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Distributional properties of an agreement marker in Austrian Sign Language (ÖGS)

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Abstract: This study focuses on the distribution of AGRM-BC, one of two agreement markers used in Austrian Sign Language (ÖGS; Krebs, Julia, Ronnie B. Wilbur & Dietmar Roehm. 2017. Two agreement markers in ÖGS. *Sign Language and Linguistics* 20(1). 27–54), with respect to different “verb types”. Using an online questionnaire, ÖGS signers rated ÖGS sentences involving different verb types that varied in whether they show agreement with their arguments (“agreeing” with two arguments, “plain” with none or only one) and if so, how (movement from subject to object, backwards from object to subject and/or facing towards object). Thus, the verbs differ in the degree and form of expressing agreement. In addition, these verbs either appeared with or without AGRM-BC. Data analysis revealed that the combination of inflected agreeing verbs and the agreement marker (“double agreement”) is acceptable in ÖGS. If the verb itself does not indicate full agreement (i.e., as in plain verbs) AGRM-BC can, but does not have to, be used to indicate the argument structure. Independently, whether the verb showed full agreement marking (movement and facing) or only facing did not influence the acceptability of the occurrence of AGRM-BC. The relatively high ratings for the combination of AGRM-BC with different verb types suggests that AGRM-BC functions as a general agreement marker in ÖGS.

Keywords: agreement, agreement markers, Austrian Sign Language, doubly-marked agreement, acceptability rating

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1 Introduction

Sign languages are expressed by manual (hands and arms) as well as non-manual means (e.g., upper body, shoulders, head, face, chin, eye gaze) within the three-dimensional signing space, i.e., the space in front of the signer that is used to convey linguistic information. Because signers also make use of the signing space for gestural reasons, the border between linguistic and gestural use of space with regard to some linguistic constructions is still under debate (e.g., Goldin-Meadow and Brentari 2017). One such construction is the process termed “verb agreement”.

In sign language grammar discourse referents are associated with specific locations in space by non-manual (e.g., eye gaze, body-shift) or manual means (e.g., index/pointing signs). These “points in space” (often denoted as “R-loci” for “Reference-loci”; see Figure 1) are used for expressing sign language verb agreement. Agreeing verbs indicate their argument structure by the starting and ending location of their movement and/or their hand orientation in space. In the regular case, the verbs move from the location associated with the subject argument to the location associated with the object (see section 2 for more details).

1.1 The issue of “verb agreement” in sign languages

The usage of spatial (and thus often assumed “gestural”) loci for expressing verb agreement and the claim that it shows some typologically unusual characteristics have led to debates about the status of verb agreement within sign language grammar. Typologically, sign language verb agreement is claimed to raise two problems: (1) that it does not show up consistently within the verb paradigm of any single sign language and (2) that it can be marked more than once (what we refer to as “double marking”).

Figure 1: Referencing of discourse referents in signing space (1: first person, made at signer’s body; 2: second person; 3a: third person referenced to the right of the signer; 3b: third person referenced to the left of the signer).

For example, Liddell (2003) has claimed that the establishment of spatial reference points, and thus the verb agreement process in sign languages, is merely gestural and therefore non-linguistic. One of his arguments is based on the assumption that morphological markers must be listable (able to exhaustively enumerate). He argues that the possible reference points in space are not listable, and therefore that they do not have linguistic status. Therefore, he denoted “agreeing verbs” as “indicating verbs”.

However, in addition to other counter-arguments against Liddell’s claim (e.g., Rathmann and Mathur 2008), Wilbur 2013 pointed out that listability cannot be used for determining the linguistic status of spatial loci, because exhaustive listability is also absent in some indisputably linguistic processes of spoken languages and is therefore not criterial to morphological or linguistic status. For instance, spoken languages with reduplication, metathesis and other process morphemes (in contrast to affixation) also cannot specify the full list of participating functional elements (Wilbur 2013).¹

Besides the question of the status of R-loci, there are some other cross-modal differences which have been taken to challenge the application of the notion “verb agreement” for sign language grammars. The main issues are that (1) only a subset of verbs overtly show “full” agreement with both their arguments, (2) all mature sign languages and apparently only sign languages have this type of verb agreement, and (3) there is a seemingly reversed hierarchical ranking between the arguments, i.e., it appears that the object outranks the subject with respect to frequency of marking (see Lillo-Martin and Meier 2011 for a discussion).

However, despite the debate and proposed solutions (e.g., Friedman 1976 for a semantic analysis; Padden 1988 for a syntactic analysis; e.g., Meir 1998 or Gökgöz 2013 for a combination of syntactic and semantic analysis; Lillo-Martin and Meier 2011 for linguistic and gestural analysis; Liddell 2003 or Fenlon et al. 2018 for a morphemic-gestural analysis), there is now general consensus in sign language linguistics that the process of sign language verb agreement is a linguistic process. Most recently Lourenço (2018) and Lourenço and Wilbur (2018) provide a

1 Rathmann and Mathur (2008) proposed a featural analysis of verb agreement in sign languages which provides a possibility how the listability issue could be removed at least from the morphological component (into the phonological component). Their analysis suggests that agreement is mediated by the features of the noun phrase instead of index-sharing or -copying. The approach assumes a finite set of person and number features, whereby the non-first person feature is realized as a zero morpheme. They suggest that the assumption of a zero morpheme can provide a solution to the listability issue. Wilbur 2013 argues that listability does not exist for morphological processes in general, and that the focus on the points in space overlooks the irrelevance of those exact locations as long as the viewer is able to interpret the person distinctions that the signer intends to signal.

convincing analysis that points out several flaws with the original claims. This work notes that the focus on “path” movement from one location to another has led to the expectation that all verbs should be marked by such movement. In essence, the error in this perspective is that not all verbs are transitive and not all transitive verbs have path movement. As a result, the co-localization of verbs with their sole arguments (e.g., intransitives) has been overlooked, greatly reducing the size of the verb set that is counted as “agreeing”. Thus Lourenço shows that many more verbs show agreement than was previously recognized because “path” was taken as the necessary form for agreement marking. Lourenço demonstrates that many verbs that have been classified as “plain”, that is, showing no agreement, are in fact able to co-localize with their argument (which has not been counted as agreement) or are phonologically blocked from doing so (truly “plain” verbs). Further, the claim that objects are marked more often than subjects is based on the erroneous counting that ignores intransitives and their subjects, and that also ignores transitive environments in which subject omission is licensed (e.g., control environments). We will follow Lourenço (2018) and use the term “verb agreement” for referring to this process. In addition, we will discuss below the use of non-manual marking as another form of agreement marking.

1.2 The use of agreement markers in sign languages

In the present study we focus on one property of the verb agreement system that is rather unusual from a typological perspective, although not unattested in spoken languages (see e.g., Steinbach and Pfau 2007 for a discussion). We investigate “double agreement marking”, i.e., the combination of an overtly marked agreeing verb with a separate sign that also functions as an agreement marker in Austrian Sign Language (ÖGS).

Agreement markers are manual signs that indicate the argument structure of the verb by spatial modulation of their movement and/or hand orientation (like agreeing verbs do). To date, such agreement markers have been described for a number of sign languages, although these signs differ in their phonological form, their syntactic distribution, and their apparent lexical source (e.g., Sapountzaki 2012; Steinbach and Pfau 2007). The main and often sole function of these agreement markers seems to be agreement marking, mostly accompanying “plain” verbs that do not indicate their argument structure by movement in space.

These agreement markers have been of particular interest with respect to the discussion of the linguistic status of sign language verb agreement. Crucially, the existence of these agreement markers and the observation that they indicate the relation between the subject and the object – and thus not a source-to-goal relation – has been taken as evidence that the agreement process is at least partially

determined by syntactic constraints (e.g., Bos 2017; de Quadros and Quer 2008; Lillo-Martin and Meier 2011; Steinbach 2011).

Some of these agreement markers are not only used to fill an agreement gap, if the verb itself does not mark any agreement, but can also co-occur with overtly marked agreeing verbs. This form of double agreement marking has been observed for a number of sign languages (e.g., Bos 1994 for Sign Language of the Netherlands NGT; Steinbach and Pfau 2007 for German Sign Language DGS; Quer and Frigola 2006 for Catalan Sign Language LSC; Smith 1990 for Taiwanese Sign Language TSL; Costello 2015 for Spanish Sign Language LSE). Such double marking flies in the face of claims that these agreement markers exist only to show agreement when the verb does not. What is now clear is that there is little uniformity to agreement marker behavior – some sign languages do not have them, some allow them only with “plain” verbs, and some allow double agreement marking.

1.3 Investigating the combination of an ÖGS agreement marker with different “verb types”

Because different sign languages have different rules for how their agreement markers behave, it is necessary to investigate them separately for each sign language. This study is the first systematic attempt to test the combination of an agreement marker with the different possible verb types. In particular, using an online questionnaire study we investigated whether the form and/or the amount of agreement information carried by the verb influences the acceptability of the occurrence of the agreement marker. We formulate three different hypotheses with respect to the outcome of the present study:

Hypothesis 1: Multiple agreement markers are not preferred.

Hypothesis 2: Multiple agreement markers are preferred.

Hypothesis 3: Whether multiple agreement markers are preferred depends on influence of other factors.

For the first outcome, we formulated the *Reduce Redundancy Hypothesis*: Signers prefer reduced/less agreement compared to double/more agreement. The Reduce Redundancy Hypothesis states that multiple agreement marking (i.e., on the verb and with an overt agreement marker) is dispreferred. Multiple agreement marking

may be dispreferred because signers prefer to avoid redundant information in general and to use reduced/less agreement in particular.

As a general phenomenon, languages provide numerous ways to reduce redundancy in ongoing conversations and, hence, narrations and text. Among the most notable are the existence of pronouns to avoid repeating nouns, especially but not only proper nouns. A further step in this direction is the permissibility of pro-drop in some languages, primarily for subjects but also in some cases for objects as well. Likewise, languages permit the deletion of verbs and verb phrases under conditions of (varying degrees of) identity in forms of conjunction/coordinate reduction, ellipsis, gapping, sluicing, and other specialty omission structures.

It should not then be surprising that sign languages also permit various forms of pronominalization and omission; indeed it is documented for American Sign Language (ASL) (Wilbur 1994: 668–670). Hypothesis 1 predicts that signers prefer structures in which agreement marking is expressed by agreeing verbs alone as compared to the combination of an inflected agreeing verb and an additional (unnecessary and redundant) agreement marker. Under this “Reduce redundancy hypothesis”, sentences with inflected agreeing verbs without an agreement marker should be rated higher than with an agreement marker; that is, double marking should carry a penalty.

In line with Hypothesis 1, one could further propose that the acceptability of the combination of AGRM-BC with a specific verb depends on the inherent agreement properties of the verb itself. Thus, the degree to which a verb may show agreement may influence the acceptability ratings on the usage of AGRM-BC. Agreeing verbs can be inflected by modification of start and end movement, but they can also be marked by a specific hand orientation whereby the palm and/or the fingertips are facing towards the object (i.e., facing). Some overtly marked agreeing verbs show both modification of start and end movement as well as facing. Hypothesis 1 proposes that the more agreement information a verb may carry, the lower the acceptability of the combination of this verb with AGRM-BC might be. According to this account, the combination of AGRM-BC with verbs that are inflected for agreement by modification of start and end movement (even if the direction is reversed as in the case of backwards verbs; see below) and facing should be rated worst, because these verbs show maximal use of signing space and hand orientation for agreement marking. Additionally, the usage of AGRM-BC in sentences with verbs that only show facing, but no modification of start and end movement, should be rated not as bad compared to sentences showing both, because these verbs are inflected to a “lesser degree” (i.e., the verbs themselves bear fewer agreement features). In contrast, the sentences with AGRM-BC involving “plain” verbs should be rated relatively higher than all of the sentences with overtly marked agreeing verbs in combination with the agreement marker.

For the second outcome, we formulate another more structurally specific hypothesis: *Enhance Agreement Marking*. The marking of argument agreement information is of such high importance that it needs to be emphasized by multiple means. Unlike the Reduce Redundancy Hypothesis, which could be considered a broader cognitive principle, the Enhance Agreement Marking hypothesis is specific to the linguistic issue of marking argument agreement in a language. That is, despite the existence of other enhancement processes in sign languages, such as subject pronoun copy or various types of doubling (wh-word, negation, verb or modal), they would not be seen as instances of the structure-specific Enhance Agreement principle.

According to Hypothesis 2, multiple agreement marking is preferred, predicting relatively higher ratings for the combination of marked agreeing verbs with the agreement marker in contrast to agreeing verbs without the agreement marker. Agreeing verbs that are maximally marked for agreement by the start and end of their movement and facing should be rated higher in combination with AGRM-BC in contrast to those with only facing. In line with Hypothesis 2, sentences with AGRM-BC involving plain verbs should be rated relatively lower than all of the sentences with agreeing verbs in combination with the agreement marker, because only the structures involving agreeing verbs co-occurring with AGRM-BC show multiple agreement marking.

Finally, the third outcome would be a mixed result in which other linguistic factors (such as verb type) might affect whether an overt agreement marker is preferred or not. Such factors could include phonological, morphological, syntactic or semantic features that contribute to verb classes.

Hypothesis 3 predicts that multiple agreement marking depends on verb type, that is that multiple agreement marking is more acceptable, for instance, for regular agreeing verbs, but perhaps not for backwards verbs or vice versa. Further, it may be that only plain verbs receive high ratings when combined with the agreement marker and that overtly marked agreeing verbs might get relatively lower ratings when co-occurring with the agreement marker.

By investigating the combination of one of the ÖGS agreement markers with different verbs that vary in whether they show agreement and if so, how (modification of start and end movement, backwards modification of start and end movement, and/or facing) the hypotheses outlined above will be tested. This article is organized as follows: In section 2, argument relations in sign languages, sign language agreement markers and their distributional properties, as well as argument relations in ÖGS, are described. In section 3, the present study, i.e., the method, results and discussion of results, is presented. Finally, concluding remarks are discussed in Section 4.

2 Argument relations in sign languages

In sign languages, argument structure is marked either by word order, semantic restrictions, discourse interpretation patterns for null arguments, and/or a system of verbal modification which has been termed “agreement” (e.g., Lillo-Martin and Meier 2011). In general, the majority of sign linguists do not assume any case marking in sign languages, although there have been some efforts in this direction.²

To describe the process of “verb agreement” in sign languages the mechanism of referencing (i.e., pronominalization) has to be outlined briefly. As indicated in the introduction, in sign languages discourse referents are associated with specific locations in space by non-manual (e.g., body shift, eye gaze) and/or manual means (e.g., index/pointing signs). The referencing may be associated with physically present as well as non-present referents. By pointing back to previously established locations, the signer can re-reference a previously introduced discourse participant. Once a referent has been associated with a certain locus or an area in space, the relation will hold until those locations are re-associated with other discourse referents or possibly when a new topic is introduced.

These points in space, i.e., the R-loci, are also used to indicate the argument structure by overtly marked agreeing verbs. Agreeing verbs realize agreement (in the regular case) by modification of the start and end locations of their movement from the R-locus associated with the subject to the R-locus of the object (Fischer 1975; Padden 1988). In many cases the hand orientation of the verb sign is modulated, in that the palm and/or the fingertips are directed towards the object position, i.e., are facing towards the object (Brentari 1989). This hand orientation sometimes co-occurs with modification of start and end locations of the movement (e.g., the ÖGS sign for ‘visit’ BESUCHEN) and sometimes as the only agreement marking – the “facing agreeing verbs” (e.g., the ÖGS sign for ‘criticize’ KRITISIEREN) (Examples (1) and (2)).³ Interestingly, there is also a set of irregular agreeing verbs that show a reversed pattern of modification of the start and end locations for their movement, namely starting from the object and moving to the subject position

² Kegl (2003) assumed that ASL uses a system of case marking for pronominalization. Recently, some researchers have started to use syntactic case marking for explaining the difference between regular and irregular agreeing verbs in sign languages (e.g., Geraci et al., 2016; Lourenço, 2016; Pfau and Salzmann, 2016). However, there is no evidence of overt morphological case marking in sign languages so far.

³ Notation conventions: Signs are glossed with capital letters; IX = manual index sign; AGRM = agreement marker; subscripts indicate reference points within signing space; the subscripts in parentheses indicate facing (i.e., only facing and no path movement) towards the object position.

(e.g., the ÖGS sign for ‘invite’ EINLADEN; Example (3)). These so-called backwards verbs may also use facing towards the object (Meir 1998).⁴ In addition to the agreeing verbs that inflect for person, Padden (1988) also described another verb group, the “spatial verbs” which show locative argument agreement by modification of the start and end locations of the movement from the source to the goal (e.g., the ÖGS sign for ‘to move’ UMZIEHEN; Example (4)).

The group of plain verbs that do not inflect for agreement at all, i.e., verbs whose start and end movement locations and/or hand orientation cannot be modulated, constitute the third (and last) verb group in Padden’s description of verb types in American Sign Language (ASL) (but see section 2.3 for further discussion). For an example of a plain verb construction see (5).

- (1) WOMAN IX_{3a} GIRL IX_{3b} 3a VISIT_{3b}
The woman visits the girl.
- (2) WOMAN IX_{3a} GIRL IX_{3b} (3a) CRITICIZE_(3b)
The woman criticizes the girl.
- (3) WOMAN IX_{3a} GIRL IX_{3b} 3b INVITE_{3a}
The woman invites the girl.
- (4) WOMAN _a MOVE_b
The woman moves from one place to another.
- (5) WOMAN IX_{3a} GIRL IX_{3b} KNOW
The woman knows the girl.

Sign languages differ in how they indicate argument relations in plain verb constructions. For example, ASL uses a strict word order (SVO in this case) to indicate the argument structure, or the semantic context avoids any potential argument ambiguities (referred to as “non-reversible” sentence contexts) (Fischer 1975). Moreover, there may be other (non-)manual cues that could be used to avoid ambiguities. One spatial default mechanism has been described for Italian Sign

⁴ In Padden’s (1988) first description of verb classes in ASL, both regular and irregular (backwards) agreeing verbs, were analyzed as belonging to the class of agreeing verbs. She referred to the agreeing verbs as “inflecting” verbs. See Geraci et al. 2016 for an analysis of backwards verbs of Italian Sign Language (LIS) as middle/unaccusative verbs.

Language (LIS), in which the sentence subject is referenced at the ipsilateral side to the signer's dominant hand and the object is placed contralaterally when the expression of spatial relationships among event discourse referents in the signing space is not required (Geraci 2013).

Further, at least for ASL, a form of non-manual agreement marking has been described (Bahan 1996; Neidle et al. 2000). In particular, it was proposed that head tilt towards the subject position marks subject agreement and that eye gaze towards the object position indicates object agreement. Bahan (1996) also observed that a sideward body shift towards the subject position is an additional cue marking subject agreement occurring simultaneously to the head tilt towards the subject position. Interestingly, these non-manuals often seem to begin before the verb. Moreover, Neidle et al. (2000) claimed that this syntactic non-manual agreement marking occurs with agreeing as well as plain verbs. However, in an eye tracking study, Thompson et al. (2006) observed that the claim that eye gaze marks the object seems to hold only for agreeing verbs, but not for plain verbs.

Many of the sign languages investigated so far make use of specific independent signs, agreement markers or agreement auxiliaries, to indicate the argument structure in sentences with plain verbs (for information about how argument relations are expressed in ÖGS see section 2.2). In the following section the properties of different sign language agreement markers as well as their distributional characteristics with regard to different verb types will be described.

2.1 Sign language agreement markers

For a number of genetically unrelated sign languages, agreement markers or agreement auxiliaries to indicate argument structure have been described (e.g., Bos 1994 for Sign Language of the Netherlands NGT; Steinbach and Pfau 2007 for German Sign Language DGS; Quer and Frigola 2006 for Catalan Sign Language LSC; Smith 1990 for Taiwanese Sign Language TSL; Costello 2015 for Spanish Sign Language LSE; Fischer 1996 for Japanese Sign Language JSL; Sapountzaki 2005 for Greek Sign Language GSL). In general, agreement markers accompany plain verbs and indicate agreement as described for regular person agreement marking (modification of start and end locations of the movement, facing). The sign languages for which agreement markers have been described differ in the number of agreement markers they have. Furthermore, the syntactic position agreement markers may take in a sentence, which verb types they may appear with, as well as the lexical source they may have

developed from, differ depending on the sign language under investigation (e.g., Sapountzaki 2012; Steinbach and Pfau 2007; for a summary of characteristics of agreement markers in different sign languages see Table 1).

For example, Smith (1990) described three forms of agreement auxiliaries in Taiwanese Sign Language (TSL). Two of these auxiliaries (AUX-2, AUX-11) are derived from verbs (i.e., AUX-2 is derived from the verb SEE and AUX-11 is derived from the verb MEET), but the meaning of the source verb has been semantically bleached in these auxiliary uses, such that these auxiliaries now have to be combined with a lexical verb. The third TSL auxiliary (AUX-1) is realized by the index sign IX and is assumed to have developed from pronominal sources. The three TSL auxiliaries preferentially occur in pre-verbal position.

DGS has only one auxiliary, referred to as PAM (Person Agreement Marker) (Rathmann 2003). PAM has developed from nominal sources, namely from the DGS noun PERSON (Pfau and Steinbach 2006, 2013). PAM appears pre- and post-verbally and also before the object (DGS is SOV), depending on the dialectical variation (Rathmann 2003; Steinbach 2011) (for more detailed cross-linguistic comparisons, see Sapountzaki 2012; Steinbach and Pfau 2007).

Although these agreement markers have been sometimes termed as “auxiliaries” they cannot be equated with auxiliaries as typically described for spoken languages because they differ with respect to their function, their developmental sources, and the restrictions on which arguments they can take. In contrast to spoken language auxiliaries, which are mainly used to mark tense, modality and aspect, the main (and in most cases only) function of agreement markers in sign languages is to express agreement. Furthermore, spoken language auxiliaries are usually derived from verbs, whereas sign language agreement markers seem to have evolved from verbal, pronominal or nominal sources. In addition, most of the sign language agreement markers are restricted to select only animate arguments (like agreeing verbs), which is rather unusual for spoken language auxiliaries (Pfau and Steinbach 2006).

This paper focuses on the question of which verb types one of the ÖGS agreement markers (AGRM-BC) can co-occur with. Therefore, in the following the distributional or combinatorial properties of agreement markers observed for other sign languages will be briefly described as background. In general, they are primarily used to mark agreement in sentences involving plain verbs. In addition, in some sign languages, agreement markers may also accompany predicative adjectives (e.g., DGS, Steinbach and Pfau 2007). However, these agreement markers show different behaviors regarding their ability to combine with different verb types. In particular, in some sign languages agreement markers may also be combined with uninflected agreeing verbs, that is, with verbs that could have

shown agreement with movement or facing but for some reason do not (e.g., Bos 1994 for NGT; Fischer 1996 for JSL; Costello 2015 for LSE).⁵ Furthermore, there are sign languages whose agreement markers may co-occur with agreeing verbs that actually do show agreement (“double agreement marking”) (e.g., Bos 1994 for NGT; Steinbach and Pfau 2007 for DGS; Quer and Frigola 2006 for LSC; Smith 1990 for TSL; Costello 2015 for LSE). However, there are also sign languages that have agreement markers, but for which double agreement marking is ungrammatical (e.g., Fischer 1996 for JSL; Sapountzaki 2005 for GSL). The sentence in (6) from LSE represents double agreement marking indicated by the agreement marker as well as by the inflected agreeing verb (Costello 2015: 191).⁶

- (6) ₁AUX₂ ₁ANNOY₂ NOTHING PALM-UP
I haven't done anything to annoy you.

However, note that not only phonological properties of verbs, but also the semantic class they belong to may restrict their combination with an agreement marker. For example, in LSC one agreement marker (AUX-DA), which expresses a causative result, typically combines with psychological predicates (Quer and Frigola 2006).

So far, the combination of sign language agreement markers with other verb types, i.e., other than plain verbs, has only been mentioned in the literature in passing. To the best of the authors' knowledge, there is just one study that examined the distributional properties of a sign language agreement marker in a systematic way. In an online questionnaire study, Murmann (2012) tested the distribution of the DGS agreement marker PAM with regard to (un)inflected agreeing verbs. In particular, participants rated constructions in which the agreement verb in canonical agreement form (i.e., the verb shows clear movement from subject to object position) occurs with or without PAM, and sentences in which the verb appears in an uninflected citation form (without movement from subject to object) with or without PAM. The participants had to rate sentences on a 5-point scale with respect to the question “Can you imagine that your friends or acquaintances sign the sentence this way?” This question could be answered by either 1 = “I cannot imagine that it is signed this way”, 2 = “I can rather not imagine

⁵ The path movement of agreeing verbs in citation form show the same starting point as if the verbs agree with first person subject argument. However, agreeing verbs in citation form are not directed towards a specific R-locus in space associated with the object referent.

⁶ The notation conventions used by Costello (2015) were slightly adapted for the present paper. Signs are glossed with capital letters; AUX represents the agreement auxiliary; subscripts indicate reference points within signing space (1 = first person; 2 = second person).

that it is signed this way”, 3 = “I can imagine that it is maybe signed this way”, 4 = “I can imagine that it is signed this way”, or 5 = “I have seen it signed this way several times”.

This study revealed that although PAM is dispreferred in constructions in which agreement is already indicated by movement of the agreeing verb, the combination of agreeing verbs and PAM – what might be considered double agreement marking – is nonetheless possible. Furthermore, the combination of agreeing verbs in uninflected citation form with PAM was rated higher than sentences without any agreement marking. Interestingly, the combination of PAM with inflected agreeing verbs led to higher ratings in contrast to the co-occurrence of PAM with uninflected agreeing verbs. Although the combination of PAM with (un)inflected agreeing verbs was possible, these constructions were rated worse than sentences with overt agreement marking on the agreeing verb without PAM, and the combination of inflected agreeing verbs with PAM was rated lower than inflected agreeing verbs without PAM. Therefore, Murmann (2012) suggested that PAM has not become a general agreement marker across all verb types in DGS.

The combination of agreement markers and backwards verbs has been considered to provide further evidence for the claim that verb agreement represents a syntactic process. The observation that those agreement markers show subject-object agreement, i.e., that they move from the subject to the object position, even when in combination with backwards verbs, and thus do not show a source-to-goal relation, is in line with syntactic accounts of verb agreement (e.g., Bos 2017; de Quadros and Quer 2008; Krebs and Wilbur 2018; Lillo-Martin and Meier 2011; Lourenço 2016; Steinbach 2011). The example from NGT in (7) illustrates the difference in movement direction of the main verb and the agreement marker (here glossed as ACT-ON) (Bos 2017: 234).

(7) INDEX_{3b 3b}ACT-ON_{1 1}CHOOSE_{3b} FIRST TEAM

He chose me for the first team.

As noted earlier, double agreement marking is one of the properties of the sign language agreement system which is unusual from a typological perspective. This is one of the reasons that makes the integration of this phenomenon into existing theories on verbal agreement systems difficult.

With respect to the question of which possible function(s) double agreement marking may take, Steinbach and Pfau (2007) speculated that it may express a pragmatic function such as emphasis in DGS (but see Murmann 2012). Although not discussed in detail, it was also noted for other sign languages that double agreement marking may express emphasis (e.g., de Quadros and Quer 2008 for

Figure 2: (A) AGRM-BC is produced with the baby-C handshape; (B) AGRM-MF is generated by a forward pointing middle finger.

LSC; Costello 2015 for LSE). It is the function of “emphasis” that leads to our “Enhance agreement” hypothesis 2.

2.2 Argument relations and agreement markers in Austrian Sign Language (ÖGS)

In general, the basic sign order in ÖGS is SOV (Skant et al. 2002; Wilbur 2002, 2005). However, in discourse context other sign orders, as well as subject and/or object drop, are possible. Furthermore, although less basic, OSV orders with agreeing verbs or plain verbs, whereby the latter occur in combination with an agreement marker, are acceptable (even in isolation). So far, two agreement markers have been described for ÖGS, here glossed as AGRM-BC and AGRM-MF (see Figure 2) (Krebs et al. 2017). While AGRM-BC is produced with a baby-C handshape (similar to the DGS PAM) AGRM-MF is formed by a forward pointing middle finger (MF) that faces the object. Both agreement markers indicate agreement by modification of start and end locations of the movement from the subject to the object position and both show facing. Like agreeing verbs, these ÖGS markers may also be accompanied by a body shift towards the subject. Furthermore, both markers can combine with plain verbs and predicative adjectives. Additional data in our ongoing ÖGS corpus shows that both agreement markers can be combined with inflected regular as well as irregular agreeing verbs. They can occur in post- and pre-verbal position (see Krebs et al. 2017) as well as in sentence second position after the subject

(i.e., between subject and object). So far, both agreement markers have been observed with animate arguments (human and animal).⁷

As outlined above, both markers generally show movement from the subject towards the object position. However, they may also be produced with reduced movement, i.e., they sometimes do not start at the reference point associated with

Table 1: Characteristics of agreement markers in different sign languages. Note that for reasons of space this list does not include (1) all agreement markers reported in the literature so far (only those sign languages discussed in this paper) and (2) additional agreement marker properties that could be listed (see Sapountzaki 2012; Steinbach and Pfau 2007). The question mark indicates that no information is available. Note that markers developed from the verb GIVE (LSC, LSE, GSL) are reported to take additional causative meaning.

Language	Agreement marker/Auxiliary	Lexical source	Sentence position	Double agreement
TSL	AUX-2	Verb SEE	Sentence-initial, pre-verbal	+
	AUX-11	Verb MEET	Sentence-initial, pre-verbal	+
	AUX-1	Pronouns	Sentence-initial, pre-verbal	+
DGS	PAM	Noun	Pre-verbal, post-verbal, between subject and object	+
		PERSON		
NGT	ACT-ON	Verb GO-TO	Pre-verbal, post-verbal	+
LSC	AUX-IX	Pronouns	Pre-verbal, post-verbal	+
	AUX-PERSON	Noun	?	Rare
		PERSON		
LSE	AUX-DA	Verb GIVE	Pre-verbal	?
	AUX	Pronouns	Pre-verbal, post-verbal	+
	PERS	Noun	Pre-verbal, post-verbal	?
		PERSON		
	BEAT-AUX	Verb BEAT	Post-verbal	?
JSL	GIVE-AUX	Verb GIVE	Pre-verbal	?
	AUX-1	Pronouns	Preferentially sentence-final; also sentence-initial or pre-verbal	-
GSL	IX-AUX	Pronouns	Sentence-final, pre-verbal	-
	GIVE-AUX	Verb GIVE	Pre-verbal	-
ÖGS	AGRM-BC	Noun	Pre-verbal, post-verbal, between subject and object	+
		PERSON		
	AGRM-MF	?	Pre-verbal, post-verbal, between subject and object	+

7 However, it is not clear whether the agreement markers can be used in combination with all plain verbs to refer to animal arguments or whether only a subset of verbs can do so. Whether they can also occur in sentences with inanimate arguments has to be tested in further studies.

the subject, but rather start at a more neutral position or even at the position associated with the object. This option has also been observed in other sign languages and has led some researchers to analyze agreeing verbs or agreement markers as (differential) object markers (e.g., Bross 2020; Gökgöz 2013).

2.3 Notion of “verb types”

When speaking about verb classes in sign languages, it needs to be noted that there are many cases where a verb cannot be clearly sorted into a specific class, that is, there are not always sharp boundaries between verb categories (Fischer and Gough 1978; de Quadros and Quer 2008). This may depend on the specific context they appear in. For example, the verbs BITE and SHOOT can occur as agreeing verbs if the action involves two arguments, and in particular the relationship between these two arguments, i.e., someone bites or is bitten by someone else. However, these verbs can also be signed as non-agreeing verbs if instead the process of shooting or biting is described. In this latter case the verbs can be signed in their uninflected citation form. Likewise, plain verbs sometimes cannot be clearly classified either. For example, some plain verbs can bear locative features in that they can be produced near the subject or near the object location (co-location; Lourenço 2018; Lourenço and Wilbur 2018).

The border between agreeing and spatial verbs is similarly not clear (i.e., one verb can function as spatial as well as agreeing depending on the context). Some recent accounts of verb categorization propose just a two-class division between plain and non-plain verbs. For example, de Quadros and Quer (2008) suggest a two-class distinction into agreeing (non-plain) vs. non-agreeing (plain) verbs by analyzing the spatial verbs as a subclass of agreeing verbs (contra Janis 1992). However like Janis, they make an important distinction between personal and spatial agreeing verbs: although both verb types use modification of start and end location of the movement and/or facing to indicate agreement, the specific points in signing space used for agreement are either associated with locations and therefore yield spatial readings (spatial agreeing verbs), or can be associated with R-loci yielding person and number readings (personal agreeing verbs) (also Wilbur 2008 for extensive treatment).

The problem of the classification of agreeing and non-agreeing verbs is further complicated by the fact that (at least in transitive ÖGS structures involving third person arguments) specific non-manual markings co-occurring with the verb can indicate argument structure. Thus, in ÖGS there are some body anchored plain verbs (i.e., that do not show any path movement and/or facing by the manual articulators) which can be combined with an agreement marker, but which can also indicate agreement by themselves through non-manual markings. For instance, the verb

UMARMEN ‘to hug’ is signed with a movement that looks like somebody hugging herself. Since the arms and hands are touching the body of the signer, there is no path movement or facing that could be modulated for agreement marking. However, the argument structure is clearly identifiable from the non-manual markings: the signer directs her chest and/or eye gaze/face towards the object position (in line with the body coordinates’ model for reference of Berenz 2002). The signer may also show a body movement from subject to object position. This form of “non-manual agreement marking” is also used in the context of agreeing verbs which can only show agreement in one direction (from subject to object), but cannot show movement in the opposite direction (from what was the object but is now the subject to what was subject before but is now the object). For instance the ÖGS verb GRATULIEREN ‘to congratulate’ is a two-handed agreeing verb which requires its movement toward the object to start at the signer’s chin (the subject position). The opposite direction movement, i.e., starting off the signer’s body for the subject and moving towards the signer’s chin for the object is ungrammatical. In ÖGS non-manual markings can unambiguously indicate the argument structure in sentences with these single direction agreeing verbs. Since this non-manual form of argument structure is not only possible in basic SOV orders, but also in OSV orders, we can conclude that word order is not the only indication of argument structure, but that indeed the specific non-manuals co-occurring with the verb sign also indicate argument structure. However, this form of “agreement marking” is only possible in the context of third person arguments. With first/second person arguments, an additional agreement marker is required.⁸ Finally, similar non-manual markings have also been observed with agreeing verbs that show a path movement from subject to object, with the signer’s body shifted towards subject position and chest/face/eye gaze directed towards object position. Specific non-manual markings with transitive verbs have also been reported for other sign languages (e.g., for ASL Bahan 1996; Neidle et al. 2000; for DGS Hansen 2007; Hosemann 2011).

These co-occurring non-manuals do raise the question of whether these verbs should be considered as agreeing or not. As mentioned, at least for ASL it has been claimed that these non-manuals mark syntactic subject and object agreement (we will return to this issue in the discussion section). On a practical level, the answer would affect how stimuli might be established for experimental purposes.

⁸ Note, however, further studies are necessary to test when (i.e., in combination with which verbs) the agreement marker is required and when it is optional in the context of first/second person arguments.

3 The present study

The present experiment focused on the question of which verbs the ÖGS agreement marker AGRM-BC can combine with. In addition, we wanted to examine whether the form of agreement marking influences the acceptability of the appearance of the agreement marker. While bearing in mind the complexity of fuzzy verb boundaries in sign languages (as outlined above), we nonetheless divided verbs into four groups. We presented sentences with and without AGRM-BC in combination with (i) verbs without subject-to-object movement and without object facing (plain verbs, not co-localized), (ii) agreeing verbs with subject-to-object movement and object facing, (iii) agreeing verbs without subject-to-object movement, but with object facing, and (iv) verbs with reversed object-to-subject movement and object facing (backwards verbs).⁹

3.1 Method and experimental design

An online questionnaire was designed with the OnExp software, a platform developed at the University of Göttingen (Onea 2011). The questionnaire consisted of five web pages (defined in HTML): a signed instruction video, written demographic questions, two warm-up sentences, ÖGS sentences to be rated by the signers (including the critical stimulus material plus filler sentences) and a final stage indicating the end of the questionnaire (design of the online questionnaire adopted from Murmann 2012).

A 4×2 design was used with the factors VERB and AGRM. The factor VERB involved four conditions: (1) plain verbs (-subject-to-object movement/-facing) (KNOW, WAIT, LOVE, PROUD-OF), (2) agreeing verbs with subject-to-object movement and object facing (VISIT, HELP, SUPPORT, ASK), (3) agreeing verbs without subject-to-object movement, but with object facing (SCOLD, CRITICIZE, TEACH, OBSERVE) and (4) agreeing verbs with reversed object-to-subject movement and object facing (backwards verbs) (INVITE, PICK-UP, TAKE-ADVANTAGE-OF, ACCEPT). The factor AGRM involved two conditions: (i) presence (+AGRM-BC) and (ii) absence (-AGRM-BC). In the structures with overt AGRM-BC, the agreement marker always occurs post-verbally.

Each condition involved four different verbs, thus 16 different verbs appeared in eight conditions. Sentence structures with and without AGRM-BC were presented with the same verbs/predicative adjectives. In sum, 32 target sentences were

⁹ Note that verbs which show facing, but no subject-to-object movement are generally included in the group of agreeing verbs. The distinction here is made to test whether absence or presence of different features (subject-to-object movement and facing) influence the acceptability ratings.

Table 2: Four verb groups were presented with (a, c, e, g) and without AGRM-BC (b, d, f, h): plain verbs (a, b), agreeing verbs with facing (c, d), agreeing verbs with subject-to-object movement and facing (e, f) and backwards verbs with reversed object-to-subject movement and facing (g, h). Notation conventions: Signs are glossed with capital letters; IX = manual index sign; AGRM = agreement marker; subscripts indicate reference points within signing space; the subscripts in parentheses indicate facing (i.e., only facing and no path movement) towards the object position.

	Plain verbs	Agreeing verbs with facing only	Agreeing verbs with subject-to-object movement	Agreeing verbs with object-to-subject movement
+ AGRM-BC	a: MOTHER IX _{3a} CHILD IX _{3b} WAIT 3aAGRM-BC _{3b} <i>The mother waits for the child.</i>	c: WOMAN IX _{3a} GRANDFA- THER IX _{3b} (3a)TEACH _(3b) 3aAGRM-BC _{3b} <i>The woman teaches the grandfather.</i>	e: GIRL IX _{3a} GRANDMOTHER IX _{3b} 3aVISIT _{3b} 3aAGRM- BC _{3b} <i>The girl visits the grandmother.</i>	g: GIRL IX _{3a} FATHER IX _{3b} 3bINVITE _{3a} 3aAGRM- BC _{3b} <i>The girl invites the father.</i>
- AGRM-BC	b: MOTHER IX _{3a} CHILD IX _{3b} WAIT <i>The mother waits for the child.</i>	d: WOMAN IX _{3a} GRANDFA- THER IX _{3b} (3a)TEACH _(3b) <i>The woman teaches the grandfather.</i>	f: GIRL IX _{3a} GRANDMOTHER IX _{3b} 3aVISIT _{3b} <i>The girl visits the grandmother.</i>	h: GIRL IX _{3a} FATHER IX _{3b} 3bINVITE _{3a} <i>The girl invites the father.</i>

presented. In addition, several filler constructions were presented, for a total of 136 stimulus sentences (see below for description of the fillers). The glossed sentences in Table 2 as well as Figure 3 exemplify the eight different conditions (condition a-h), involving the four different verb groups in combination with and without AGRM-BC. Structures with regular agreeing verbs show a path movement from the position associated with the subject (although this path movement does not have to start exactly at the position at which the subject referent was located by an index sign, it starts at a position which is nevertheless associated with the subject referent) to the position associated with the object (from 3a to 3b) and/or facing towards the object (3b) and sentences with irregular agreeing verbs showing a path movement from the position associated with the object to the position associated with the subject (from 3b to 3a) and facing towards the object (3b).

Figure 3: Exemplification of the eight experimental conditions. All sentences consisted of two animate argument NPs, referenced in space by manual index signs. Then either a plain verb (A), an agreeing verb with facing only (B), a regular agreeing verb with path movement from subject to object and facing (C), or an irregular agreeing verb with path movement from object to subject and facing (D) indicated the argument structure. Sentences occurred with or without the agreement marker AGRM-BC (indicated in magenta colored frame).

3.2 Materials

In the present study we focused on the combinatorial properties of only one of the ÖGS agreement markers (AGRM-BC), because (a) the experiment was part of a larger questionnaire and additional structures (such as the structures tested in the present experiment in combination with AGRM-MF) would have made the questionnaire too long, and (b) at the time the questionnaire was planned and conducted it was unclear whether the other agreement marker AGRM-MF was only a dialectical form restricted to the area of Salzburg and thus possibly the less frequent agreement marker in ÖGS.

Note that due to the small number of backwards verbs that can be used to express transitive argument relations between human arguments, we had to include two backwards verbs (TAKE-ADVANTAGE-OF and ACCEPT) which show a

reversed movement that either ends in front of the signer's lower face (TAKE-ADVANTAGE-OF) or at the signer's chest (ACCEPT). Non-manual markings clearly indicated that the subject argument of the backwards verb is not first person (i.e., not that the signer accepts or takes advantage of somebody), but that the backwards verb indicates the relation between two third person arguments. These non-manual markings also occurred in the other sentences involving agreeing verbs and/or agreement markers. In sentences with regular as well as irregular agreeing verbs with and without a co-occurring agreement marker, during the production of the verb/agreement marker eye gaze and/or head position and/or the chest was directed towards the object position and/or the body was shifted towards the subject position. When an agreement marker was present in sentences with agreeing verbs, both the agreeing verb as well as the agreement marker were marked by the non-manuals. In contrast, no specific non-manuals (except lexical non-manuals) co-occurred with plain verbs, independent of whether they were accompanied by an agreement marker or not. However, the agreement marker occurring in combination with plain verbs was accompanied by the non-manuals.

Given that the non-manual markings observed with transitive argument structures in ÖGS are part of the transitive constructions (see the discussion section; section 3.7), it would have been highly artificial to control the stimulus material for non-manual markings, i.e., to try to minimize or even exclude them. The aim here was to test ÖGS material that is as natural as possible and thus non-manual markings could not be excluded, because these are crucial within sign language grammar (e.g., Liddell 1980; Neidle et al. 2000; see also Pfau and Quer 2010 for an overview). We can exclude the possibility that the occurrence of the non-manuals influenced the ratings to different degrees in the different conditions because these non-manual markings occurred in all conditions in which agreeing verbs and/or agreement markers were present.

Finally, AGRM-BC was always signed with reduced movement, i.e., not starting at the exact reference point where the subject was established, but rather near the object position. This reduced form has also been reported for DGS PAM as well as LSC AUX-PERSON (Pfau and Steinbach 2013; Quer and Frigola 2006). Regular agreeing verbs were likewise signed with a reduced movement in the present study (except the sign FRAGEN 'to ask'), i.e., they start their movement not at the reference point where the subject was established, but rather at a more neutral position in space. However, as discussed above, specific non-manuals co-occurring with the manual agreeing verb clearly indicated the argument structure. The reduced path movement will be discussed in more detail in the discussion section.

Note that the same argument NPs occurred in structures with and without the agreement marker. The sentences involved third person arguments that are not compound signs and which are known by the majority of ÖGS signers independent of different dialects. All sentences comprise the basic SOV order (see the Appendix for a list of the critical stimulus material).¹⁰

To ensure reliability of participants' judgments, clearly incorrect sentences (that should be rated as bad) and clearly correct sentences (that should be rated as good) were presented. Thus, in addition to the critical stimulus material, several kinds of grammatical and ungrammatical filler sentences were included. The correct filler sentences showed the ordering: time adverbial – possessive – S – O – V (e.g., YESTERDAY MY BROTHER NEWSPAPER READ). Incorrect sentences showed the order: V – first argument (S or O) – second argument (S or O) – time adverbial (e.g., LAUGH BOSS GRANDFATHER TWO-YEARS-AGO). These correct and incorrect sentences involved only plain verbs. To avoid a possible interpretation of the first argument of the incorrect sentences as a topicalized constituent (and thus as a possible acceptable structure), the sentences were signed with a neutral facial expression and without any other specific non-manual marking (e.g., no body lean, head tilt, brow raise or specific eye-gaze direction). Filler sentences also included modal verbs and sentences with AGRM-BC or AGRM-MF (the second ÖGS agreement marker) in either post-verbal or pre-verbal position. In total, the 136 stimulus sentences comprised 32 target sentences and 104 filler sentences [24 sentences involving modal verbs, 48 sentences with AGRM-BC or AGRM-MF in pre-verbal vs. post-verbal position, and 32 (16 correct/16 incorrect) sentences].

10 There are some agreeing verbs in ÖGS which can, but do not have to, show facing. In this case the verbs can be signed with slightly different hand orientations (i.e., resulting either in facing or not). In addition, the presence/absence of facing of some verbs depends on whether first or second/third person object arguments are involved. For example, in sentences with first person object arguments the verbs UNTERSTÜTZEN 'to support' or EINLADEN 'to invite' do not show facing, because of articulatory, i.e., efficiency, reasons. In the context of second/third person arguments the presence/absence of facing of some verbs can depend on the interrelation between the direction of the path movement (i.e., from left to right vs. from right to left) and which hand the signer is using to produce the verb (right vs. left hand). For instance, for articulatory reasons a right-handed signer sometimes signs some verbs (e.g., the sign for 'to ask') in the direction from right to left with facing and from left to right without facing. The reversed pattern of facing, i.e., involvement of facing if the path movement is executed from left to right and lack of facing if the hand moves from right to left, can be observed when signed by a left-handed signer. However, the signer signing the stimulus material for the present study is a right-handed signer and placed the object argument always at her left side. Thus, in the present study all of the (regular and irregular) agreeing verbs show facing in that either the palm, the fingertips or the base of the fingers was facing towards the object position.

All stimulus material was signed by a Deaf signer who acquired ÖGS at an early age, used sign language in her daily life and is a member of the Austrian Deaf community.¹¹ She was signing in a sitting position in front of a dark blue screen with a distance of 1 to 1.5 m to the camera. The videos were recorded in Full HD quality with an image size of 1920 × 1080.

3.3 Procedure

Two different pseudo-randomized lists of all stimuli were created. The Onexp software (Onea 2011) presented the participants with one of the two lists randomly. In the instruction video, the participants were asked to rate each ÖGS sentence on a scale from one to seven with respect to the task of imagining if their Deaf friends would sign a sentence like this. The points on the scale were defined as follows: one stands for worst (no one would sign a sentence like this), four means that the sentence is not ÖGS, but understandable, and seven indicates a grammatical and well-formed ÖGS structure. Importantly, the participants were instructed to watch each video once and not to think about their decision very long, but rather to judge the structures by intuition. In the instruction video two of the correct and incorrect filler sentences (which represent the two ends of the rating-scale and were included to ensure the reliability of the participants' judgments) were shown to make the task clear.

3.4 Participants

Seventeen participants (13 women) with the mean age of 35.4 years ($sd = 8.2$; $range = 24-55$) from different parts of Austria (Salzburg, Vienna, Upper Austria and Tirol) took part in the online questionnaire. Most of the Deaf participants were born deaf or lost hearing early in life (age 0–3 years) and acquired ÖGS at age 4–7 years. Three of the Deaf participants acquired ÖGS from their Deaf parents. Among the participants were also two hearing native signers who acquired ÖGS from their Deaf parents.

¹¹ Per convention, Deaf with an upper-case D refers to deaf or hard-of-hearing humans who define themselves as members of the sign language community. In contrast, deaf refers to the audiological status of an individual.

Table 3: Descriptive statistical values: mean acceptability ratings (*Mean*) and standard deviations (*sd*) per verb type ordered by decreasing mean acceptability ratings.

Condition	<i>Mean</i>	<i>sd</i>
h = backwards verbs	6.16	1.31
a = plain verbs + AGRM-BC	6.12	1.09
f = path movement	5.90	1.62
b = plain verbs	5.88	1.47
d = facing	5.69	1.64
e = path movement + AGRM-BC	5.69	1.56
c = facing + AGRM-BC	5.43	1.50
g = backwards verbs + AGRM-BC	5.40	1.59

Figure 4: The boxplot indicates mean acceptability ratings ordered by decreasing mean values. Mean ratings (from level three to seven) are represented on the y-axis; this span suffices to represent the relevant results. The eight conditions are shown on the x-axis (h = backwards verbs, a = plain verbs and AGRM-BC, f = agreeing verbs with path movement and facing, b = plain verbs, d = agreeing verbs with facing, e = agreeing verbs with path movement and AGRM-BC, c = agreeing verbs with facing and AGRM-BC, g = backwards verbs and AGRM-BC). The black horizontal line represents the median.

3.5 Data analysis

To keep track of by-participant and by-item variability the data was analyzed using linear mixed-effects models with the lme4 package (Bates et al. 2015b) in R (R Core Team 2014). The ratings functioned as dependent variable. We defined a model that included an interaction between the two-level factor AGRM and the four-level

Table 4: Summary of model fit.

Summary of model fit			
Linear mixed model fit by maximum likelihood			
AIC	BIC	logLik	deviance
1849.1	1896.4	−913.6	1827.1
Random effects:			
Groups	Name	Variance	Std. Dev.
item	(Intercept)	0.002944	0.05426
subject	(Intercept)	0.617409	0.78575
Fixed effects			
	Estimate	Std. Error	<i>t</i> -value; <i>p</i> -value
(Intercept)	5.783088	0.198364	<i>t</i> = 29.15; <i>p</i> < 0.001
AgrM[+AGRM]	−0.125000	0.053349	<i>t</i> = −2.34; <i>p</i> < 0.05
Verb[facing]	−0.224265	0.095344	<i>t</i> = −2.35; <i>p</i> < 0.05
Verb[path movement]	0.011029	0.095344	<i>t</i> = 0.12; <i>p</i> = 0.91
Verb[backwards]	−0.003676	0.095344	<i>t</i> = −0.04; <i>p</i> = 0.97
AgrM[+AGRM]:Verb[facing]	−0.007353	0.092403	<i>t</i> = −0.08; <i>p</i> = 0.94
AgrM[+AGRM]:Verb[path movement]	0.022059	0.092403	<i>t</i> = 0.24; <i>p</i> = 0.81
AgrM[+AGRM]:Verb[backwards]	−0.257353	0.092403	<i>t</i> = −2.79; <i>p</i> < 0.01

factor VERB as fixed effects. The random effects structure consisted of by-participant and by-item intercepts.¹² The categorical predictors AGRM and VERB were encoded with sum coding.

This parsimonious model structure supports the experimental hypotheses in line with recent proposals for random-effects structure (cf. Bates et al. 2015a) and avoids overparameterizing the model on a small dataset (e.g., as would be the case with the “maximal” structure proposed by Barr et al. 2013). Based on Baayen et al. (2008) we interpreted a *t*-value of two and above as indicating a significant effect. Additional *p*-values were calculated with the package “lmerTest”.

3.6 Results

Mean acceptability ratings (*Mean*) and standard deviations (*sd*) are presented in Table 3. Figure 4 represents the mean rating for each verb type in combination with or without AGRM-BC. In addition, the incorrect filler sentences were rated as bad (*Mean* = 1.24; *sd* = 0.91) and the other grammatical filler sentences were rated

¹² The code we used for calculating the model in R is the following: `lmer(Rating ~ AGRM*VERB + (1|Subject) + (1|Item)`.

Table 5: Summary of the results of the post hoc Tukey-Tests.

Contrast	Estimate	Standard error	df	t ratio	p value
Facing – path movement	–0.21	0.23	69.00	–0.89	0.99
Facing – plain	–0.19	0.23	69.00	–0.83	0.99
Facing – backwards	–0.47	0.23	69.00	–2.04	0.47
Facing – facing + AGRM-BC	0.26	0.21	515.89	1.24	0.92
Facing – path movement + AGRM-BC	0.00	0.23	69.00	0.00	1.00
Facing – plain + AGRM-BC	–0.43	0.23	69.00	–1.85	0.59
Facing – backwards + AGRM-BC	0.29	0.23	69.00	1.27	0.91
Path movement – plain	0.01	0.23	69.00	0.06	1.00
Path movement – backwards	–0.26	0.23	69.00	–1.15	0.94
Path movement – facing + AGRM-BC	0.47	0.23	69.00	2.04	0.47
Path movement – path movement + AGRM-BC	0.21	0.21	515.89	0.96	0.98
Path movement – plain + AGRM-BC	–0.22	0.23	69.00	–0.96	0.98
Path movement – backwards + AGRM-BC	0.50	0.23	69.00	2.16	0.39
Plain – backwards	–0.28	0.23	69.00	–1.21	0.93
Plain – facing + AGRM-BC	0.46	0.23	69.00	1.97	0.51
Plain – path movement + AGRM-BC	0.19	0.23	69.00	0.83	0.99
Plain – plain + AGRM-BC	–0.24	0.21	515.89	–1.10	0.96
Plain – backwards + AGRM-BC	0.49	0.23	69.00	2.10	0.43
Backwards – facing + AGRM-BC	0.74	0.23	69.00	3.18	<0.05
Backwards – path movement + AGRM-BC	0.47	0.23	69.00	2.04	0.47
Backwards – plain + AGRM-BC	0.04	0.23	69.00	0.19	1.00
Backwards – backwards + AGRM-BC	0.76	0.21	515.89	3.57	<0.01
Facing + AGRM-BC – path movement + AGRM-BC	–0.26	0.23	69.00	–1.15	0.94
Facing + AGRM-BC – plain + AGRM-BC	–0.69	0.23	69.00	–2.99	0.07
Facing + AGRM-BC – backwards + AGRM-BC	0.03	0.23	69.00	0.13	1.00
Path movement + AGRM-BC – plain + AGRM-BC	–0.43	0.23	69.00	–1.85	0.59
Path movement + AGRM-BC – backwards + AGRM-BC	0.29	0.23	69.00	1.27	0.91
Plain + AGRM-BC – backwards + AGRM-BC	0.72	0.23	69.00	3.12	0.051

above the level of five except the sentences with modal verbs in sentence-final position (*Mean* = 4.75; *sd* = 2.01).

The results revealed by the linear mixed-effects model analysis are presented in Table 4.

The results for the fixed effects revealed an intercept of all ratings (mean over all conditions) of 5.78. The analysis revealed a significant main effect of AGRM. Sentences with the agreement marker were rated lower than average (i.e., lower than the grand mean over all conditions). In addition, a significant main effect of VERB was revealed, indicating that the agreeing verbs with facing only were rated lower than average. In addition, a significant interaction of AGRM and backwards

verbs was revealed. The backwards verbs were rated lower when co-occurring with the agreement marker. To calculate comparisons of the ratings for the individual conditions we used Tukey-Tests (effects are presented in Table 5).¹³

These tests revealed a significant effect for the ratings for the backwards verbs with AGRM-BC in comparison to backwards verbs without AGRM-BC ($t = -3.57$; $p < 0.01$), decreasing the rating slope by 0.76 ± 0.21 (standard errors) for backwards verbs with AGRM-BC compared to backwards verbs without AGRM-BC. There was also a significant effect for the ratings for the agreeing verbs with facing with AGRM-BC in comparison to backwards verbs without AGRM-BC ($t = -3.18$; $p < 0.05$), decreasing the rating slope by 0.74 ± 0.23 (standard errors) for agreeing verbs with facing with AGRM-BC compared to backwards verbs without AGRM-BC. In addition, an effect approaching significance was revealed for the ratings for the agreeing verbs with facing with AGRM-BC in comparison to plain verbs with AGRM-BC ($t = -2.99$; $p = 0.07$), decreasing the rating slope by 0.69 ± 0.23 (standard errors) for agreeing verbs with facing with AGRM-BC compared to plain verbs with AGRM-BC. Likewise, there was an effect approaching significance for the ratings for the backwards verbs with AGRM-BC in comparison to plain verbs with AGRM-BC ($t = -3.12$; $p = 0.051$), decreasing the rating slope by 0.72 ± 0.23 (standard errors) for backwards verbs with AGRM-BC compared to plain verbs with AGRM-BC.

Due to the fact that the ratings for the regular agreeing verbs with path movement and the agreeing verbs with just facing did not differ significantly from each other, the same linear mixed-effects model analysis was calculated in which the regular agreeing verbs with path movement and the regular agreeing verbs with just facing were collapsed into one verb group (i.e., termed as “regular agreeing verbs”). This model included an interaction between the two-level factor AGRM (+AGRM-BC and -AGRM-BC) and the three-level factor VERB (plain verbs; regular agreeing verbs; agreeing verbs with reversed path movement and facing) as fixed effects. The random effects structure consisted of by-participant and by-item intercepts.

The results for the fixed effects revealed a significant main effect of AGRM ($t = -2.27$; $p < 0.05$). Sentences with the agreement marker were rated lower than average. Additionally, a significant interaction of AGRM and backwards verbs was revealed ($t = -3.06$; $p < 0.01$). The backwards verbs were rated lower when combined with the agreement marker.

Post hoc data analysis by Tukey-Tests revealed a significant effect for the ratings for the backwards verbs without AGRM-BC in comparison to the regular agreeing verbs with AGRM-BC ($t = -2.96$; $p < 0.05$), decreasing the rating slope by

¹³ The code we used for calculating the model in R is the following: `lsmeans(model, pairwise ~ VERB*AGRM, adjust = “tukey”)`.

0.60 ± 0.20 (standard errors) for regular agreeing verbs with AGRM-BC compared to backwards verbs without AGRM-BC. Further, a significant effect was revealed for the ratings for the backwards verbs without AGRM-BC in comparison to the backwards verbs with AGRM-BC ($t = -3.57$; $p < 0.01$), decreasing the rating slope by 0.76 ± 0.21 (standard errors) for backwards verbs with AGRM-BC compared to backwards verbs without AGRM-BC. In addition, a significant effect was observed for the ratings for the plain verbs with AGRM-BC in comparison to the backwards verbs with AGRM-BC ($t = -3.07$; $p < 0.05$), decreasing the rating slope by 0.72 ± 0.24 (standard errors) for backwards verbs with AGRM-BC compared to plain verbs with AGRM-BC. An effect approaching significance was revealed for the ratings for the plain verbs with AGRM-BC in comparison to the regular agreeing verbs with AGRM-BC ($t = -2.75$; $p = 0.08$), decreasing the rating slope by 0.56 ± 0.20 (standard errors) for regular agreeing verbs with AGRM-BC compared to plain verbs with AGRM-BC.

Because this analysis revealed that the ratings for the regular agreeing verbs and the backwards verbs either with or without the agreement marker did not differ significantly (difference between the verbs without AGRM-BC: $t = -1.81$; $p = 0.47$; difference between the verbs with AGRM-BC: $t = 0.79$; $p = 0.97$) a further linear mixed-effects model analysis was calculated in which the regular agreeing verbs and the backwards verbs were collapsed into one group (i.e., termed as “agreeing verbs”). This model included an interaction between the two-level factor AGRM (+AGRM-BC and -AGRM-BC) and the two-level factor VERB (plain verbs; agreeing verbs) as fixed effects. The random effects structure consisted of by-participant and by-item intercepts.

The results for the fixed effects revealed a main effect of VERB approaching significance ($t = -2.09$; $p = 0.054$), indicating that the agreeing verbs were rated lower than average. In addition, a significant interaction of AGRM and agreeing verbs was revealed ($t = -2.62$; $p < 0.01$). The agreeing verbs were rated lower when combined with the agreement marker.

Post-hoc data analysis by Tukey-Tests revealed a significant effect for the ratings for the agreeing verbs without AGRM-BC in comparison to the agreeing verbs with AGRM-BC ($t = -3.32$; $p < 0.01$), decreasing the rating slope by 0.41 ± 0.12 (standard errors) for agreeing verbs with AGRM-BC compared to agreeing verbs without AGRM-BC. In addition, a significant effect was observed for the ratings for the agreeing verbs with AGRM-BC in comparison to the plain verbs with AGRM-BC ($t = -3.23$; $p < 0.05$), decreasing the rating slope by 0.61 ± 0.19 (standard errors) for agreeing verbs with AGRM-BC compared to plain verbs with AGRM-BC.

In summary, three analyses were run. The first compared the four verb groups separately. In the second, verbs that showed agreement whether by subject-to-object movement or by object facing were grouped together into “regular” agreeing verbs, for a three-way comparison (plain, regular agreeing,

backwards). In the third analysis, verbs showing agreement, whether regular or backwards, were grouped together, for a two-way analysis (plain vs. non-plain).

3.7 Discussion

3.7.1 The combination of AGRM-bc with different “verb types”

The present study revealed relatively high ratings for all eight experimental conditions (each condition showed a mean rating above the level of 5). Thus, the sentences in which AGRM-BC co-occurs with agreeing verbs were acceptable at least to some degree and were rated relatively high, showing that ÖGS allows “double marking” of agreement despite the fact that it is not necessary. Therefore, ÖGS patterns with other sign languages for which double agreement marking has also been reported (e.g., NGT, Bos 1994; DGS, Steinbach and Pfau 2007; LSC, Quer and Frigola 2006; TSL, Smith 1990; LSE, Costello 2015).

Although multiple agreement marking is acceptable in ÖGS, it is however, not preferred over single agreement marking. In addition, the agreement marker in combination with agreeing verbs is not rated higher compared to co-occurrence with plain verbs. Therefore, the present results do not support Hypothesis 2 proposing that multiple agreement marking is preferred.

Also Hypothesis 1, stating that multiple agreement marking is dispreferred, is only supported to a minor extent by the present findings. The results indicate that the acceptability of the sentences involving different verbs varying in their inherent agreement features was, at least to some extent, influenced by the usage of the agreement marker. In line with Hypothesis 1 the regular/irregular agreeing verbs without agreement marker were rated higher than in combination with the agreement marker. The plain verb condition showed the opposite pattern of results compared to the non-plain verbs, namely the plain verbs with AGRM-BC were rated relatively higher than without AGRM-BC. Thus, whereas the plain verbs were rated high in combination with AGRM-BC (*Mean* = 6.12, *sd* = 1.09), all non-plain verbs which occurred with AGRM-BC were rated relatively lower (+path movement verbs: *Mean* = 5.69, *sd* = 1.56; +facing verbs: *Mean* = 5.43, *sd* = 1.50; backwards verbs: *Mean* = 5.40, *sd* = 1.59). Note however, that the differences in ratings for structures with the agreement marker in contrast to sentences without the agreement marker reached significance only with respect to the backwards verbs. In particular, for the backwards verbs data analysis revealed significantly

higher ratings for sentences without AGRM-BC in contrast to sentences with AGRM-BC ($t = -3.57$; $p < 0.01$).¹⁴

The finding of a significant difference only for the backwards verbs supports Hypothesis 3 which proposes that the acceptability of multiple agreement marking depends on verb type. However, because the difference in ratings for the backwards verbs with AGRM-BC compared to the backwards verbs without AGRM-BC is relatively small and all of the structures were rated relatively high, this difference has to be interpreted with caution (see the discussion in the next section).

The present study further reveals that in ÖGS, plain verbs can, but do not necessarily have to, combine with an agreement marker. In particular, the ratings for the plain verbs in combination with or without the agreement marker did not differ significantly, suggesting that in ÖGS sentences involving plain verbs, both options, using basic sign order as well as adding an agreement marker for indicating argument structure, are possible. The optionality of agreement markers in structures with plain verbs showing basic sign order has also been described for other sign languages, such as Brazilian Sign Language (Libras) (de Quadros 1999) or DGS (Murmann 2012).

3.7.2 Significant difference in ratings only for the backwards verb group

As pointed out above, the present questionnaire reveals that double agreement marking is possible in ÖGS, although the presence of AGRM-BC with an agreeing verb leads to slightly reduced ratings. However, this difference only reached level of significance in the case of the backwards verbs (difference in ratings: *Mean* = 0.76).

One might argue that a possible explanation for the observation that only the group of backwards verbs showed a significant effect depending on the occurrence of the agreement marker may be that in these structures the agreement marker did

¹⁴ Further support for Hypothesis 1 is provided by the significant effect revealed for ratings for sentences with backwards verbs without AGRM-BC compared to ratings for structures with facing agreeing verbs combined with AGRM-BC. This contrast revealed significantly higher ratings for the backwards verbs without AGRM-BC compared to the sentences with facing verbs combined with AGRM-BC. Likewise, further effects approaching significance revealed by the post hoc analysis support Hypothesis 1. In particular, an effect approaching significance was observed regarding the comparison of ratings for the plain verbs with AGRM-BC and the ratings for agreeing verbs with facing co-occurring with AGRM-BC, whereby higher ratings were revealed for plain verbs with AGRM-BC. Additionally, an effect approaching significance was observed for the comparison of ratings for plain verbs with AGRM-BC and the ratings for backwards verbs with AGRM-BC, whereby higher ratings were observed for plain verbs with AGRM-BC (see section 3.6; Table 5).

Figure 5: Illustration of the direction of movement of regular agreeing verbs from the position associated with the subject (S) to the position associated with the object (O) indicated by the arrow a. In contrast, arrow b shows the direction of the movement of the irregular agreeing, i.e., backwards verbs from the position associated with the object to the position associated with the subject.

not, and could not, occur with such a reduced form of path movement as with the other agreeing verb conditions (+path movement and +facing as well as -path movement and +facing). In particular, as outlined above, in the stimuli the agreement markers accompanying regular and irregular agreeing verbs were produced with a reduced path movement. But due to the fact that backwards verbs show a reversed path movement from the position associated with the object to the position associated with the subject and therefore move conversely to the direction of the following agreement marker, a reduction of the path movement of AGRM-BC as observed for the constructions involving regular agreeing verbs is not possible, because the target location of the backwards verb is the position associated with the subject, which is the same position at which the subsequent AGRM-BC starts to move (Figure 5).

In particular, the regular agreeing verbs with AGRM-BC show a more continuous or fused movement, which may have led to the higher acceptability ratings for regular agreeing verbs in combination with AGRM-BC (in contrast to the backwards verbs combined with AGRM-BC). In line with this argumentation, the necessary converse movement of AGRM-BC in comparison to the backwards verbs does not allow a reduction of the movement as observed for the regular agreeing verbs, which may have caused the slight reduction of acceptability within the backwards verb category.

One could also explain the lower ratings for the backwards verbs in combination with the agreement marker in contrast to those with backwards verbs without AGRM-BC as being due to the fact that the backwards verbs and the agreement marker show a reversed movement direction. Thus, possibly this difference in the direction of the movement of the backwards verbs with respect to that of the AGRM-BC could have caused the significant effect observed for the backwards verbs.

However, the observation that backwards verbs in combination with the agreement marker did not lead to significantly lower ratings in comparison to the combination of the agreement marker with regular agreeing verbs (+path movement and +facing as well as -path movement and +facing) leads to the assumption that the effect within the backwards verb condition is not driven by a longer movement of the agreement marker or by the reversed direction of the movement of the agreement marker accompanying backwards verbs. If this were indeed the case we would expect significantly higher ratings for the regular agreeing verbs in combination with AGRM-BC in contrast to the combination of backwards verbs co-occurring with AGRM-BC, but this pattern was not observed.¹⁵ The significant difference in ratings within the backwards verb category seems to be instead the result of relatively high ratings for the backwards verbs occurring without the agreement marker. As pointed out previously, the overall difference in ratings between backwards verbs with AGRM-BC and without AGRM-BC is relatively small and therefore should not be over-interpreted.

3.7.3 Factors that might have influenced ratings

It has to be mentioned that the conclusion drawn by the present findings, i.e., that double agreement marking is possible in ÖGS, is currently limited to (a) sentences involving the agreement marker AGRM-BC, (b) sentences involving an agreement marker in post-verbal position, (c) sentences involving an agreement marker showing a reduced path movement, and (d) sentences in which specific non-manual markings co-occur with the manual signs. In the following we will discuss briefly how these aspects might have influenced the acceptability ratings of signers rating transitive constructions in ÖGS. In particular, issues include (a) the choice of agreement marker and its syntactic position, (b) the reduced form of movement and (c) non-manual markings. In the present study, all of these factors were controlled for (i.e., only one of the ÖGS agreement markers AGRM-BC was used, it appears only in post-verbal position, in all conditions it showed a reduced path movement, and in all conditions with an agreeing verb/agreement marker non-manuals occurred). How we controlled our material could nevertheless have had an impact on the results.

¹⁵ A reviewer pointed out that this would not necessarily have to be the case: if there is a cumulative effect of redundancy (provided by the occurrence of AGRM-BC) and reversed movement (within the backward verbs condition), the effect of redundancy being the stronger one, no difference is expected between regular agreeing verbs with AGRM-BC and backwards verbs and AGRM-BC.

3.7.3.1 Choice of agreement marker and syntactic position

The present study focused on the distributional properties of one of the ÖGS agreement markers AGRM-BC. We can raise the question of whether these findings would also account for AGRM-MF. Deaf informants confirmed that both agreement markers can be used interchangeably (Krebs et al. 2017). In particular, there are some signers who prefer using only one of the agreement markers, and, to our knowledge, there are no specific verbs that require only one of the two agreement markers. The analysis of the filler sentences involving both agreement markers in pre- as well as post-verbal position revealed that both agreement markers are equally acceptable in combination with plain verbs as well as predicative adjectives, and our corpus data shows that AGRM-MF can also be combined with inflected agreeing verbs. Therefore, we assume relatively similar combinatorial properties with respect to AGRM-MF as observed for AGRM-BC.

The questionnaire tested the acceptability of the combination of different verbs with AGRM-BC occurring in post-verbal position. Thus, it remains to be investigated whether similar ratings can be observed in structures with AGRM-BC occurring pre-verbally. That both ÖGS agreement markers are acceptable in pre- as well as post-verbal position with plain verbs and predicate adjectives can be inferred from the analysis of the ratings for the filler sentences. We note though that analysis of the filler sentences revealed that the agreement markers are slightly preferred in pre-verbal position (Krebs et al. 2017). This observation needs further testing with verbs of varying degrees of overt agreement, as in the present study.

3.7.3.2 Reduced form of path movement

In the stimulus material in the present study, the agreement markers were signed with a reduced path movement. We have so far described the reduced movement of agreement markers (and agreeing verbs) on the phonological level, but this could also be considered from a morpho-syntactic perspective. Other linguists have interpreted reduced path movement as indicating single agreement marking, i.e., agreement only with the object (e.g., Pfau and Steinbach 2013; Steinbach and Pfau 2007 for DGS PAM; Quer and Frigola 2006 for LSC AUX-PERSON). Reduced path movement has also been interpreted as “subject agreement marker omission” (e.g., Padden 1988). Whether these structures are real instantiations of subject agreement marker omission or whether in these cases other (non-) manual markers may take over that function is still under debate. For example, Meir et al. (2007) proposed that at least at the lexical level, the signer’s body represents the subject and therefore subject marking is always apparent. In addition, it has been claimed at least for ASL that non-manual markers may perform important syntactic functions, such as marking agreement (Bahan 1996;

Neidle et al. 2000). There are also sign language agreement markers that cannot mark two arguments, but only mark a single argument belonging to the semantic category of undergoer. For example, Costello (2015) describes the agreement marker PERS in LSE; it does not show a path movement from subject to object position, but is instead located at the object position, i.e., indicating single agreement marking. More recently Bross (2020) has argued for DGS PAM as a “differential object marker”. A similar sign, glossed as PRO_[bc], was also observed by Meir (2003) for Israeli Sign Language (ISL); she interpreted this sign not as an agreement marker, but as a form of case-marked pronoun. Interestingly, like the DGS agreement marker PAM, the LSE sign PERS and the ISL sign PRO_[bc], seem to be derived from the noun PERSON. Costello (2015) pointed out that these signs may represent different phases of a larger grammaticalization process, whereby he refers to the common grammaticalization path from pronoun to affix to agreement marker observed for spoken languages (Heine and Kuteva 2002; for more information about the grammaticalization of sign language agreement markers/auxiliaries see Steinbach and Pfau 2007 as well as Pfau and Steinbach 2013).

The ÖGS agreement marker AGRM-BC is also suggested to be derived from the noun PERSON. AGRM-BC can be signed with or without (a reduced) path movement in combination with agreeing and plain verbs. Thus, one could suggest that AGRM-BC is still on its grammaticalization path from an affix towards an agreement marker and that in our stimulus material, the agreement marker only agrees with the object argument. However, in line with the proposal of Bahan (1996) and Neidle et al. (2000) for ASL, we could assume that the subject agreement marking is expressed by the specific non-manual markings occurring in the ÖGS constructions under examination. Hence, it may be that the agreement marker can be signed either with a manual path movement from subject to object position, or with a reduced form, or lack of path movement, in which case the non-manual markings may take over the function of subject agreement marking.

It is not trivial to determine whether the agreement marker indeed shows single agreement with the object argument or whether the agreement marker appears with a reduced movement. This problem is related to the difficulty of determining the onset of a sign. Due to the fact that it is not entirely clear when a sign (within a signed sentence) starts, it is sometimes difficult to determine whether a specific movement should be considered as lexical part of the sign or whether it is a phonetic (non-lexical) trajectory movement towards the onset of a specific sign. There are some researchers who define the onset of a sign as the time point when a sign shows its first hold in signing space, i.e., when the target handshape slightly stops at the target location from where the movement will start

(if the sign shows a path movement or an internal movement)¹⁶ or at the target position at which the sign is articulated (if the sign does not show a specific movement). However, this definition of sign onset is problematic for several reasons. For instance, holds of signs can be modulated by signing rate and are thus better described as phonetic as opposed to phonological features (Wilbur 1990; Wilbur 2009). In addition, many signs do not show a first hold (e.g., Hanke et al. 2012). Furthermore, transitional movements as defined in the traditional sense (i.e., every movement within the signing stream that does not appear during the phase from the “first” to the “final” hold of a sign) have been shown to provide crucial information about upcoming lexical signs (e.g., Jantunen 2010; Ten Holt et al. 2009) and have been claimed to present important information during predictive processing (Hosemann et al. 2013; Hosemann 2015; Roehm et al. 2012). In our stimulus material, the handshape of the agreement marker is formed during the movement towards the object position. However, because the handshape can sometimes also be established before “sign onset” (i.e., before the “first hold”) and the agreement marker does not always show a clear “first hold” in space, it is difficult to determine whether (parts of) the movement from the endpoint of the verb to the object position should be considered as phonological (lexical) part of the agreement marker or as phonetic (non-lexical) trajectory movement towards the onset of the agreement marker. Although this movement of/towards the agreement marker is very short in the case of regular agreeing verbs (especially with respect to the regular agreeing verbs with path movement), it is more obvious in the plain and backwards verb condition. Unfortunately, the present results do not help to clarify whether the agreement marker presented in the experiment shows single agreement marking, whether it is better described as showing a form of reduced path movement, or whether the specific non-manuals take the function of subject agreement marking.

However, with respect to the present study it is important to keep in mind that our results are restricted to structures in which the agreement markers were signed with a reduced path movement – independent of how we interpret the reduction of the path movement of the agreement marker (either in phonological or morpho-syntactic terms; as agreement marking of one or two arguments). Thus, it is possible that the results would be different if we were to present the same structures with AGRM-BC without a reduced path movement.

16 Note that lexical movement has been divided into two subcomponents, the path movement and hand-internal movement. Path movement can be either straight, arcing or circular. Internal movement can involve a change in handshape, a change in hand orientation or a combination of both. Further, path movement and internal movement can occur in combination (Brentari 1998; Wilbur 2011).

Our corpus data of ÖGS show that plain verbs and inflected agreeing verbs can also be combined with both ÖGS agreement markers that do not show reduced movement. Therefore, we can attest that double agreement marking is also possible in ÖGS with an agreement marker that shows a full path movement from subject to object position. However, we can only speculate whether and if so, how much non-reduced movement would influence the acceptability ratings. From an articulatory perspective one could assume that the combination of an agreement marker without reduced movement would lead to lower ratings for regular agreeing verbs (+ path movement and + facing, as well as – path movement and + facing), in contrast to when regular agreeing verbs co-occur with an agreement marker with reduced movement, because in the case of non-reduced movement an additional trajectory movement back from the offset of the agreeing verb (either at the object position in case of regular agreeing verbs with path movement or at a neutral position in space in case of regular agreeing verbs without path movement) towards the subject position is required. This additional movement back to subject position is not required when the post-verbal agreement marker is signed with reduced movement. Thus, possibly the combination of regular agreeing verbs with an agreement marker without reduced movement would lead to lower acceptability ratings in contrast to the co-occurrence of regular agreeing verbs with an agreement marker that shows reduced movement.

3.7.3.3 Non-manual markings

As described above, in the present study specific non-manual markings accompanied the agreeing verbs and the agreement markers. During production of the (regular as well as irregular) agreeing verbs the signer directed her eye gaze and/or head position and/or chest towards the object position and/or shifted her body towards the subject position. These non-manuals did not occur with plain verbs in the present study, but our corpus data show that in structures in which the agreement marker appears *before* the verb, body shift towards the subject position co-occur with both regular agreeing verbs and plain verbs. Thus, when the plain verb appears after the agreement marker, the non-manual markings accompanying the agreement marker spread onto the following plain verb. Further, these non-manuals also occur independent of word order, because they can be observed in SOV as well as OSV orders and are sometimes visible before the verb sign/agreement marker is established. Non-manuals are an integral part of the expression of transitive argument relations in ÖGS (at least when third person arguments are involved). Similar non-manual markings were also observed during the production of transitive argument structures signed by other signers in our corpus recordings. It has also been suggested that these non-manuals are important with respect to the processing of transitive argument relations in ÖGS (e.g.,

Krebs et al. 2018; Krebs et al. 2019). Further studies would have to test how absence of these non-manuals would influence acceptability ratings. Because it seems that the observed non-manuals constitute a crucial part of transitive structures, we would assume a drop in acceptability when non-manuals are excluded (to the extent such an exclusion is even possible).

4 Conclusions

The present study can be considered the first systematic attempt at evaluating the potential of an agreement marker to combine with different verb types. It was shown that all non-plain verb structures were rated relatively high, independent of the occurrence of an agreement marker, leading to the conclusion that double agreement marking is allowed in ÖGS. Nevertheless, this proposal can only be made at the moment for sentences involving AGRM-BC in post-verbal position showing a reduced path movement, and also accompanied by specific non-manual markings. Interestingly, plain verb constructions are equally acceptable with or without the agreement marker. This leads to the conclusion that in the basic sign order (SOV), no additional agreement marking by an agreement marker is required in sentences involving plain verbs.

This experiment does not only extend our knowledge about the grammar of ÖGS, but it also contributes to typological investigation as well as theoretical discussions focusing on the verbal agreement system of sign languages. In particular, we provide experimental data of yet one more sign language that allows double agreement marking, i.e., the combination of an agreement marker with regular and irregular inflected agreeing verbs. The observation that ÖGS AGRM-BC can occur in combination with agreeing verbs suggests that it is not just an agreement gap filler when the main verb cannot show agreement marking. However, whether double agreement marking performs additional functions such as marking emphasis (as proposed for e.g., DGS PAM) has to be tested further.

The finding that AGRM-BC can co-occur with different verb types suggests that the ÖGS agreement marker (at least with a reduced form or absence of path movement) has been grammaticalized towards a general marker for indicating agreement in ÖGS.

In addition, we showed that the amount of agreement information carried by the verbs themselves seems not to influence the acceptability of the occurrence of an agreement marker. This leads to the assumption that regular agreeing verbs with path movement and facing and those with facing only are treated similarly (i.e., have a similar status) within the agreement system in ÖGS.

Furthermore, the finding that in ÖGS – as for a number of other sign languages – the agreement markers move from the position associated with the

subject to the object position (contrary to backwards verbs) provides additional data supporting the claim that the process of verb agreement in sign languages is not merely gestural or is not only constrained by thematic roles (i.e., expressing only a source-to-goal relation), but is linguistically/syntactically determined (e.g., de Quadros and Quer 2008; Steinbach 2011; Bos 2017). Thus, the present study again emphasizes the linguistic status of verb agreement.

As described for other sign languages, specific non-manual markings co-occurring with agreeing verbs and agreement markers can be observed with transitive argument structures in ÖGS, which seem to be an essential part of the expression of transitive argument relations. Due to the fact that these non-manuals seem to occur only with agreeing verbs and agreement markers (and not with plain verbs, except by assimilation from a preceding agreement marker) we propose that these are part of the agreement marking process. Therefore, we propose that it would be valuable to bring non-manuals back into focus again with respect to the discussion about sign language agreement.

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Appendix: Materials¹⁷

Plain verbs:

1. *The man knows the doctor.*

MAN IX_{3a} DOCTOR IX_{3b} KNOW _{3a}AGRM-BC_{3b}

MAN IX_{3a} DOCTOR IX_{3b} KNOW

2. *The mother waits for the child.*

MOTHER IX_{3a} CHILD IX_{3b} WAIT _{3a}AGRM-BC_{3b}

MOTHER IX_{3a} CHILD IX_{3b} WAIT

¹⁷ Notation conventions: Signs are glossed with capital letters; IX = manual index sign; AGRM-BC represents the ÖGS agreement marker; subscripts indicate reference points within signing space; the subscripts in parentheses indicate facing (i.e., only facing and no path movement) towards the object position.

3. *The mother loves the father.*MOTHER IX_{3a} FATHER IX_{3b} LOVE _{3a}AGRM-BC_{3b}MOTHER IX_{3a} FATHER IX_{3b} LOVE4. *The boss is proud of the man.*BOSS IX_{3a} MAN IX_{3b} PROUD-OF _{3a}AGRM-BC_{3b}BOSS IX_{3a} MAN IX_{3b} PROUD-OF*Agreeing verbs with facing:*1. *The father scolds the boy.*FATHER IX_{3a} BOY IX_{3b} (3a)SCOLD(3b) _{3a}AGRM-BC_{3b}FATHER IX_{3a} BOY IX_{3b} (3a)SCOLD(3b)2. *The boss criticizes the man.*BOSS IX_{3a} MAN IX_{3b} (3a)CRITICIZE(3b) _{3a}AGRM-BC_{3b}BOSS IX_{3a} MAN IX_{3b} (3a)CRITICIZE(3b)3. *The woman instructs the grandfather.*WOMAN IX_{3a} GRANDFATHER IX_{3b} (3a)TEACH(3b) _{3a}AGRM-BC_{3b}WOMAN IX_{3a} GRANDFATHER IX_{3b} (3a)TEACH(3b)4. *The child observes the doctor.*CHILD IX_{3a} DOCTOR IX_{3b} (3a)OBSERVE(3b) _{3a}AGRM-BC_{3b}CHILD IX_{3a} DOCTOR IX_{3b} (3a)OBSERVE(3b)*Agreeing verbs with path movement:*1. *The girl visits the grandmother.*GIRL IX_{3a} GRANDMOTHER IX_{3b} _{3a}VISIT_{3b} _{3a}AGRM-BC_{3b}GIRL IX_{3a} GRANDMOTHER IX_{3b} _{3a}VISIT_{3b}2. *The boss helps the woman.*BOSS IX_{3a} WOMAN IX_{3b} _{3a}HELP_{3b} _{3a}AGRM-BC_{3b}BOSS IX_{3a} WOMAN IX_{3b} _{3a}HELP_{3b}3. *The mother supports the woman.*MOTHER IX_{3a} WOMAN IX_{3b} _{3a}SUPPORT_{3b} _{3a}AGRM-BC_{3b}MOTHER IX_{3a} WOMAN IX_{3b} _{3a}SUPPORT_{3b}

4. *The man asks the boy.*MAN IX_{3a} BOY IX_{3b} 3aASK_{3b} 3aAGRM-BC_{3b}MAN IX_{3a} BOY IX_{3b} 3aASK_{3b}*Backwards verbs:*1. *The girl invites the father.*GIRL IX_{3a} FATHER IX_{3b} 3bINVITE_{3a} 3aAGRM-BC_{3b}GIRL IX_{3a} FATHER IX_{3b} 3bINVITE_{3a}2. *The grandfather picks up the child.*GRANDFATHER IX_{3a} CHILD IX_{3b} 3bPICK-UP_{3a} 3aAGRM-BC_{3b}GRANDFATHER IX_{3a} CHILD IX_{3b} 3bPICK-UP_{3a}3. *The man takes advantage of the woman.*MAN IX_{3a} WOMAN IX_{3b} 3bTAKE-ADVANTAGE-OF_{3a} 3aAGRM-BC_{3b}MAN IX_{3a} WOMAN IX_{3b} 3bTAKE-ADVANTAGE-OF_{3a}4. *The girl accepts the woman.*GIRL IX_{3a} WOMAN IX_{3b} 3bACCEPT_{3a} 3aAGRM-BC_{3b}GIRL IX_{3a} WOMAN IX_{3b} 3bACCEPT_{3a}

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