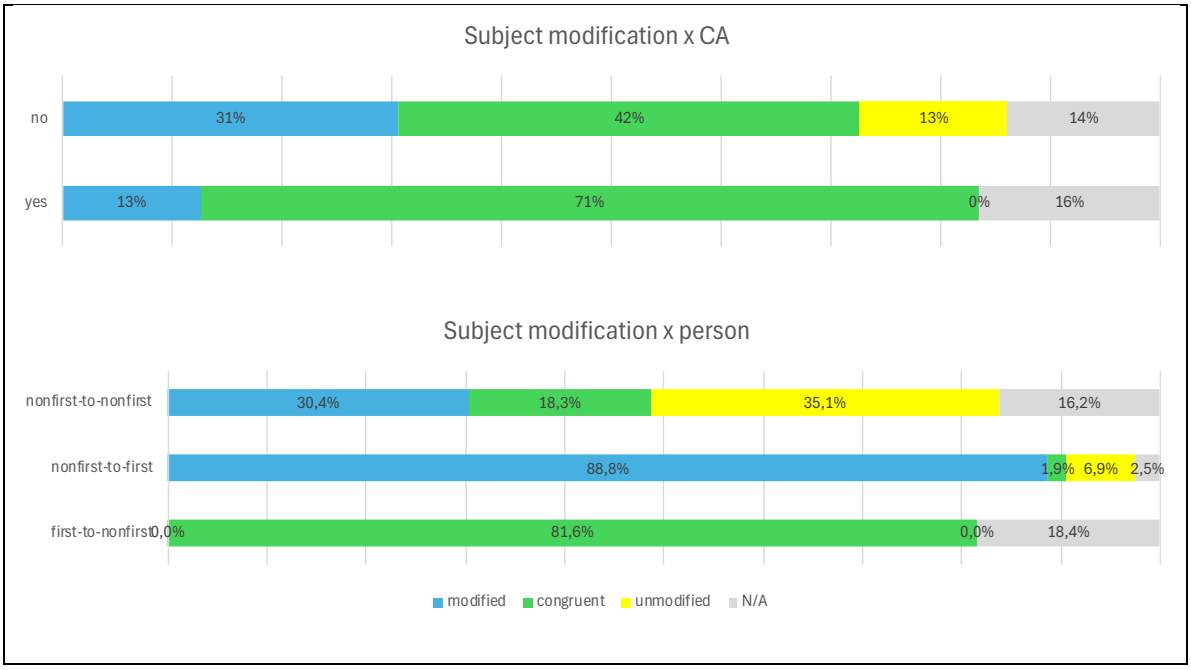


Figure 3: Results for Subject modification in CA and for Person

The use of CA was present in 23% (N = 176) of the occurrences, with 70% (N = 124) of these occurrences in congruent cases, that is, with the subject's position in citation form, alongside the body. Sixteen percent (N = 29) of the CA usage occurred with N/A modification, where the subject's position is not modified. Even so, we observed modified subjects in CA, representing 13% (N = 23) of all CA occurrences. The majority of these (N = 16) were Nonfirst-to-first, when in fact the verb was in CA enacting the object, as illustrated in the following example.

IX-3sg 3sg-EXPLAIN-1sg IX-1sg I-SEE

"They explained it, and I thought: "now I got it"."

Figure 4: In the example, the participant initiates a sequence in CA with a dialogue constructed to show a doubt he had while watching a television program; then, quickly and still in CA, he states that the matter was clarified. The verb EXPLAIN is produced in a Nonfirst-to-first context, but the CA is associated with the referent receiving the explanation.

Regarding the results for Person, the majority of cases are First-to-nonfirst, representing 54% of all occurrences, with only 1.2% (N = 5) modified, while the remainder (327 congruent and 75 NA) maintain the subject's position with the body. When the subject is not first person, the results are more varied. We observe a significant modification of the subject in Nonfirst-to-first cases (88.8%, N = 142). However, in verbs without a first person (Nonfirst-to-nonfirst), the largest proportion is of unmodified subjects (35%, N = 67) versus 30.4% (N = 58) modified, 18.3% (N = 35) congruent, and 16.2% (N =

31) N/A. Even in the object analysis, where Person did not reach statistical significance, the quantitative results show a lower proportion of object modification in Nonfirst-to-nonfirst (22%, N = 115) compared to Nonfirst-to-first (28%, N = 145) and First-to-nonfirst (50%, N = 249). Similarly, there was a higher proportion of unmodified objects in Nonfirst-to-nonfirst (43%, N = 29) compared to First-to-nonfirst (40%, N = 24) and Nonfirst-to-first (16%, N = 11).

Concerning the factors with collinearity, the collinearity between the linguistic factors Coreference and Referential Form was expected, since both depend on the realization of the referent in the preceding sentence. In cases where the referent is not mentioned, the response for Referential Form is N/A and Coreference cannot be Maintain, and vice versa. Table 4 shows this relationship.

Table 4: Relationship between the Coreference and Referential form factors

	N/A	pronoun	noun	NULL	Total
Subject					
Maintain	0	185 (41%)	40 (9%)	227 (50%)	452 (100%)
Re_intro	248 (100%)	0	0	0	248
New	58 (100%)	0	0	0	58
Object					
Maintain	0	113 (26%)	114 (26%)	213 (48%)	440 (100%)
Re_intro	224 (100%)	0	0	0	224 (100%)
New	94 (100%)	0	0	0	94 (100%)

Figure 5 shows the distribution of verb modification through argument coreference. Overall, the results show that the modification is not obligatory in any coreferential context. Objects with maintained referents (i.e., those mentioned in the preceding sentence) constitute the largest proportion of modified instances (71%, N = 313), compared to reintroduced referents (65%, N = 145) and new referents (67%, N = 63). However, they also constitute the highest proportion of unmodified instances (10%, N = 45), compared to 7% (N = 16) for reintroduced referents and 6% (N = 6) for new referents. The only category with a lower proportion of unmodified cases is congruent referents.

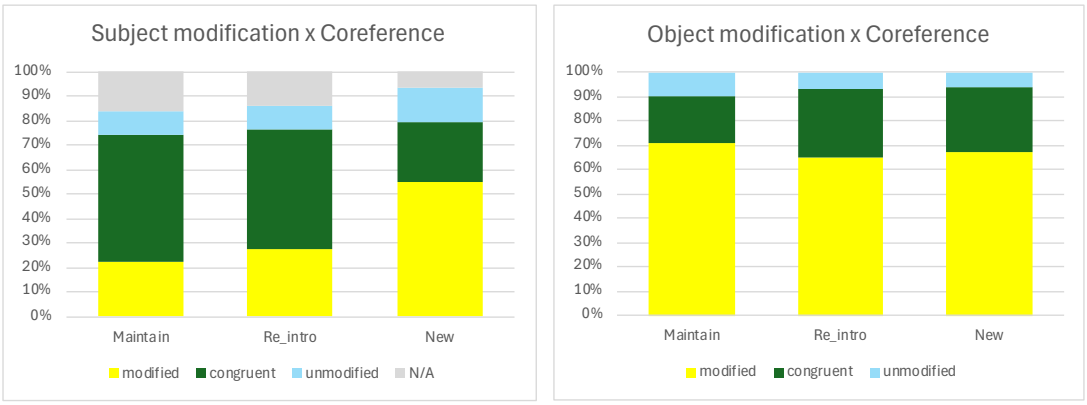


Figure 5: Verb modification based on argument coreferential context

For maintained subjects, we observe the opposite pattern: the proportion of verb modification is the lowest for maintained referents (22%, N = 100), compared to reintroduced referents (27%, N = 68) and new referents (55%, N = 32). When unmodified, the proportions are equal for maintained (10%, N = 46) and reintroduced referents (10%, N = 24), but higher for new referents (14%, N = 8). Additionally, we examined the phonological behavior of verbs concerning their horizontal and vertical orientation, as well as other morphological behaviors, such as aspect or plurality markers—whether related to the number of referents or to verb repetition as an indicator of frequency and aspect— to check whether these factors influence modification behavior. Morphological markers appeared in 14% (N = 93) of

occurrences. Among these cases, subject modification occurred in 29% (N = 27) and remained unmodified in 6% (N = 6). For objects, however, modification occurred in 84% (N = 78), while only 1% (N = 1) remained unmodified. This suggests a possible morphological influence on object modification. Regarding phonological behavior, we annotated horizontal positioning to determine whether placement relative to the dominant hand (ipsi or contralateral side) affected modification and vertical positioning to assess whether the physical properties of referents in the argument structure influenced modification. For horizontal positioning, the central position exhibited more unmodified instances and fewer modified instances compared to lateral positions for both subjects and objects, which aligns with expectations. However, the quantitative results do not indicate a phonological influence of horizontal positioning. Even though the proportion of modified subjects was slightly higher in ipsilateral cases (31%, N = 82) compared to contralateral cases (26%, N = 43), the proportion of unmodified subjects was also higher in ipsilateral cases (11%, N = 30) compared to contralateral cases (2%, N = 4). A similar balance is observed in object modification: ipsilateral modification occurred in 97% (N = 256) of cases, compared to contralateral modification in 93% (N = 154), while unmodified objects appeared in 2% (N = 4) of ipsilateral cases and 4% (N = 6) of contralateral cases. This suggests that the phonological and morphological environment does not restrict the verb modification. Additionally, we analyzed verbs that are phonologically capable of moving through space vertically. Cases of vertical modification accounted for 21% of occurrences, with 12% (N = 92) classified as high and 9% (N = 68) as low. These occurrences were associated with referent properties, such as referent size/height (Figure 6a), geographic positioning (Figure 6b), and even metaphorical hierarchical positions such as boss or teacher (Figure 6c). This shows the influence of semantic-pragmatic conventions on the choice of referent location.

a) SEE (CHILDREN) b) LOOK(STARS) c) TO-LET-KNOW (CHIEF)

Figure 6: Vertical modification of verbs influenced by properties of the referents

5.1.2 Social factors

All participants from the Northern region (Hamburg and Schleswig-Holstein) are elderly. Additionally, there are no elderly participants in the Eastern region. This is due to the methodological segmentation. Although the corpus as a whole presents a balance among the factors of Age, Gender, and Cities, this balance is not exactly segmented into identical cells – that is, some cities have more women and others more men, with some having younger individuals and others older. Finally, we selected only free conversation videos, which were possibly recorded with more elderly individuals in that region. The collinearity between the factors modification and region is presented in Table 5. Here, once again, the northern region yielded a null value in one category: none of the participants produced a verb categorized as Unmodified for the object. Since we know that all these participants are elderly, even though the region factor was not used in the statistical analysis, we will later observe the results for age.

Table 5: Results for verb modification by region

	modified	congruent	unmodified	total
north	49	15	0	64

south	95	33	10	138
east	143	38	11	192
west	234	84	46	364
total	521	170	67	758

Figure 7 represents the distribution of verb modification for the object across four age groups. When congruent cases are included, object modification increases with age. Young signers modified the verb toward the object in 93% of cases, young-adult signers in 92%, adults in 85%, and older signers in 98%. Notably, adults showed the lowest rate of object modification and the highest rate of congruent forms (15%), while older signers showed the highest modification rate and the lowest proportion of congruent responses (3%). When congruent cases are excluded, this trend is largely maintained. Older signers still show the highest rate of object modification (97%), while adults show the lowest (82%). Young and young-adult groups both show 89% modification. Again, adults are the group with the highest proportion of congruent responses (18%) and the lowest modification rate.

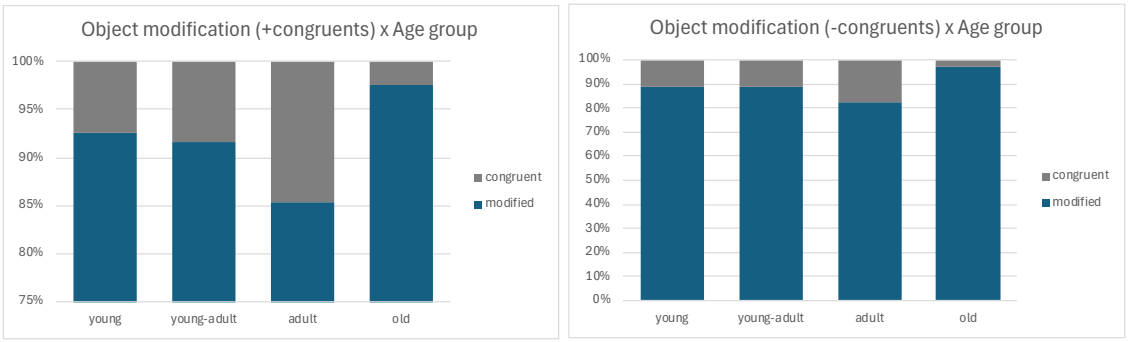


Figure 7: Distribution of verb modification to object by Age groups

The percentages of object modification by gender are represented in Figure 8. When congruent cases are included, men show a slightly higher rate of object modification (94%) than women (89%). This pattern remains when congruent cases are excluded, with men at 92% and women at 86%. In both conditions, the rate of object modification is consistently higher for male signers than for female signers.

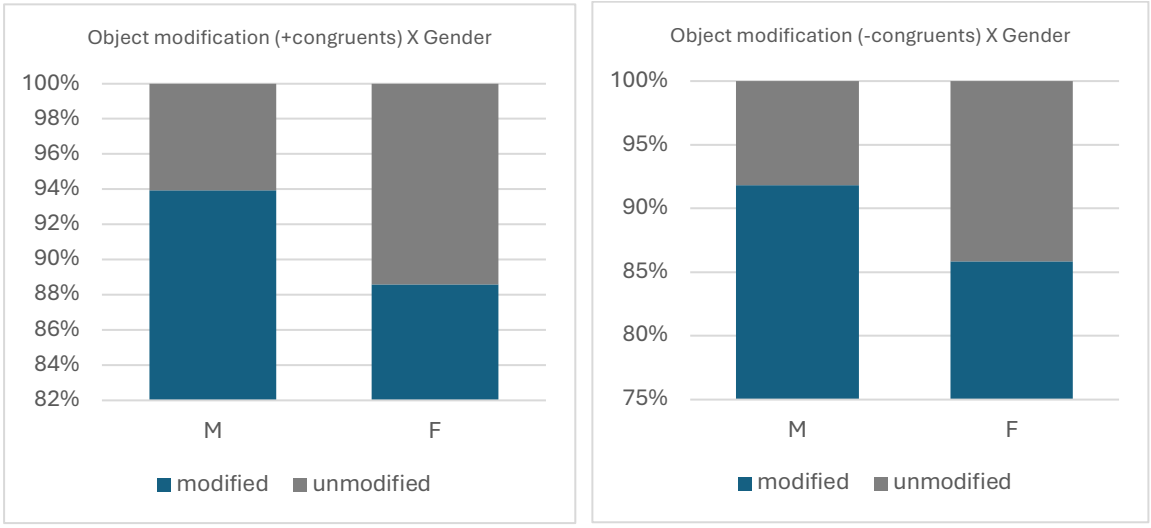


Figure 8: distribution of verb modification to object through male and female gender

Next, we present the results of the statistical analysis for verb modification for both the subject and the object.

5.2 Statistical analysis

Below, we present the statistically significant factors for subject and object modification. We adjusted the responses of the factors to avoid an excessive number of categories for each factor, given the total number of tokens. For example, we grouped classifiers, referential form sentences and their combinations (e.g., noun + pronoun) into a single "noun" category. In addition to the index personal pronoun, pronouns such as ALL and WHO were included. Two cases with reflexive first person use (e.g. *see myself*), essentially First-to-first, were excluded. . There were cases that we initially annotated as "incongruent," when the verb was modified to a location different from where the object was, including instances when the object was first person. These cases were included in Unmodified, since they were not modified for the argument and were not congruent. Although the animacy annotation included three categories—human, animate non-human, and inanimate—we opted for a binary distinction in practice, due to the distribution of the data. Only two tokens could potentially be classified as animate non-human, and both occurred in the same discourse context. In these cases, the signer was describing her first experience working in a slaughterhouse and recalled seeing a warehouse full of chickens hanging from the ceiling. The verb LOOK referred not to the chickens as individual animate referents, but to the overall scene or situation she witnessed. Based on this interpretation, we annotated these instances as inanimate, since the referent of the verb was the broader visual experience, not the animals themselves. In general, no factor contained more than four categories. When verb modification (called Argument modification) was treated as the dependent variable, the annotation categories were 4: Modified, Unmodified, Congruent, and NA. The variables Argument Modification and Person were statistically significant predictors of whether the verb was modified toward the subject. Specifically, the verb was more likely to be modified toward the subject in Nonfirst-to-first contexts, and less likely in Nonfirst-to-nonfirst contexts. Additionally, when the verb was modified toward the object, it was also more likely to be modified toward the subject; conversely, when the object was unmodified, modification toward the subject was disfavored. For modification toward the object, the significant predictors were Argument Modification, CA, Gender, and Age. The verb was more likely to be modified toward the object when it was also modified toward the subject, and less likely when the subject was unmodified. The presence of Constructed Action (CA) favored object modification, as did being male and being older. Because the set of significant predictors was nearly identical in both models—with and without congruent cases—except for Person (which could only be analyzed when congruent cases were excluded), we present the results for both conditions in the same table for ease of comparison.

5.2.1 Subject modification

We conducted two separate analyses for each argument position—one including congruent cases and one excluding them—to account for their ambiguous status in terms of modification. When analyzing whether the verb was modified toward the subject, the status of object modification (modified, unmodified, congruent, or NA) was treated as a predictor variable. In both analyses, object modification (A2) was a significant predictor ($p < 0.001$) of whether the verb was modified toward the subject. However, the influence of the object's status varied slightly between the two models. In the analysis that included congruent subjects, verbs were more likely to be modified toward the subject when the object was congruent (factor weight = 0.62). This suggests that when the object aligned with the citation form, the signer may have been more likely to actively modify the verb for the subject. In contrast, in the analysis that excluded congruent subjects, congruent objects no longer favored subject-directed modification (factor weight = 0.45). This indicates that the apparent effect of congruent objects was partly dependent on the inclusion of congruent subjects in the dataset.

Table 7: Results of verb-to-subject modification with statistically relevant factors

	Modified/Congruents x Unmodified				Modified x Unmodified (Congruents excluded)			
	logodds	TOKENS	%Modified	factor.weight	logodds	TOKENS	%Modified	factor.weight
A2 (p<0.001)								
modified	0.965	471	0.917	0.724	2.801	226	0.827	0.943
congruent	0.520	135	0.859	0.627	-0.173	26	0.269	0.457

unmodified	-1.485	42	0.524	0.185	-2.628	26	0.231	0.0674
Person (p<0.001)								
nonfirst-to-first	-	-	-	-	1.69	153	0.928	0.844
nonfirst-to-nonfirst	-	-	-	-	-1.69	125	0.464	0.156

In both analyses, object modification favors subject modification, with a lower factor weight (fw) in the first analysis (fw 0.72) due to the congruents, but a much higher weight in the analysis without congruents (fw 0.94), as shown in Table 7. Following this pattern, non-modification of the object disfavors subject modification in both analyses, with fw 0.18 when congruents are included and an even lower weight of fw 0.06 when congruents are excluded. The Person variable did not present the First-to-nonfirst category, since all cases in this category were excluded in the second analysis for being congruent. Nevertheless, there was a significant difference ($p < 0.001$) between the Nonfirst-to-first and Nonfirst-to-nonfirst categories, such that Nonfirst-to-first verbs favor subject modification (fw 0.84), while Nonfirst-to-nonfirst verbs disfavor it (fw 0.15).

5.2.2 Object modification

The analysis of object modification showed high significance ($p < 0.001$) for the same factors in both conditions, with differences among the categories (Table 8). As expected, subject modification was the most significant factor favoring object modification. In the analysis with congruents, both modified subjects (fw 0.89) and congruent subjects (fw 0.53) favored object modification, while unmodified subjects (fw 0.24) or those that cannot be modified (fw 0.24) disfavored object modification. However, in the analysis without congruent objects, congruent subjects disfavored object modification (fw 0.49), and the weight of modification was slightly higher (0.92) than in the analysis with congruents. The weight of Unmodified was also higher than in the analysis with congruents (fw 0.29), whereas N/A was lower in this second analysis (0.17).

Table 8: Results of verb-to-object modification with statistically relevant factors

	Modified/Congruents x Unmodified				**Modified x Unmodified (Congruents excluded)**			
	logodds	**TOKENS**	**%Modified**	**factor.weight**	**logodds**	**TOKENS**	**%Modified**	**factor.weight**
A1 (p<0.001)								
modified	2.104	200	0.970	0.891	24.500	193	0.969	0.921
congruent	0.119	370	0.957	0.53	-0.0172	261	0.939	0.496
unmodified	-1.108	78	0.744	0.248	-0.8768	59	0.661	0.294
N/A	-1.115	110	0.773	0.247	-15.560	75	0.667	0.174
CA (p<0.001)								
yes	0.961	176	0.977	0.723	1.132	141	0.972	0.756
no	-0.961	582	0.892	0.277	-1.132	447	0.859	0.244
Age (p<0.05)								
old	1.083	120	0.975	0.747	1.345	97	0.969	0.793
young-adult	-0.114	299	0.916	0.472	-0.224	231	0.892	0.444
young	-0.195	148	0.926	0.451	-0.381	101	0.891	0.406
adult	-0.774	191	0.853	0.316	-0.740	159	0.824	0.323
Gender (p<0.05)								
M	0.392	363	0.939	0.597	0.431	270	0.919	0.606
F	-0.392	395	0.886	0.403	-0.431	318	0.858	0.394

The use of CA was also highly significant ($p < 0.001$) in both analyses, with very similar results among the categories. In the analysis with congruents, the use of CA favored object modification (fw 0.72), while non-use of CA disfavored modification (fw 0.27). Nearly identical weights were observed in the analysis without congruents, in which CA favored object modification (fw 0.75), while its non-use disfavored it (fw 0.24). Among the linguistic factors, both Age and Gender showed significance ($p <$

0.05); it is worth noting that the region factor was excluded from this analysis. In both analyses, only elderly individuals favored object modification, with a weight of 0.74 in the analysis with congruents and 0.79 in the analysis without congruents, whereas young and adult speakers disfavored it. The category that most strongly disfavored modification was the adult category, with a weight of around 0.3 in both analyses. Regarding Gender, men favored object modification with and without congruents (fw 0.6), while women disfavored modification (fw 0.4) in both analyses.

5.2.3 Verb modification to subject x Verb modification to object

The results so far showed a strong relationship between subject and object modification, i.e., if the object was modified, the subject was likely to be modified and vice versa. These findings suggest that the factors analyzed as promoting the modification of one argument or the other may, in fact, favor verb modification in a more comprehensive manner, encompassing both arguments. In other words, they may support verbal modification as an argument-marking strategy. Nevertheless, a difference in modification between subjects and objects remains. We conducted a proportion comparison test in *R* using *prop.test* on the modification results (with congruents = modified) for subjects, excluding cases of N/A subjects to maintain consistency in response patterns between the two variables. Modification occurred more frequently in objects (93.52%) than in subjects (87.96%). The proportion test confirmed that this difference is statistically significant ($X^2 = 11.25$, $p < 0.001$), indicating that objects have a significantly higher probability of being modified compared to subjects. These results align with the pattern of greater flexibility in subject modification observed in other sign languages.[4] Additionally, among the 67 unmodified objects, the highest percentages were found in cases where the subject could not be modified (37%, $N = 25$) and in unmodified subjects (30%, $N = 20$). Meanwhile, among the 78 unmodified objects, two-thirds (66%, $N = 39$) had modified objects. This suggests that while there is a strong interdependence between argument modifications, subjects exert a greater influence on the lack of object modification than the reverse.

6 Discussion

6.1 Social factors

In this section, we present a brief discussion of the results that demonstrate the influence of social factors, specifically age and gender, on verb modification for the object in DGS. The statistical analysis indicated that men tend to modify the verb for the object more frequently than women, and that older individuals tend to modify verbs for objects more than other age groups.

We begin the discussion with the age factor. The results showed that older individuals favor modification, whereas other age groups do not. Findings regarding the age factor can help us understand ongoing linguistic changes, particularly when there is a continuous direct correlation between the dependent factor and age categories. For instance, if older individuals use a variant at a high proportion, but this proportion gradually decreases among younger groups, it is possible that this variation is declining in use and may even disappear in the future. Conversely, if a variant has a low proportion of use among older individuals but increases progressively among younger groups, it may become obligatory in the future. A corpus-based study on DGS by Otte et al. (2023) found that numerical incorporation (e.g., THREE^WEEK) is more common among younger signers and decreases in proportion with increasing age. On the other hand, the phrasal use of numbers (e.g., THREE+WEEK) is more prevalent among older individuals and reaches zero (out of 344 tokens) among younger signers. According to the authors, these data may indicate a possible linguistic change toward incorporation. Additionally, a study on conditionals in DGS conducted by Paulus (2022) found that younger signers tend to use more manual conditional variants (e.g., WENN) than older individuals, although the use of non-manual markers (e.g., raised eyebrows) is balanced across age groups. This study suggests a potential new trend in the use of manual signs for conditionals in DGS.

[4] Meier 1982; Padden 1988; Bahan 1996; Liddell 2003 for American Sign Language (ASL); Meir et al. 2007 for Israeli Sign Language (ISL); Engberg-Pedersen 1993 for Danish Sign Language (DTS); Costello 2015 for Spanish Sign Language (LSE); Pizzuto 1986 for Italian Sign Language (LIS)

However, in our study, we do not observe a complete direct or inverse correlation, as the adult group was the one that most disfavored object modification. The graphs in Figure 7 highlight the discontinuity in a supposed modification trend. This result suggests that another factor may have influenced the high frequency of modification among adults. More than half (N=64) of adult occurrences were in the Northern region (with 100% modification). Furthermore, there were no elderly participants in the Eastern region. Although it is not possible to determine the exact influence of the region on age-related results, as the region factor was not included in the statistical analysis, we can observe a discrepancy in the distribution of age groups by region. Comparing responses from the Southern and Western regions, we do not see a standard distribution of elderly participants: in the southern region, nearly 30% of occurrences come from elderly individuals, whereas in the western region, this proportion drops to 4%. Thus, it is highly probable that the region factor is influencing age-related proportions. This interference may also be due to stratification, as participant distribution is not standardized across groups.

A similar situation is observed in the distribution of men and women across regions, as there are no women in the northern region and only two men (compared to ten women). However, in the eastern and western regions, the proportions are relatively balanced, with 55% of tokens produced by women in the west and 36% in the east. Although the proportion of modification is high for both men and women, the difference between them is statistically significant, indicating that men tend to modify verbs more than women. Following Labovian principles (Labov, 2001) for interpreting social variables, one might infer that modifying the verb for the object is a more stigmatized variant, whereas not modifying the verb represents a standard variant in DGS. According to Labov, women, who historically receive less social prestige than men, tend to use more prestigious linguistic forms to attain social recognition. This interpretation could also lead to the assumption that all participants might be modifying verbs less due to being filmed, which introduces a level of formality, even in so-called "free conversations," thereby influencing the use of more prestigious forms. However, as discussed in the theoretical framework chapter, various studies point to the obligatoriness of object modification. These scientific approaches have direct implications for teaching and understanding what signers consider to be the standard form in DGS. Thus, the most standard or prestigious form in DGS would be object modification. Therefore, it would be expected that women modify verbs for objects more than men, as the standard form is typically the one with higher social prestige.

However, this is not what the results indicate, leading us to believe that the Labovian interpretation of gender is not applicable in present-day Germany for DGS. Stratton & Beaman (2024) critically analyze Labovian principles in the context of their application in sociolinguistic research in Germany. According to the authors, the male-female division is not as influential in contemporary German society, and many studies may be conflating the influence of gender with that of social networks. Since we do not have access to other factors that could influence diastratic variation in DGS, we cannot delve deeper into this analysis. It is also worth noting that the DGS corpus began to be recorded in 2009 and that the Deaf community may exhibit different levels of social organization within the same country, particularly concerning linguistic expression. Future research with updated data will be able to examine this factor in relation to other social variables, as well as provide stratification and more consistent results regarding the region and age variables. In the next section, we will discuss the results for linguistic factors.

6.2 Linguistic factors

6.2.1 Person x subject modification

The relationship between Person and subject-directed verb modification, as well as the patterns observed in Constructed Action (CA), both relate to the concept of the body as subject, as proposed by Meir et al. (2007). The authors argue that there is an asymmetry between the body and the hands, similar to the asymmetry between subject and predicate, and that the body as subject mechanism is evolutionarily prior to verbal modifications in sign languages. This explains why citation forms of verbs always have the body as the subject (even in backward verbs). In our annotation, we accounted for this principle; all First-to-nonfirst verbs were annotated as congruents. It is also important to recall that the

annotation of Person was semantic rather than morphological, meaning that we analyzed discourse to determine who the subject and object were and whether they were first or non-first person, regardless of verbal modification. When a signer adopted another referent as first person in CA, we examined the use of surrogate space in CA, ensuring that within CA, the argument structure was First-to-nonfirst. In the comparison between the two remaining response types, Nonfirst-to-first favored modification, as the presence of the signer in the argument structure—even in object position—led to the verb being interpreted as modified toward the subject. This is because, in order to mark a first-person object, the verb typically moves inward toward the signer's body. That inward movement, even if intended to mark the object, creates a spatial pattern that also aligns with subject modification. In this sense, the physical involvement of the body in the production of the sign influences its interpretation as being modified for both arguments. Conversely, Nonfirst-to-nonfirst disfavored subject modification, which may be related to the absence of the body as a referential anchor in the argument structure. We expand upon Meir et al. (2007)'s perspective by incorporating Fenlon et al. (2018)'s argument that the presence of the signer in the argument structure attracts modification. Even for objects, Nonfirst-to-nonfirst had more unmodified and less modified proportion than First-to-nonfirst and Nonfirst-to-first.

6.2.2 CA x Object modification

As we observed in the quantitative results section, in all cases where the verb appeared in a context of Constructed Action, the verb was modified toward the subject. This does not mean that the referent enacted in CA was always the subject. For example, in the example with EXPLAIN (Figure 4) discussed above, the signer enacts the object, but the verb is still modified for both arguments. That is, although the CA involves the object, the verb is still modified toward the subject—consistent with the overall pattern of 100% subject modification in CA contexts. The explanation for the relevance of object modification extends beyond the body as subject principle. Instead, Fenlon et al. (2018)'s interpretation of similar results in BSL provides an additional explanation: surrogate space in CA brings the object referent into the signer's immediate mental space, making it more spatially and referentially accessible. The example in Figure 9 illustrates this phenomenon: even when a new referent (MOTHER) is introduced, the use of CA in the verb TO-LET-KNOW, extended through the subsequent quotation, influences the spatial localization of the referent via verb modification, making it immediately accessible within the signing space.

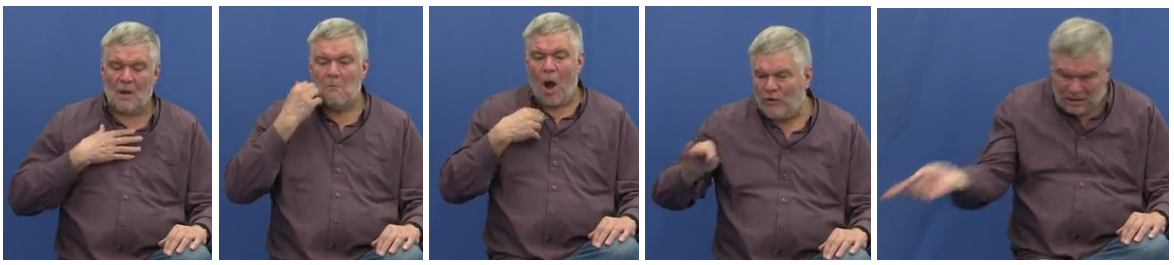
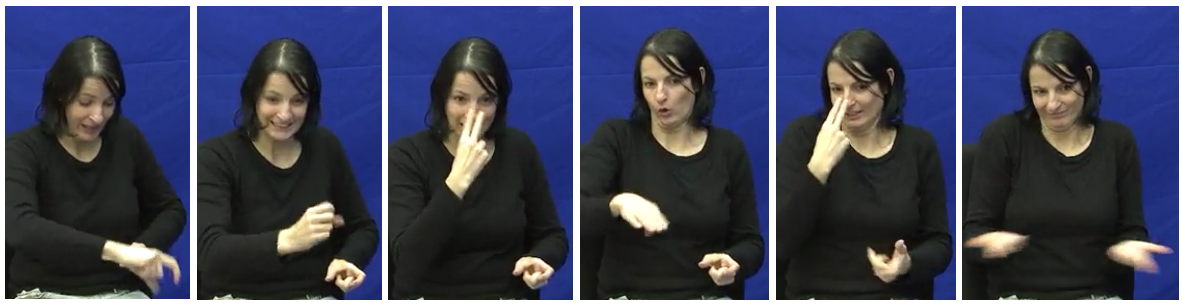


Figure 9: Example of modification for a new object referent**.** In this example, the signer states that he always tells his mother to attend the senior meeting in Freiburg. We have omitted the sign OFTEN (using (…) instead) from the example, as well as the remainder of the quotation, for formatting reasons.

Only 2% (N = 4) of CA cases did not result in object modification. We also annotated whether the use of CA was part of a constructed dialogue (CD), as in Figure 9. Among the 72 cases of CD, one instance did not modify the subject, and five instances did not modify the object. However, in the statistical analysis, we recoded the CD cases based on whether the verb was embedded within CA. In Figure 9, the verb appears in CD but is also in CA, since the action of the verb itself functions as the quotation, as seen in 46 out of 72 cases. However, in the remaining 26 cases, such as those illustrated in Figures 10a and 10b, although the verb appears within CD, it is not part of CA. In 10a, the participant is engaged in CD, requesting help. However, the verb HELP is not used with constructed action, as she is not enacting the act of helping. Similarly, in 10b, she is recounting an event in which she saw something, but she does not enact the verb SEE in either of its occurrences.

a) X-1sg DEAF PLEASE 3SG-HELP-1SG

"I'm deaf. Please help me."



b) STRIP CAN SEE CAR SEE NOT

"I was able to see the white median strip, but not the parked car."

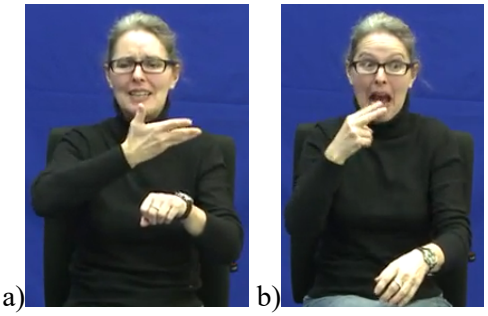
Figure 10: Examples of CD where the verbs HELP and SEE are not in CA. In this context, the participant is recounting a story about when she accidentally hit a parked car. She got out to ask for help at the house in front of the car. Upon discovering that the homeowner was also the owner of the parked car, she explains the reason for the accident.

In Figure 10a, although the verb is not within CA, the referents in CD are the same as those of the verb HELP. This may have influenced the modification of the verb. In contrast, in Figure 10b, although the signer used the signs CAR and STRIP and positions them in space—thus making them highly accessible, particularly the object STRIP, which remains as a buoy during the first realization of the verb SEE—the verb itself is not modified. Several factors may have contributed to this lack of modification, including the fact that SEE does not modify for subject and that the objects in this case are non-human. Additionally, the absence of the interlocutor in the argument structure may have played a role. It is possible that CD structures only facilitate verb modification when the interlocutors are also the arguments of the verb, as seen in the examples in Figures 9 and 10a. Further research with a larger dataset is needed to investigate these cases more comprehensively.

6.3 Non-Obligatoriness of Verb Modification in DGS

In this subsection, we discuss evidence for the non-obligatoriness of verb modification in DGS. The clearest indication comes from the presence of unmodified verbs even in contexts where modification would be expected—such as when referents are maintained and already established in space. If verb modification functioned as a syntactic agreement mechanism, it should apply consistently in such contexts. However, our data show that verbs may remain unmodified despite contexts with maintained referents (see Figure 5). Additional evidence comes from morphological and phonological behavior: as shown in the previous chapter, certain morphological forms of the verb appear to influence whether modification occurs, and even when modification is phonologically possible (e.g., with referents located on the ipsilateral side), it still does not happen systematically. Furthermore, we observe modification directed not only laterally but also vertically (upward/downward), which reinforces the challenge of listability and suggests that the system cannot rely on a fixed inventory of loci. These patterns support the view that modification is not syntactically required, but rather optional and shaped by broader cognitive and discourse-related factors. In the example shown in Figure 11, the participant is narrating a story involving herself as a child and her mother. Figure 11a captures the moment when the mother

hands her a bag. The verb GIVE moves from the participant's left to the center, indicating that her mother is positioned to the left within the signing space. However, as the story progresses, she recounts that after falling off her bicycle, her mother reacts in shock (Figure 11b) upon seeing her on the ground. The verb LOOK now points to the child on the left, whereas one might expect the child to be positioned to the right of the mother (in CA). This suggests that, in the participant's mental space and memory, the child moves to the opposite side of her mother while riding the bicycle. This movement is not syntactic but rather a real shift, represented in surrogate space through Constructed Action (CA), ultimately resulting in verb modification.



a) 3SG-GIVE-1SG b) 1SG-LOOK-3SG

Figure 11: Shift in Referential Loci Between the Verbs GIVE and LOOK

Our findings indicate that the notion of verb modification as a syntactic and obligatory process does not hold when interpreting our results. First, the accessible positioning of the referent in space does not necessarily guarantee modification. Second, object modification may be influenced by referent properties (e.g., plurality) or event properties (e.g., aspect), which are reflected in the morphological modification of the verb. Third, phonological behavior does not seem to restrict modification to the extent of affecting the results for unmodified verbs. Fourth, our data highlight the issue of listability, as discussed by Liddell (2000) as an argument for gestural-morphemic analysis, suggesting that an agreement system would be insufficient to account for such a wide range of modifications influenced by referent properties. Fifth, verb modification may diverge from established loci in ways that are not accounted for by a strictly syntactic system, but which instead reflect broader discourse or cognitive dynamics.

6.4 Prominence account

For the analysis and discussion of how verb modification in DGS may be sensitive to linguistic prominence, we considered three factors:

1. **Thematic role of the subject** – with agents being more prominent than experiencers.
2. **Animacy in both arguments** – with human referents being more prominent than inanimate ones.
3. **Coreference, particularly for the object** – as objects previously mentioned in discourse can be interpreted as definite (see de Souza Santos et al., 2025), and definite objects are more prominent than indefinite or new objects.

The statistical analysis did not identify these factors as significant for verb modification, neither for the subject nor for the object. However, some quantitative results suggest a possible relationship between verb modification and the competition between arguments for prominence. We can best illustrate this relationship by assigning degrees of competition for prominence based on previous studies (Himmelmann & Primus, 2015; Aissen, 2003; de Souza Santos et al., 2025) and by then cross-referencing levels of competition.

For **subjects**, we consider Role and Animacy as indicators of prominence. The values reflect degrees of prominence, such that higher numbers indicate greater prominence in the competition between arguments:

- **Agents** and **human referents** receive a weight of **2**.
- **Inanimate agents** or **human experiencers** receive a weight of **1**.
- **Inanimate experiencers** (which did not occur in our dataset) receive a weight of **0**.

For **objects**, we consider Coreference and Animacy.

- **Coreferential human objects** receivea weight of **2**.
- **Coreferential inanimate objects** or **non-coreferential human objects** receive a weight of **1**.
- **Non-coreferential inanimate objects** receive a weight of **0**.

Based on the total prominence scores that can be calculated for each argument (A1 and A2), clauses can be grouped into three categories:

- **A1 > A2** (subject more prominent than object).
- **A1 = A2** (subject and object equally prominent).
- **A1 < A2** (object more prominent than subject).

Figure 12 presents the results for verb modification according to each competition scenario.

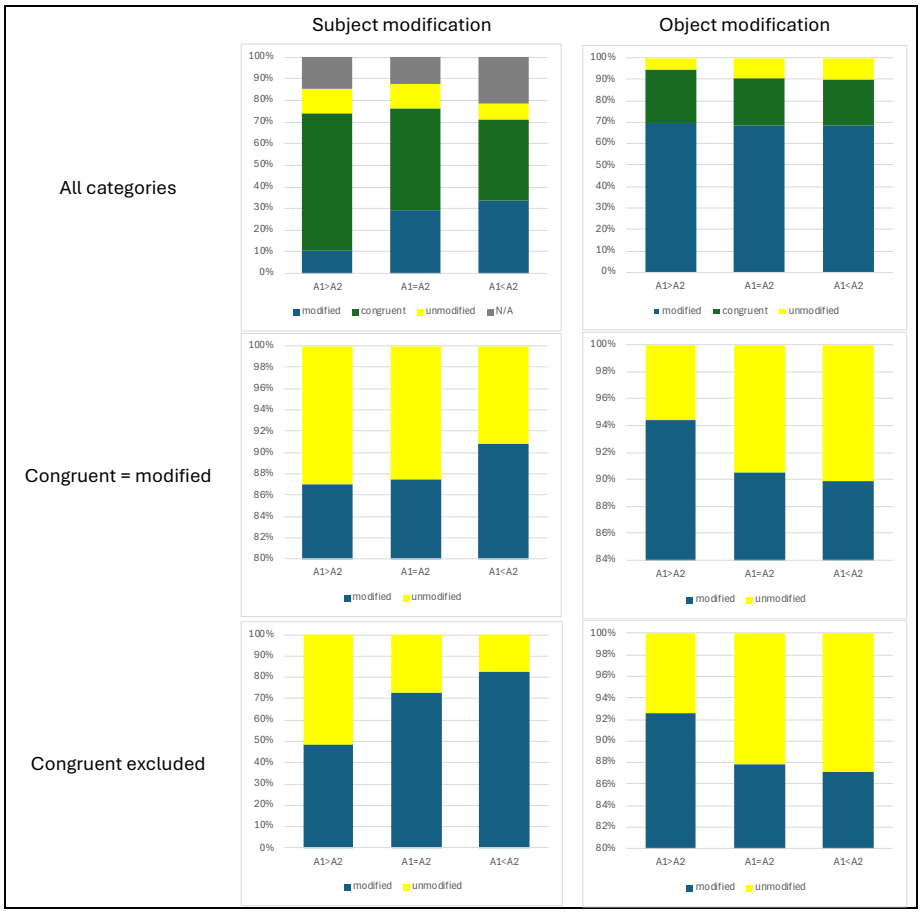


Figure 12: Argument modification based on competition for prominence analysis

Analyzing the relationship between modified and unmodified verbs across the three datasets, we observe a possible tendency for arguments to undergo modification when they are less prominent. This is evident in the slightly higher proportion of subject modification when the subject is less prominent than the object, and conversely, more object modification when the object is less prominent than the subject. However, it is important to note that these proportions are relatively close and did not yield statistically significant differences. We initially expected the results to indicate greater modification for more prominent arguments, particularly for prominent objects. From a statistical perspective, our findings suggest that verb modification in DGS is not clearly sensitive to prominence. However, this conclusion calls for further data collection or a more refined annotation approach concerning animacy, role, and coreference, incorporating additional subcategories for each factor based on their sensitivity to prominence. For example, we classified companies and governments as inanimate subjects and objects, even when the context implied the actions of human agents (e.g., with the verb GIVE). A more fine-grained categorization could allow for a deeper understanding of how prominence influences modification. Nevertheless, we can still consider the quantitative results to explore the role of

prominence in verb modification. Interestingly, our data suggest that when the agent is highly prominent—strongly agentive and discourse-salient—it does not require overt marking through modification. In contrast, less prototypical agents (e.g., low-agentivity subjects) show a slightly higher rate of modification, which may reflect their reduced prominence in both syntactic and discourse terms. This pattern appears to apply to objects as well, but we do not observe a similar increase in modification for more prominent objects. Still, the tendency to mark less prominent agents reinforces the view that verb modification in DGS serves a referential function: strongly agentive subjects tend to be protagonists in discourse and require less overt marking, while less prominent agents—especially when not mentioned in the preceding clause—are more likely to be reintroduced or emphasized through spatial modification.

In summary, our quantitative results suggest that lack of modification may signal prominence—but the question remains: what kind of prominence? There is a crucial distinction between morphosyntactic prominence (hierarchical position within clause structure) and discourse prominence (referent accessibility). If we consider morphosyntactic prominence, our findings indicate that verb modification does not systematically reflect argument prominence. However, through the lens of discourse prominence, the data align with the view that referents requiring less overt material—such as null arguments—are more accessible. Consequently, modification is more frequently used for referents that are less accessible or less prominent in discourse. This interpretation presupposes an understanding of modification as referential and discourse-driven, rather than as syntactic agreement. In research on spoken languages, verbal agreement does not inherently correlate with overtness—null arguments contain less overt material than full noun phrases, regardless of agreement marking. Similarly, as observed in BSL (Fenlon et al., 2018), where modification is productively used to reintroduce a referent as overt material, our findings support the view that verb modification in DGS serves as a mechanism for retrieving or reestablishing less prominent referents. In our data, subject and/or object modification occurs more frequently when referents are reintroduced or maintained as null, rather than when they appear as full nouns or pronouns in the preceding sentence. Beyond discourse accessibility (Ariel, 1994), the referential system in DGS is also tied to spatial positioning—meaning that the need to (re)introduce an element into signing space is stronger than the mere need to mention it again. Even though null-maintained elements are highly accessible in discourse, they are not necessarily accessible within the signing space. Modification, therefore, functions as a materialized mechanism that reallocates these elements within the spatial structure of the utterance.

7 Conclusion

The current study presents evidence that challenges the analysis of verb modification in DGS as syntactic agreement, particularly with respect to its non-obligatory nature. The results of the statistical analysis indicate a strong influence of person on verb modification for the subject, with modification being favored when the first person is involved in the argument structure. Additionally, Constructed Action (CA) has a significant impact on both subject and object modification, with 100% of CA cases involving subject modification and a statistically significant increase in object modification in CA contexts. These findings align with previous research on indicating verb modification in BSL by Fenlon et al. (2018). Moreover, a strong interdependence was observed between subject and object modification, with a general preference for modification over non-modification, and a notably higher proportion of modification in objects. Statistical analyses of role, animacy, coreference, and verb position did not yield statistically significant results. However, social factors such as gender and age showed a tendency toward favoring object modification. These findings further support the gestural-morphemic interpretation of modification, as Constructed Action appears to establish a dynamic mental representation that enhances the gestural nature of how referents are expressed in space. Additionally, the involvement of first person in the argument structure contributes to the mental representation of space, making referential gestures more productive. Most importantly, the non-obligatoriness of modification reinforces a gestural-morphemic reading of verb modification. The phonological behavior of verbs in horizontal positioning did not impose restrictions on modification in unmodified cases. Furthermore, when analyzing vertical verb positioning, many verbs were produced at different spatial points according to referent properties, highlighting the listability problem identified by Liddell (2000).

Finally, some cases of incongruence in verb modification could be explained by shifts in mental space and referential representation rather than by a purely syntactic system.

Regarding linguistic prominence, no significant results were found to establish a clear correlation between prominence and verb modification. However, the quantitative results suggest a potential tendency for verb modification to occur with less prominent elements, supporting an interpretation of indicating verb modification as a discourse-driven rather than a syntactic phenomenon. Nonetheless, when replicating the study by Fenlon et al. (2018), we did not obtain strong results consistently illustrating competition between referents for discourse prominence or competition between arguments for syntactic prominence. Further research could explore these issues by examining subsequent sentences beyond the target sentence, as well as additional preceding sentences, to gain a deeper understanding of how agentivity and coreference influence verb modification. Additionally, a more detailed analysis of verbal parameters that indicate the prototypicality of subjects and objects, along with syntactic positioning and additional marking strategies, could provide more concrete insights into how syntactic prominence may influence verb modification in sign languages.

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