Grammaticalization is not the full story: a non-grammaticalization account of the emergence of sign language agreement morphemes

Irit Meir
University of Haifa
imeir@univ.haifa.ac.il

1. Introduction

Of all the processes that induce language change, grammaticalization stands out as the only process that introduces new grammatical categories into the language. While other processes may introduce new forms, new morphemes or allomorphs, or cause the disappearance of morphemes, grammaticalization is considered the only process (or assembly of processes working together) that may cause the emergence of a new grammatical *category*.

Grammatical categories, also referred to as inflectional, functional or morpho-syntactic categories, have two facets: they are *conceptual* categories that are manifested *morphologically* in a given language. In order for a new category to arise, a novel bonding between a conceptual category and its morpho-syntactic manifestation has to be created. For example, the creation of forms such as *shew* and *snew* as the past tense forms of *show* and *snow* in the Norfolk dialect of English (Trudgill 2009) cannot count as cases of the emergence of a new category, since past tense already exists in the language; it is only a new form that is introduced. But a change in the meaning of a verb such as *will* from volition to future tense marker (in English and many other languages, see Heine and Kuteva 2002:310-311), does introduce a new category, that of future tense.

The fact that only grammaticalization can cause the emergence of new grammatical categories in a language has been pointed out by Meillet, the linguist who coined the term 'grammaticalization' (1912). Meillet describes two basic core mechanisms for language change – analogy and grammaticalization. However, he points out that there is a fundamental difference between the two: "While the analogy can renew the detail of the forms, but often leaves untouched the overall plan of the grammatical system, the 'grammacticalization' of certain words creates new forms, introduces categories for which there was no linguistic expression, and transforms the whole of the system." (1912:133). According to Meillet, analogy can introduce new forms into the language, but not new categories.

The rich body of research on grammaticalization from Meillet until today has revealed a vast range of changes in languages all over the globe that can be regarded as grammaticalization, the change from a lexical item to a more grammatical item, eventually leading (in some cases) to the creation of a new grammatical category. Heine and Kuteva (2002) compiled a detailed data-set of about 400 attested grammaticalization processes on the basis of a study of about 500 languages.

Grammaticalization has been so widely attested and studied, that it is regarded as the main mechanism for the development of grammatical "stuff" in a language, resonating Meillet's view. In a recent position paper by Beckner et. al (2009), summarizing their view of language as a complex adaptive system, the dominant role of grammaticalization in creating the grammar of a language is emphasized: “Given that grammaticalization can be detected as

ongoing in all languages at all times, it is reasonable to assume that the original source of grammar in human language was precisely this process." (Beckner et al. 2009: 9).

Kiparsky (2012) holds a different view regarding the relationship between grammaticalization and analogy. He suggests that they are not orthogonal to each other, but rather that grammaticalization is a special type of analogy, one that is not exemplar-based; it is a specific kind of analogy driven by general principles (UG constraints or rules). He further suggests that examplar-based analogy can, in rare cases, give rise to new categories, "provided they are built from simpler ones in conformity with existing combinatoric patterns of the language." (Kiparsky 2012: 9). However, the major process for introducing new categories in the language is still grammaticalization, as it does not need to have an existing model in the language in order to start the process.

This paper suggets that Meillet's and Kiparsky's assumptions are too strong, in that new forms and new categories can arise not by means of grammaticalization of free words, or by exemplar-based analogy (in specific cases), but rather by reanalysis of a set of monomorphemic words into multi-morphemic, consisting of a base (stem) and inflectional morphemes. These monomorphemic words have a shared phonological component and a shared meaning component. By comparing the different words in this set, the shared phonological stretch is reanalyzed as associated with the shared meaning component, and thus a new form-meaning element is created, a new morpheme. This novel morpheme can then attach to other bases and become a productive morpheme in the language.

As an illustration, consider a hypothetical language in which a few words end in /*ko*/ and they all happen to denote entities that are inherently red: blood, lips, a rose, Cardinal (bird), a tomato, etc. Speakers of that hypothetical language may identify the shared phonological element and the shared meaning component, and start to associate /*ko*/ with red color. Eventually, /*ko*/ may be reanalyzed as the segment representing red, thus creating a new morpheme in the language, -*ko*, a suffix denoting red color. The next stage would be for -*ko* to attach to other bases, to indicate that they are red. Thus, 'house+ -*ko*' would mean a red house, 'fruit+-*ko*' could mean a red apple, and so on. If the language did not have a grammatical category of color, the emergence of this morpheme introduces not only a new form to the language, but also a new category.

This hypothetical example gives the flavor of the process that will be described below. This process is not grammaticalization, since it involves the fission of an existing word into two parts, rather than the fusion of elements into one word. However, it is not analogical, since it is not based on a pre-existing model in the language.[1] Furthermore, it cannot be said to eliminate unmotivated grammatical complexity of idiosyncrasy, as analogical changes often do; if anything, it may be regarded as creating more complexity in the language, as it creates complex words out of non-complex ones. Yet it is based on comparison across a set of words and on consistent form-meaning pairing.

As we demonstrate below, processes along these lines have been attested in derivational morphology, but they are rare in inflectional morphology. But we show that at least in one case, it is responsible for the creation of a new morphological category. The category in question is the class for agreement verbs in Israeli Sign Language (ISL), a class of verbs that denote transfer and are inflected for agreement with their subject and (indirect) object. This class of verbs exists in many other sign languages too, but the diachronic evidence for its emergence presented here is from ISL.

The paper is structured as follows: we first describe the class of sign language agreement verbs (section 2), and present diachronic evidence for the different stages of its emergence in ISL, from mono-morphemic verbs into multi-morphemic words (section 3). We then analyze

[1] This contrasts with Kiparsky's (2012: 10) view that the fission of one word into two is always exemplar-based, occurring only by analogy to specific existing constructions.

the process involved (section 4), and discuss some phenomena in spoken languages (section 5) which are similar yet are derivational, and therefore do not lead to the emergence of a new grammatical category.

2. Sign language agreement verbs

Agreement verbs in sign languages constitute a class of verbs that are inflected for agreement with the verb's arguments. This class is one of three verb classes of sign languages, identified first by Padden (1988) for American Sign Language (ASL) and then attested in many other sign languages. The two other classes are *plain verbs* and *spatial verbs*. These three classes differ in their agreement patterns: plain verbs do not mark agreement with the verb's arguments at all, and spatial verbs mark agreement with spatial referents, that is, locations. Agreement verbs mark agreement with the verb's subject and (indirect) object arguments by a special mechanism, described below, of copying the locational features of the arguments' referential indices onto the verb's location slots. This tri-partite verb classification is semantically grounded (Meir 2001, 2002). Agreement verbs denote transfer, whether concrete (as in GIVE, SEND) or abstract (as in TEACH, HELP).[2] Spatial verbs denote motion in space, and plain verbs are defined negatively, as not involving transfer or motion. Many plain verbs denote psychological and emotional states.

Verb agreement in sign languages is based on their referential system, in which referential indices are realized by specific loci in space. In sign languages, the referential features of nominals in a clause are associated with discrete locations in space, called 'R(eferential)-loci' (Lillo-Martin and Klima 1990). If the referent is present in the signing situation, the R-locus is towards the actual location of the referent. If the referent is not present, it is assigned a point in the signing space (provided that other NPs have not already been assigned that point). This association is achieved by signing a noun and then pointing to, or directing the gaze towards, a specific point in space.[3] Once an R-locus has been established for a specific referent, subsequent reference to that locus is equivalent to pronominal reference; that is, pointing again to that locus has the function of referring back to the NP associated with it. These R-loci are therefore regarded as the visual manifestation of the pronominal features of the nominals in question (see e.g., Meier 1990; Lillo-Martin and Klima 1990; Janis 1992; Neidle et al. 2000; Rathmann and Mathur, 2002; Lillo-Martin and Meier 2011. Liddell 2003, presents a different view of these loci).

In addition to pronouns, verbs which inflect for agreement, the class of agreement verbs, also make use of the system of R-loci: their beginning and end points are determined by the R-loci of their grammatical arguments. The initial point of the verb is associated with the R-locus of the subject argument, and the final location with that of the object's R-locus (Padden, 1988).[4] Agreement verbs can be regarded as verbs whose beginning and end points are not lexically specified, but rather contain a variable whose phonetic value is filled by copying the location features of the R-loci of the verb's arguments (Meir 1998a). According to this

[2] Not all agreement verbs are prototypical verbs of transfer, as pointed e.g. by Quer and de Quadros (2008). I attribute this to the grammaticization of this class of verbs (Meir 2012). However, in all sign languages that have agreement verbs, this class includes a core set of typical verbs of transfer.

[3] Localization of referents may also be achieved by signing the noun itself in a specific location in space, if the sign is not body-anchored. For example, the sign CHILD is signed by placing a  handshape facing downwards in neutral space. If the signer places his/her hand to the right or to the left of the signing space, this location may serve as an R-locus for the particular child introduced into the discourse.

[4] This description of the mechanism of sign language verb agreement is oversimplified. The more precise generalization is that the verb's initial and final locations are associated with its source and goal arguments, and the facing of the palm is towards the grammatical indirect object. For a fuller description and analysis, see Meir (2002).

analysis, which we adopt here, the agreement *markers* are the location values of the beginning and end points of the verbs, since these values encode features of the arguments (their R-loci) on the verb. [5]

However, not all agreement verbs behave the same regarding these agreement markers. Some verbs agree only with one argument, the object, while their initial point is anchored to the body and is invariable (Pizzuto 1986 for Italian Sign Language; Engberg-Pedersen 1993 for Danish Sign Language; Meir et al. 2007 for ISL and ASL). Additionally, signers do not always use inflected forms of agreement verbs; they might use a non-inflected form of a verb (called also citation form; in these forms the movement of the verb is from the signer's body outwards), or they may inflect only the final point of the sign, while the initial point is anchored to the signer's body. This variable behavior has been attested in various sign languages (e.g. Padden 1988 for ASL; Engberg-Pedersen 1993 for Danish Sign Language; Meir 1998a, 2010, 2012, Padden et al. 2010 and Meir et al. 2013 for ISL; de Beuzeville at al. 2009 for Australian Sign Language, and Schembri et al. 2016 for British Sign Language). Some researchers found diachronic differences in the use of these different forms of agreement verbs, to which we now turn.

3. The diachronic development of Israeli Sign Language verb agreement

Sign language verb agreement, then, is a complex grammatical system as it involves systematic encoding of syntactic roles, as well as the referential features of the arguments on the verb. How did this system develop? How did the class of agreement verbs arise in a given sign language?

Luckily, sign languages are relatively young, and so diachronic developments may be easier to trace since many of them might be quite recent. We present here a diachronic study of Israeli Sign language, a language that evolved with the emergence of the Israeli Deaf community about 85 years ago, in a language-contact situation. The members of the first generation came from different backgrounds, both in terms of their country of origin, and in terms of their language. A few were born in Israel, and some of them went to the school for the deaf in Jerusalem that was founded in 1932, but the majority were immigrants who came to Israel from Europe (Germany, Austria, France, Hungary, Poland), and later on from North Africa and the Middle East. Some of these immigrants brought with them the sign language of their respective communities. Others had no signing, or used some kind of home sign.[6] Today, the Deaf community numbers about 10,000 members, spanning over four generations, from the very first generation, which contributed to the earliest stages of the formation and development of the language, to the fourth generation, that has acquired and further developed the modern language as a full linguistic system.

By studying the language of different generations of signers in the community, we can trace diachronic developments in the language (based on Labov's 1963 *'apparent time*' construct, which assumes that differences in the linguistic productions of different age groups in a language reflect diachronic changes in that language). The three groups of ISL signers who participated in the study are presented in Table 1.

[5] There are further complications regarding the characterization of agreement verbs, which cannot be described here for the sake of brevity. See e.g. Meir (1998a), Meir et al. (2007, 2013) and Lillo-Martin and Meier (2011) for discussion.

[6] For a description of the history of the Deaf community in Israel and the development of ISL, see Meir and Sandler (2008).

Group	*Generation*	*Age*	*N*	*characteristics*
1	First	65+	13 (7 male, 6 female)	• came from a variety of linguistic backgrounds • not exposed to a unified linguistic system
2	Second	45-65	10 (5 male, 5 female)	• had linguistic models for ISL
3	Third	25-45	8 (4 male, 4 female)	• exposed to ISL from their early childhood, • six are native ISL

Table 1: Participants in the study, according to groups

3.1 Task

In order to elicit verb forms from the participants, we used a set of 30 video clips, each depicting a single event (Sandler et al. 2005). Of these, relevant to our study are nine clips depicting transitive or di-transitive events with two human participants (see Appendix). The verbs in these clips have the potential of becoming agreement verbs in a sign language, since agreement verbs are always transitive and have two human/animate arguments. Participants were asked to view the clips and describe the event in each clip to another ISL signer. The verbs in all the responses obtained from the signers were analyzed as to whether they displayed full agreement, that is, agreeing with two arguments (the subject and the object), with one argument (the object) or did not agree at all.

3.2 Results

The analysis of the signed productions of the different groups shows that there is a noticeable difference between the two older groups and the youngest group (Figure 1): while signers of the youngest group used agreeing forms in 72.5% of their verb productions, signers in the two older groups used agreeing forms in less than 40% of their responses. Furthermore, in the two older groups, fully agreeing forms are very rare: only 5%-6% of their verb forms mark agreement with two arguments. The majority of forms inflected for agreement in these groups mark agreement with only one argument. In Group 3, fully agreeing forms appear in 45% of the responses.

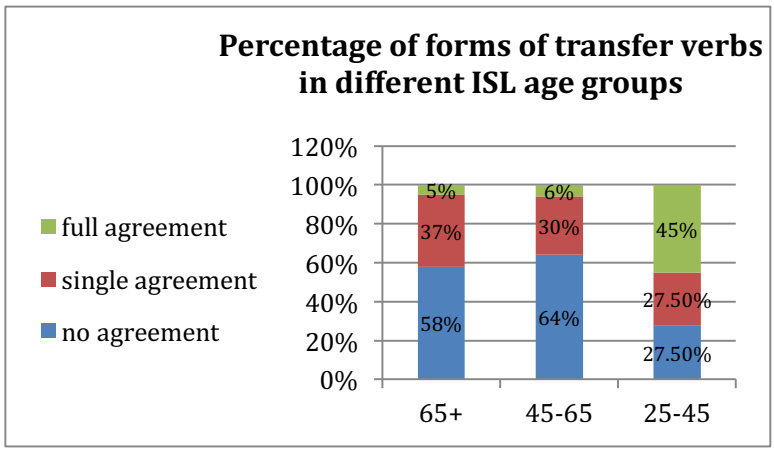

Figure 1: Percentage of forms of transfer verbs in the three ISL groups

Though Groups 1 and 2 look very similar, there is an interesting difference in the form of the single-agreeing verbs. A single-agreeing verb can be articulated in the *Z axis*, that is, the axis from the signer towards a potential addressee, or it can be directed towards locations in space that are to the right or to the left of the signer (the *diagonal axis*). As shown in Figure 2, there is a marked difference between Group 1 and the other groups: in Group 1, almost half of the single agreeing forms are signed on the Z axis. In Groups 2 and 3, their percentage is 17% and 10% respectively. This means that in Group 1, many more verbs are confined to the Z axis, and make more restricted use of the horizontal plain around the signer's chest. As we shall see shortly, this difference in form is important for understanding the diachronic development of agreeing forms.

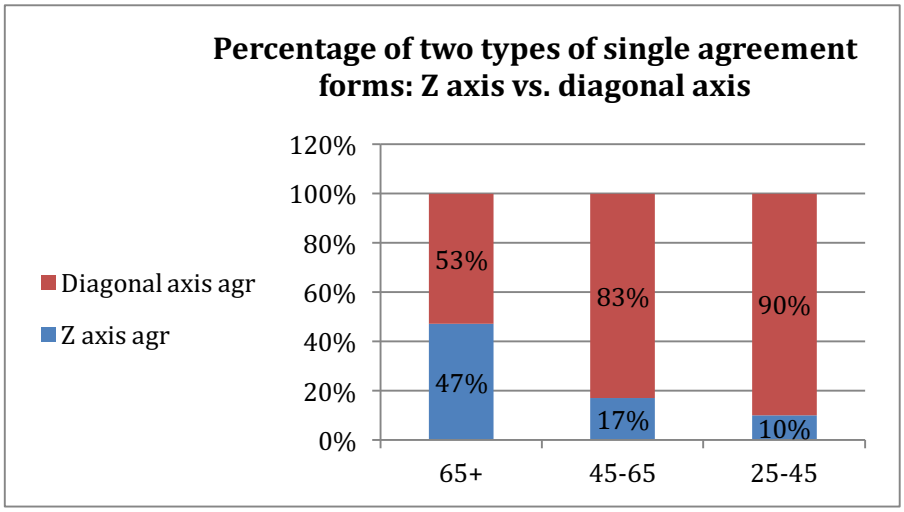

Figure 2: Use of the Z axis vs. diagonal axis in single agreeing forms in the three age groups

The results above indicate that fully agreeing verbs were very rare in the first generation of signers, and that the verb forms were mainly confined to the Z axis. In the second generation, verbs started to be directed at various points of the signing space, but fully-agreeing forms were still rare. In the third generation, fully agreeing forms became wide-spread, and most verb forms take advantage of the plane around the signer, liberating themselves from the Z axis. Yet how these changes occur? And what triggered them? A closer examination of the responses of signers from the different groups reveals several stages that led to the emergence of fully agreeing forms.

3.3 Stages in the development of verb agreement

Stage 1: Verbs of transfer as plain verbs. In Groups 1 and 2, 60% of the responses contain uninflected forms. These verbs of transfer behave like plain verbs; their initial and final points are not determined by the R-Loci of the verb's arguments, but rather stay stable in all the verb's productions, and their movement is from the signer outwards, on the Z axis. Figure 3 shows the verb GIVE signed by a Group 1 signer, when describing a clip in which a woman is giving a shirt to a man.

Figure 3: A non-inflecting form of the transfer verb GIVE

Stage 2: Re-analysis of end point. Some signers in Group 1, however, produce forms that can be regarded as an initial step towards marking agreement. For example, in a clip depicting a man throwing a ball to a girl, one signer signed the following:

(1) I FATHER, FEMALE CHILD$_{Z->2}$ I THROW$_{0->2}$
'I am the father, the child is there, I throw (to the child)'

In this response, the signer places the sign CHILD in a location in space right in front of her (notated by the Z->2 subscript), as if the child were the addressee. She then directs the verb THROW towards the point in space where she had previously localized the child. This verbal form is quite similar to the uninflected forms described in stage 1. There are two main differences, though. First, the signer explicitly localizes the argument (CHILD) in front of her; second, the verb is signed as if directed towards the child. Such a form, then, shows the buds of the sign language agreement system: a verb is directed towards a location in space associated with an argument of the verb. The end point of the sign is being reanalyzed as a morpheme, encoding a feature of the verb's argument. But the verb is still articulated on the Z axis. These forms can be analyzed as agreeing with the object argument, but only when the object argument is the addressee or construed as the addressee. Three signers out of the thirteen in Group 1 used this form in two thirds or more of their responses.

Stage 3: from axis to plane. In the next step towards an agreement system, the verb is no longer restricted to the Z axis. Some signers, mostly from Group 2, produce forms in which the sign's initial location is on the signer's body, and its end point is directed towards a spatial locus associated with the object argument. Crucially, the location associated with the argument is not on the Z axis, but rather to the right or to the left of the signer; the verb's 'loose end' can be directed to any location associated with an argument in the signing plane. Such forms can be regarded as verbs marking agreement with the (indirect) object (Figure 4).[7] The reanalysis of the verb's final location as a morpheme marking agreement with an argument has been completed. This morpheme is not restricted to a specific point in space on the Z axis, but can take any value of an R-locus associated with the verb's argument. Such forms are found in the responses of signers from all three groups, but they become much more prevalent as the language matures (see Figure 2 above).

[7] Thanks to Ann Senghas for this point.

Figure 4: The transfer verb GIVE directed towards the R-locus of the (indirect) object argument

Stage 4: Re-analysis of the verb's initial location. The final stage of the emergence of verb agreement is obtained when the verb movement's heretofore fixed and body-anchored initial point can be articulated at a place off the body; it is reanalyzed as the subject argument marker. When such a reanalysis occurs, the verb might be said to have left the body; it is no longer body-anchored. A verb form marked for agreement with two 3rd person referents moves from one location in space to another, often on the left-right spatial axis (see Figure 5). Both end-points, then, are analyzed as morphemes, and the verb becomes multi-morphemic.

Figure 5: A fully agreeing form of the verb GIVE, signed on the X axis

Further developments: Once this mechanism of agreement (associating the verb's initial and final points with the R-loci of the arguments) is established for a group of verbs with specific semantic characterization, namely, verbs of transfer, other verbs may also adopt this morphological mechanism, and become agreement verbs. These verbs may share some, but not all of the semantic attributes of verbs of transfer, e.g. they are transitive and involve two human participants, but the transfer sense is less obvious. For example, verbs of communication, such as PHONE or FAX, involve two human participants, as do verbs of transfer, and also the act of communication. In some languages (i.e. ASL and ISL) these signs were originally plain verbs, but have become agreement verbs over the years. Similarly, verbs of saying, such as TELL, ASK, ANSWER, TELL-A-STORY, and ASL SAY-NO-TO are also agreement verbs. Other verbs that became agreement verbs in ISL are VIDEOTAPE (someone), HATE/DETEST (someone) and STAY-AWAY-FROM/AVOID. As the formal mechanism becomes established in a language, the semantic basis for the category becomes more opaque, and the grammatical characteristics of the elements become more prominent.

4. The diachronic mechanism underlying the development of sign language verb agreement

The preceding section described the chain of changes that occurred in verbs of transfer in ISL, from plain verbs that are not marked for agreement at all to fully agreeing forms. What is the mechanism underlying this chain of changes?

The crucial change is in stage 2, where verbs denoting transfer were reanalyzed as multi-morphemic; their final location was reanalyzed as directed towards the addressee, that is, a morpheme marking agreement with the addressee. I suggest that this reanalysis was triggered by two factors: (i) a resemblance of form and meaning components in words denoting transfer in the manual modality; and (ii) an increase in the use of the signing space for reference indexing.

When depicting a transfer event in gestures, the hands typically move outwards from the signer's body, as if tracing the transfer of an entity from one possessor (represented by the signer's body) towards another person (the recipient, who is conceived of as being located in front of the signer). One end of the sign is at the signer's body, and the other end is in space, away from the body. This 'loose end' of the verbs is crucial here: when a language develops systematic use of space for referential purposes, the 'loose end' lends itself more easily towards reanalysis; it is reanalyzed as a morpheme encoding the R-locus associated with the object (recipient) argument. After one end point undergoes such reanalysis, the other end point, the one close to the signer's body, may also be reanalyzed in a similar way, as encoding properties of the argument associated with the signer's body, the subject argument (Meir et al. 2007, 2013). Verbs of transfer share a *meaning component* and a *physical formational component*: they denote the transfer of an entity from one possessor to another, and their form consists of a path movement between the signer's body and space. The two endpoints (first the spatial end corresponding to the object and then the body-anchored end corresponding to the subject) lend themselves quite easily to reanalysis: they become morphemes, encoding person features of the two possessors.

What makes verbs of transfer special in sign languages is that they share not only meaning (as they do in spoken languages as well), but also a specific iconic form: a path movement from or towards the signer's body. It is this packaging of shared meaning and form that makes verbs of transfer in the manual modality amenable to reanalysis, eventually leading to the creation of a morphological class. Sign language agreement morphemes, then, came into being not by being grammaticalized from free words, but rather by being carved out of a set of existing words that share a form and a meaning component.

Though this process is not based on analogy to existing forms in the language, it is dependent on the language using space for referential purposes. And indeed, we find that concomitant with an increase in the use of agreeing forms, there is also an increase in the use of space for localizing referents in the younger groups. As evident in Figure 6, signers in Group 2 provided spatial information more often than Group 1 signers, and signers in Group 3 provide spatial information in 40% of their responses, and localize referents in about 60% of their responses. The increased use of space, then, together with the form-meaning packaging of verbs of transfer, gave rise to the reanalysis of the endpoints as agreement markers, thus creating a new grammatical category in the language.

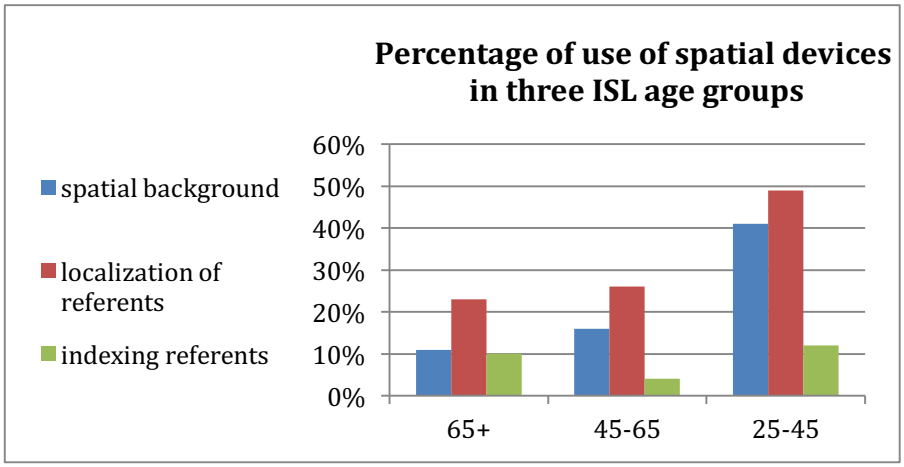

Figure 6: Percentage of reference to spatial background, localization and indexing of referents in the three age groups

5. A non-grammaticalization mechanism for morpheme emergence

The analysis of the emergence of agreement morphemes in ISL presented above shows how morphemes can come into existence by carving off or detaching phonological segments from the words the occurred in, thus granting them morphemic status. In the case of ISL verbs of transfer, not only a new morpheme emerged, but a new grammatical category, that of agreement verbs. Has such a process been attested in spoken languages too?

The carving of a morpheme from a non-complex word has been attested in several types of phenomena, mainly derivational, resulting in a novel morpheme, but not a novel grammatical category in the language. I briefly describe these phenomena here.

(i) Backformation: In backformation a mono-morphemic word is reanalyzed as multi-morphemic because of phonological similarity to existing morphemes in the language. The word [*sculptor*], a mono-morphemic word to begin with, was reanalyzed as [*sculpt+or*], that is, as containing the agentive suffix *–or* and the verbal base *sculpt*, by analogy to the existing verb-noun pairs such as *terminate- terminator*, and the phonological identity of the sequence /*or*/ to the morpheme *–er/or* that exist in the language (Booij 2005: 40-41). The morpheme itself is not new in the lexicon (though the verb is); the novelty is the morphemic status of this sequence in an initially monomorphemic word.

(ii) The creation of productive splinters: The sequence *–oholic*, extracted from the word *alcoholic*, now attaches to a number of words, such as *workaholic*, *foodoholic*, *golfaholic*, *chocoholic*, *shopaholic* (Lepic 2015). In this case there is no analogy to existing morphemes in the language, as the sequence *–oholic* did not exist as an independent unit in the language. On the contrary; it is unique in the language, and therefore unequivocally associated with the word *alcoholic* and its meaning ‘a person addicted to alcoholic drinks’. By detaching *–oholic* from *alc–*, the more general meaning of ‘being addicted to’ is detached from the specific cause of addiction, and a new suffix is created, *–oholic*, which attaches to a noun X, and whose meaning is ‘a person addicted to X’. This process created a new derivational suffix in the language. Similarly, the sequence *–tron* in Hebrew was extracted from *te'atron* (‘theatre’), and signals a theatre group (Mirkin 1968), and the sequence *–fie* in Dutch was extracted from *selfie*, denoting specific self-photos of X taken by X (Audring and Jackendoff 2014).

(iii) Hebrew morphologized derivational suffixes: In Hebrew there is a set of derivational suffixes, whose origin is attributed to non-morphemic subparts of certain nominal vocalic patterns in the language. The agentive suffix *–an*, which appears in words such as *psantran* ('pianist', *psanter* ('piano')+-*an*), *yeynan* ('wine maker', *yayin* ('wine')+-*an*), has its origins in the sequence *–an*, which is part of the vocalic pattern *CaCCan* (Ornan 1983: 30-33, 2001: 138; Schwarzwald 2002 (vol. 2): 20 and references there). Similarly, the Hebrew suffix *–ut*, deriving abstract nouns, was morphologized from words formed from roots whose third radical is *w/y*, and denote abstract nouns, such as *d^{e}mut* ('image', root *d.m.w.*), *p^{e}dut* ('salvation', root *p.d.y*) (Bolozky and Schwarzwald 1992: 52).

(iv) Literal alliterative agreement: This phenomenon refers to cases where agreement markers attached to agreement targets are not affixes but rather part of the noun radical. In Bainouk (Sauvageot 1967), an Atlantic (Niger-Congo) language, prefixed nouns fall into eleven genders (each containing a matched pair of singular and plural prefixes) and show agreement through the prefix, which appears on pronouns, demonstratives, and adjectives, as exemplified by the noun *gu-sɔl* 'tunic' in Table 2. Nonprefixed nouns, which are often loanwords, trigger one of two sorts of gender agreement in both singular and plural: either a default prefix *a–* or an affix copy of the first CV of the noun stem (Sauvageot can find no reason for which method a given noun chooses). It is the latter mechanism, exemplified by the noun *kata:ma* 'river' in Table 2, that is relevant for our discussion here.[8] What is copied onto the agreement targets is the sequence /*ka*/, the first CV of the noun stem, which becomes an agreement affix.

Noun	**class**	**Singular**	**Plural**	**Agreement environments**
'tunic'	7/8 (prefixed)	gu-sɔl	ha-sɔl	gu-sɔl gu-fɛr 7-tunic 7-white 'white tunic'
'river'	0/0 (non-Prefixed)	kata:ma	kata:ma-ã	kata:ma-ŋɔ in-ka river-DEF this-CV 'this river' kata:ma-ã ka-nak-ã river-PL CV-two-PL 'two rivers'

Table 2: Agreement with prefixed and non-prefixed nouns in Bainuk

What all the four cases described above have in common is that morphemes arise by taking a phonological sequence in existing words and reanalyzing it as a unit, a morpheme. The reanalysis may be triggered by analogy to existing forms and constructions in the language, as with the case of *-er* in *babysitter*, or the case of *ka* in the literal alliterative agreement in Bainuk. It can also be triggered by a strong connection between specific forms and specific meanings, either in a single word, as in *alcoholic*, or in a group of words such as those sharing the sequences, *-an* and *-ut* in Hebrew.

The case of the emergence of ISL agreement morphemes is very similar to the case of the Hebrew affixes. A group of words that share a meaning component, namely an event of transfer, also shares a form: a path movement on the signer-addressee axis, going to or from the signer. Since points in space have a morphemic status in the R-loci system, the part of the verb that moves towards a point in space is reanalyzed as a morpheme. Unlike the Hebrew

[8] For a deeper discussion of literal alliterative agreement, see Aronoff et al. 2005.

morphemes and the productive blends, the ISL agreement morphemes denote the referential features (phi-features) of the verb's arguments. As such, they contain more grammatical (rather than lexical) content, and they form a group of morphemes rather than an individual morpheme. Therefore they form a new grammatical category, not only new forms. While such a process has not been described for spoken languages, to the best of my knowledge, the emergence of agreement verbs in ISL shows that it is a possible way for a language to acquire new grammatical categories, in addition to the much more wide-spread and very-well attested mechanism of grammaticalization.

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Appendix: List of clips used in the study

1. A woman *looks* at man
2. A girl *pulls* a man
3. A woman *pushes* a girl
4. A man *taps* a girl (on the shoulder)
5. A woman *gives* a shirt to man
6. A woman *takes* a pair of scissors from a girl
7. A man *shows* a picture to a woman
8. A man *throws* a ball to a girl
9. A girl *feeds* a woman yogurt