Agreement Verbs in Turkish Sign Language (TİD) from the Perspective of Templatic Morphology

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ABSTRACT: One of the peculiarities of sign languages is that verbs are listed in the lexicon according to agreement types that are categorized by tripartite verb classification of Padden (1983, 1988, 1990): (i) plain verbs, (ii) agreement verbs, and (iii) spatial verbs. However, Padden's classical classification does not clearly present the mutually exclusive criteria between the verb types in that transitions between the types have been frequently observed. In this study we aim to show that verb types are related to the combination of roots with specific verbal templates within TİD data, by following the view that SLs are similar to Semitic languages in exhibiting morphological [root + template] combination (Liddell, 1984; Fernald & Lillo-Martin, 2006). We analyze the root as an underspecified lexical and phonological core that becomes a pronounceable/signable verb in combining with verbal patterns/templates in the lexicalization process and suggest that TİD has six different verbal templates which can be characterized in terms of agreement.

Keywords: verb classes, agreement, sign language, templatic morphology

Şablon Biçimbilim Açısından Türk İşaret Dilinde (TİD) Uyum Eylemleri

ÖZ: İşaret diline özgü ilginç durumlardan biri, eylemlerin sözlükçede uyum türleri açısından ayrılmasıdır. Padden (1983, 1988, 1990), bunları (i) basit eylemler, (ii) uyum eylemleri ve (iii) uzamsal eylemler olarak sınıflandırmaktadır. Ancak, bu türler arasında sıklıkla geçişim gözlenmekte, dolayısıyla, Padden'ın bu klasik sınıflandırması eylem türlerinin açıkça birbirinden ayrılabileceği bir karşılıklı dışlama ölçütü sunmamaktadır. Bu doğrultuda, bu çalışmanın amacı, işaret dillerinin biçimbilimsel [kök + şablon] birleşimi sergileyen Sami dillerine benzediği görüşünü izleyerek (Liddell, 1984; Fernald & Lillo-Martin, 2006), eylem türlerinin köklerin farklı eylemcil şablonlarla birleşimine bağlı olduğunu TİD verisi çerçevesinde ortaya koymaktır. Bu çerçevede, çözümlememiz, tür açısından belirsiz sözlüksel ve sesbilimsel çekirdekler olarak ele aldığımız köklerin sözlükselleşme sürecinde belirli eylemcil şablonlarla bileşmeleri sayesinde sesletilebilir/işaretlenebilir eylemler durumuna geldiğini ve TİD'de uyumun belirleyici olduğu altı farklı eylemcil şablon bulunduğunu iddia etmektedir.

Anahtar sözcükler: eylem sınıfları, uyum, işaret dili, şablon biçimbilim

1   Introduction

One of the peculiarities of sign languages (SLs) is that agreement applies only to a subset of verbs, known as 'agreement verbs' (AVs), which is in sharp contrast to spoken languages (SPLs) where agreement between the verb and its arguments invariably applies to each verb in a given SPL, if agreement is part of its grammar.[1] This property of agreement in SLs is handled with the classical verb classification of Padden (1983, 1988, 1990), according to which there are three types of verbs: (i) plain verbs, (ii) AVs, and (iii) spatial verbs (SPVs). While plain verbs show no agreement, AVs agree with either their objects (single agreement) or both their objects and subjects (double agreement), through the movement of the hand(s). SPVs, on the other hand, are those verbs that denote the location of spatial referents represented by the beginning and ending points of the movement of a verbal sign, which, in general, correspond to the source and the goal.

Even though Padden's classification is widely accepted, it has some problems (Quadros & Quer, 2008; Rathmann & Mathur, 2008; Pfau, Salzmann & Steinbach, 2011; Makaroğlu, 2018). First of all, unlike SPLs, it is quite unexpected that in SLs agreement is found as an internal property of a lexical category and not as a grammatical property in general. On the other hand, the linguistic features that distinguish the three types of verbs in this classification are quite uncertain, as witnessed by the fact that there are frequent transitions between the types. These issues suggest that a re-examination of Padden's classification is required for a more viable analysis, which is also consistent with agreement facts in SPLs.

To this end, in this paper we look into verbs in Turkish Sign Language (TİD) using the basic core vocabulary corpus that consists of 2,000 TİD words/signs (Makaroğlu & Dikyuva, 2017). Following the view that SLs are similar to Semitic languages in exhibiting morphological [root + template] combinations (Liddell 1984; Fernald & Lillo-Martin 2006), we aim to show

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[1]   A reviewer suggests that this peculiarity belongs, in fact, to non-radically lexicalized theories and is not an empirical one. S/he contends that some constructions in SPLs as well show this 'peculiarity', i.e. differences in agreement, and radically lexicalized theories actually predict such differences. As it is not our aim to contrast different theoretical stances in terms of how they approach agreement phenomena in SLs, we leave this issue open. However, we would like to state that we do not agree with the view that the difference in question between SLs and SPLs is not empirical, given the fact that agreement applies across the board for each verb in SPLs, but not in SLs, if their grammar have agreement. Also note that there are SPLs, like Japanese, whose grammar do not include verbal agreement while, to our knowledge, there is no SL which does not include any of the verb types specified in Padden (1983, 1998, 1990), a fact which empirically points to different treatments of agreement in the systems of signed and spoken modalities.

that in TİD the types of verbs in question can be derived using Templatic Morphology, namely, from the combination of roots with specific verbal templates (VTs). To account for the morpho-syntactic properties of verbal agreement, we propose a templatic model based mainly on the existence of locus, the placeholder for referential arguments, in a VT that is in a bi-directional relationship with the root. Working in this framework, and in line with recent studies that show SPVs should be categorized under the double AV type, we have identified a total of six verbal templates, two for each type of verb, i.e. plain, single AV, and double AV.

The organization of the paper is as follows. Section 2 gives an overview of the arguments against Padden's (1983, 1988, 1990) tripartite classification of verbs and argues for a need to reconsider the verb types looking into TİD data. Section 3 introduces the framework of templatic morphology and its application to SLs and TİD. Section 4 focuses on the relationship between verbal templates and agreement. Section 5 proposes a templatic model to account for verbal agreement in TİD, and suggest a total of six verbal templates that are linked to three different types of verbs, i.e. plain, single AV, and double AV. Section 6 presents a discussion that supports our findings with extra observations, and concludes the study.

2   Reconsideration of Padden's Classification

In SLs, the three-dimensional signing space provides the signer to use spatial mechanism with syntactic, morphological or discursive functions and different thematic roles such as agent, patient, source, and target are spatially realized within the sign area. These differences in visual-gestural modality have led SL researchers to create a verb classification specific to SLs, where verbs are generally described as 'simple' or 'complex' according to their structural characteristics, and as 'single agreement' or 'double agreement' in terms of agreeing with subject and object.

According to the classical verb classification (Padden, 1983, 1988), revised in Padden (1990), verbs are divided into three types, as seen in Fig. 1: (i) plain verbs, which do not inflect for number or person or take locative affixes, (ii) agreement verbs, which do not take locative affixes but inflect for person and number, and (iii) spatial verbs, which inflect neither for number, person or aspect, but do take locative affixes (see Fig. 2 for the examples of the three types of verbs in TİD). Subsequent studies have suggested that AVs should be classified into single agreement and double agreement verbs with regard to the number of arguments they agree with.

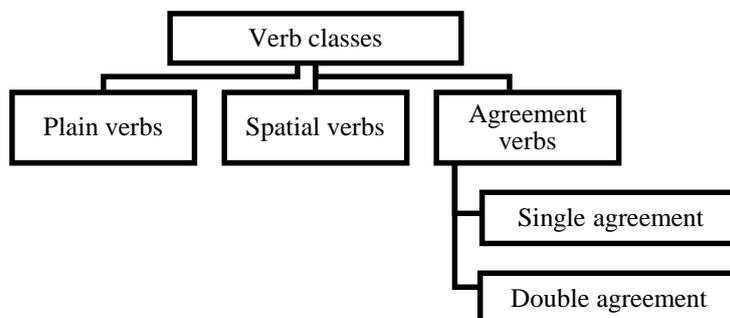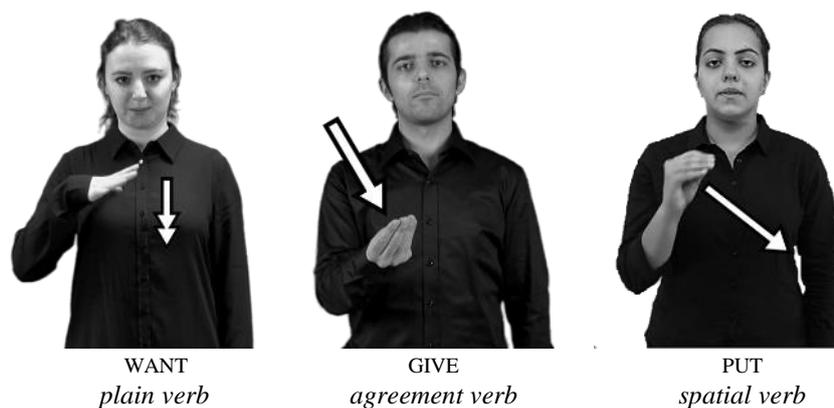*Figure 1. Verb classification for sign languages (Padden, 1990)*

Figure 2. Examples of the verb types in Turkish Sign Language

WANT	GIVE	PUT
plain verb	*agreement verb*	*spatial verb*

In addition to Padden's view that only agreement verbs can inflect for number, Sandler and Lillo-Martin (2006: 39) suggest that number features can be seen in three types, *dual*, *exhaustive*, and *multiple*. Exhaustive number, which is realized via distributive marking to different locations in space, can have similar functions in both agreement (see 1) and spatial (see 2) verbs, as opposed to Padden's classification (Quadros & Quer, 2008). Hence, the fact that two different types of verbs enter into a similar type of number inflection yields an implication that these are similar kinds of verbs, which, in turn, leads to the idea that the so-called SPVs should be categorized under AVs.

(1) $_1$GIVE$_{3\text{-dist.}}$
       I gave it to each one of them.
(2)   PUT$_a$ PUT$_b$ PUT$_c$
       I put it there, there and there.

Another argument of the classical classification for the division between agreement and spatial verbs is that spatial verbs, unlike agreement verbs, do not take aspectual marking. However, the completive aspect (bn) in TİD (see Dikyuva, Makaroğlu & Arık, 2015) that is realized by non-manual movements can occur with both the agreement verb GIVE and spatial verb MOVE (3 and 4).

(3)   IX1$_a$ IX2$_b$ $_a$GIVE$_{b-(bn)}$
      I gave it to you.
(4)   YESTERDAY $_a$MOVE$_{b-(bn)}$
      I moved it from one place to another yesterday.

AVs also differ in thematic roles of their arguments from SPVs according to Padden's classification. They agree with arguments having agent, patient and theme roles while SPVs agree with target and source arguments. On this note, the starting and ending points of SPVs present the spatial referent, with the movement of an object from its location to another location in space, and the trajectory of this movement represents the spatial relations of the spatial argument. At first glance, there seems to be a sharp distinction between the types of verbs in terms of the thematic roles of the arguments, but (5) suggests that this is not necessarily the case in TİD:

(5)   IX1$_a$ IX2$_b$ FACTORY$_c$ $_b$PUT$_c$
      I employed you in the factory (place).

The spatial verb PUT assigns the theme, not the source or target, role to its object argument (IX2), in contrast to the assumed hypothesis that the starting point of SPVs agree with the source argument. Thus, it seems that a classification of verbs based on thematic roles would be problematic on empirical grounds.

In cases where the subject is [-referential] as seen in (6), the movement path of an AV starts at the defective area in front of the signer and ends in the location associated with the object argument it agrees with (Costello, 2015). Similarly, if the locative source argument of a SPV is [-referential] as in (7), it moves exactly in the same way as an AV, starting at the defective area where the agreement does not take place. This supports the assumption that both verb types have similar agreement features. Hence, even though Meir (1998) made a proposal to capture the thematic generalization arguing spatial agreement uses the direction of the movement path to mark source and goal arguments, it is difficult to say that the defective area including the signer represents the source argument.

(6)   FOR EXAMPLE SOMEONE IX2ₐ ₒASKₐ
       Just saying, someone asks you.
(7)   SOMEONE HEREₐ ₒPUTₐ
       Someone put it here.

Contrary to Padden's classification, if the loci of both objects are overtly realized spatially, ditransitive verbs will change their movement trajectory and/or orientation of the hand so that the verb starts at the locus associated with the DO and ends at the locus associated with the IO. This shows that it is not always the subject and object that a double agreeing AV agrees with, and that both the argument structure of the verb and the referential features of the arguments are decisive in agreement realization. For example, the TİD ditransitive verb GIVE agrees with the subject and IO when the DO is [-referential], although it agrees with both IO and DO when they both are [+referential], as seen in (8) and (9), respectively.

(8)   IX1ₐ IX2_b BOOK ₐGIVE_b
       I gave you a book.
(9)   IX1ₐ BOOK IX_b IX2_c _bGIVE_c
       *IX1ₐ BOOK IX_b IX2_c ₐGIVE_c
       I gave you the book.

Again, in contrast to Padden's classification where verbs are listed according to agreement types in the lexicon, transitions between the types have been frequently observed and there seem to exist "fuzzy verbs" that do not strictly fit into the tripartite classification (Fischer & Gough, 1978; Quadros & Quer, 2008). For example, PAY in (10) appears to be an AV although it acts as a SPV in (11) as it agrees with source and goal arguments. The difference between the two instances of PAY is that the arguments that it enters into an agreement relation with are [+animate] in the former case, i.e. the subject and object, while one of them, BANK, is [-animate] in the latter, making the verb act as if it is a SPV agreeing with the source argument. Therefore, the agreement type of the verb seems to be affected by the properties of its arguments,[2] which is quite unexpected given Padden's tripartite classification.

(10)   IX1ₐ IX2_b ₐPAY_b
       I paid you.

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[2]   Thus, the semantic feature [±animate] appears to interact significantly with the type of the verb, an observation already made by Sevinç and Bozşahin (2016) who showed that animacy is a grammatical category in TİD. We would like to thank the reviewer for pointing out this reference.

(11) IX1$_a$ HOUSE RENT BY-HAND NOT BANK$_b$ IX2$_c$ $_{*a/b}$PAY$_c$
 I paid you the house rent by bank transfer not in hand.

Another similar situation we have observed from our database is that backward agreement verbs (BAVs) can exhibit agreement characteristics similar to SPVs and their thematic and grammatical properties can fall in more than one class (for a similar observation in TİD, see also Sevinç and Bozşahin, 2016). While in the first example below, COPY behaves like an AV agreeing with the subject and object arguments, in the latter example it agrees with the source and target arguments, just like a spatial verb. So, we conclude that the transition between the types is not limited to regular/forward agreement verbs.

(12) IX2$_a$ ALWAYS ALWAYS IX1$_b$ $_b$COPY$_a$
 You always copy (imitate) me.
(13) IX1$_a$ DATA ALL COMPUTER$_b$ HARD-DISK$_c$ $_b$COPY$_c$
 I copied all the data from the computer to hard disk.

Classifiers in SLs often combine with verbs, specifically with verbs that indicate (i) a referent's motion through space, a change of posture, and its location or existence somewhere in space, and (ii) the handling of the referents (Supalla, 1982, 1986; Engsberg-Pedersen, 1993; Schembri, 2001; Wallin, 1996, 2000, among others). The lexicalized and particularly non-lexicalized classifier verbs offer many opportunities for testing verb classification in SLs. In the following examples the non-lexicalized classifier verb that has classifier handshape representing round objects is interpreted as GIVE when its arguments are [+animate] (see 14) and as PUT when they are [-animate] (see 15). The interesting point here is that when it is interpreted as GIVE it will be an AV, and when it is interpreted as PUT it will be a SPV in TİD. So we can safely argue that thematic or semantic features do not actually determine verb class.

(14) YESTERDAY IX1$_a$ IX2$_b$ $_a$ROUND-OBJECT-GIVE$_b$
 Yesterday I gave you a round object.
(15) YESTERDAY IX1$_a$ HERE$_b$ $_a$ROUND-OBJECT-PUT$_b$
 Yesterday I put here a round object.

Thus, as there is considerable amount of transition between the verb types, it is possible to say, from a formal point of view, that Padden's (1988/1990) tripartite classification does not clearly present the mutually exclusive criteria to be safely used to draw a line between the verbs of different types. Moreover, the classification of verbs based on thematic/semantic factors reflects fuzzy borders between the types making it difficult to make a formal analysis. In this respect, Quadros (1999), following Janis (1992), argues that there is just a

single distinction between the verbs in a SL: the ones with agreement markers and the others without them, i.e. non-plain and plain verbs, respectively.

The general consensus about the status of agreement is that its morphological realization is understood as the movement between two points associated with the arguments of certain verbs. On the other hand, there are many different analyses identifying agreement as something determined by syntactic and/or semantic motivations and granting a distinct status to syntactic and spatial agreement (Shepard-Kegl, 1985; Padden, 1983/1988; Janis, 1992; Mathur, 2000 and others). However, in the light of the arguments we have discussed above, we agree with the view that there is no formal difference between spatial and person agreement, and that it is therefore not necessary to postulate two different φ-features or grammatical features for agreement and spatial verbs.

3   Templatic Morphology of Sign Languages and TİD

Movement is one of the most important phonological parameters in sign phonology. However, there is no common view about how to characterize it, in particular, how to organize movement types and their related features in a phonological representation. Movement was first analyzed to describe the differences between noun-verb pairs in detail (Supalla & Newport, 1978). Many researchers argue that the noun-verb distinction can be carried out on the basis of movement characteristics in many SLs such as AUSLAN (Johnston, 2001), NGT (Schreurs, 2006), ÖGS (Hunger, 2006), and ISL (Tkachman & Sandler, 2013). Similarly, some researchers have found that for the pairs of semantically related signs in TİD the number of movements as part of a given sign defines the lexical category of the words in the pair (Kubus, 2008; Özkul, 2013; Dikyuva, Makaroğlu & Arık, 2015). For instance, the noun KEY and the verb LOCK have the same handshape but are distinguished from each other only in terms of the number of movements of the respective hand producing the movement, as seen in Figure 3 below.
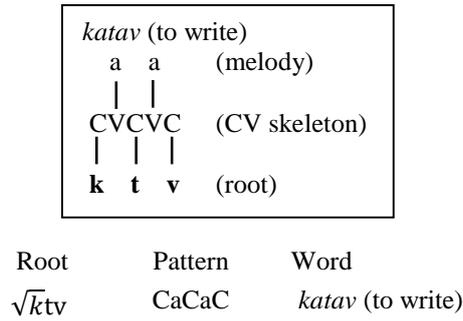
Figure 3. LOCK and KEY in TİD

LOCK　　　　　　　KEY

There are numerous semantically related noun-verb pairs in TİD such as SHOUT-SOUND, SIT-CHAIR, ELIMINATE-ELIMINATION, distinguished from each other only in terms of the number of movements of the moving hand. Although the lexical category is seen as the determinant and distinguishes the noun-verb pairs (Sutton-Spence & Woll, 1999; Schembri and etc., 2002; Johnston, 2001, Dikyuva, Makaroğlu and Arık, 2015), some systematic changes in the movement do not always make reliable formational distinctions between semantically related pairs. Taken together with comparative analyses of other linguistic phenomena, we suggest that the signs in semantically-related pairs in the same lexical category such as FATHER-BROTHER, TIE-BREAK, PLAN-ORGANIZATION, SAY-EXPLAIN are similarly distinguished from one another only in terms of the number or types of movements, but have the same type(s) of location and handshape.

One of the points to be discussed here is whether the movement in the internal formation of a sign is merely a feature having the decisive role in determining the lexical category of the sign or has a more comprehensive word-formational role. Concerning the noun-verb pairs, the following question may be asked: Can the formation of movement in the internal mechanism of the sign be regarded as a morphological process in SLs? This basic question poses many others, such as "What phonological structure in the SL is in the root function?" and "What is the morphological appearance of the nominal-verbal templates?" In order to answer these questions and to be able to classify verbs in SLs, it is necessary to define the features of sub-lexical units first.

According to the traditional view of Central Semitic non-concatenative morphology, a word such as Hebrew *katav* 'to write' is made up of the consonantal "root" $\sqrt{k}$tv and a melodic verbal "template" or "pattern" (the two terms will be used interchangeably). This perspective was famously formalized by McCarthy (1979, 1981), who divided the Semitic verb into three "planes" or

"tiers", as seen in Fig. 4: the CV skeleton (slots for consonant and vowels), the root (consonants) and the melody (individual vowels and inflectional information). This theory allowed for a separation of three morphological elements on three phonological tiers.

Figure 4. Tiers in McCarthy (1979, 1981)

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katav (to write)
   a   a      (melody)
   |   |
  CVCVC      (CV skeleton)
  |  |  |
  k  t  v    (root)
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Root	Pattern	Word
$\sqrt{k}$tv	CaCaC	*katav* (to write)

On the other hand, the Prosodic Model (Brentari, 1998), seen in Fig. 5, reveals the phonological aspects of SLs by means of feature geometry and is motivated by theoretical considerations that follow the work of Clements (1985) for SPLs. This model presents a fundamental difference between SLs and SPLs. Besides the different featural contents in nature, the most striking difference between them is the hierarchical structure itself – i.e, in SLs the root node at the top of the structure is the entire lexeme, a stem, not a consonant or vowel like unit (Brentari, 2012). Following the general concept of 'root-as-lexeme', we can conclude that the SL modality allows simultaneous appearance of sublexical sign structure.[3]

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[3]   For a different view, see Sevinç (2015) who suggests, following One-level Phonology (Bird and Ellison, 1994), that the underlying computational mechanism of SLs and SPLs is similarly serial. We would like to thank the reviewer for pointing this reference out.

Figure 5. Prosodic Model: Hierarchical organization of inherent and prosodic features (Brentari, 1998)
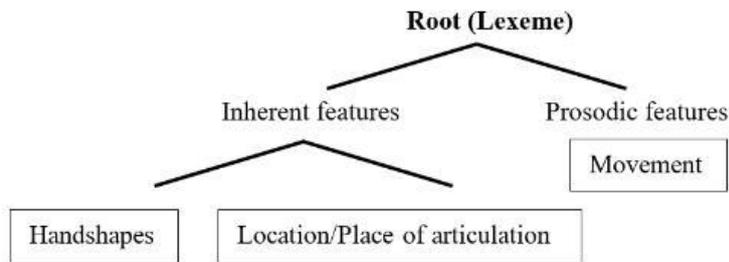
In Hebrew, verbal roots consist of only a series of consonants that do not constitute a well-formed word in the absence of a vowel melody. Under behaviors of inherent features (IF), we can similarly argue, inspired by templatic morphology, that the IFs are the roots of the signs in SLs because they constitute the semantic core of the structure. Besides, in a similar manner to the vowels in Hebrew, the word/sign cannot be a well-formed word without the prosodic feature (PF), i.e. movement, and cannot take the proper pronounceable/signable phonological content (see Arad, 2005). Obviously, when considering templatic structures, the morphological similarity of SLs and Semitic languages becomes more apparent. In parallel with the assumption put forward for the Semitic languages (see McCarthy, 1981), inherent and prosodic features in SLs carry a kind of templatic character. Brentari (2002) also states that similar to consonants the IF branch of the structure carries more potential to be the lexical core and that movement functions as the "medium" of the signal, just as vowels function as the medium in SPLs. For these reasons, we can assert that the IF can be analyzed as more consonant like and the PF can be analyzed as more vowel like, similar to non-concatenative languages.

All SLs have been documented so far display a particular type of morphological organization that is strikingly different from that of SPLs. Besides, SLs show strong resistance to sequential morphology of the concatenative affixation type (Fernald & Napoli, 2000:12) and as stated in Sandler and Lillo-Martin (2006:51) what is common in SLs is the templatic type of non-concatenative morphology. These specific morphological properties reinforce the assumption that the predominant type of morphological structure of SLs is non-concatenative as a result of modality specifications.

Similar to Hebrew three-consonantal roots like $\sqrt{k}$tv, $\sqrt{b}$xn, we assert that IFs are atomic lexical elements storing idiosyncratic phonological and semantic information. But, then, the root in SLs can be seen as "bi-featural" due to its having dual associations – i.e, handshape (HS) and location (LOC), seen in Fig. 6 – where their simultaneous organization does not show any linearity

according to the Prosodic Model. In Semitic languages vowels and consonants can be seen as independent morphemes. On the other hand, due to their autosegmental status, HS and LOC are phonologically, rather than morphologically, motivated.

Figure 6. Root linearization in SLs

$$\sqrt{\dfrac{HS}{LOC}}$$

Although semantic factors that underlie phonological elements in SL lexicons have often been ignored, some researchers have dealt with it explicitly and revealed the relationship between the two (e.g., Brennan, 1990; Johnston and Schembri, 1999; Wilbur, 2008; Strickland et al., 2015), which may provide important information on roots in terms of word formation. In the framework of the templatic morphology, the examination of the semantic and phonological similarities of lexical items provides numerous examples to determine the derivational power of the roots as well as the systematicity of this process in the TİD pattern system. Take, for example, the words in Fig. 7, MARRY, DIVORCE and SPOUSE, whose phonological and semantic similarities clearly show that they are derived from the same root.

Figure 7. MARRY, DIVORCE and SPOUSE in TİD

MARRY   DIVORCE   SPOUSE
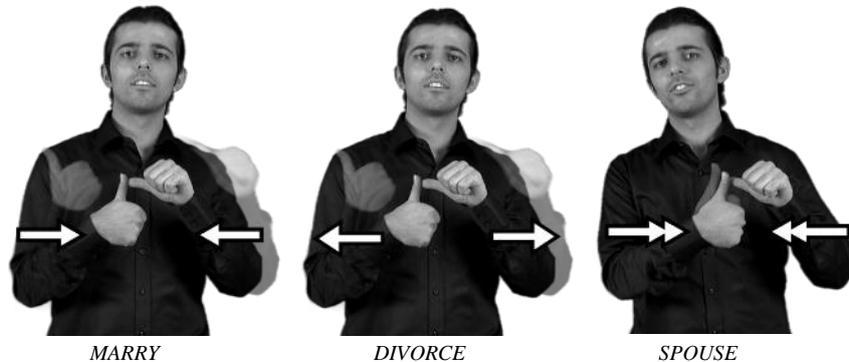
Each word in Fig. 7 contains the same IF and shares with the others an abstract lexical core related to the concept of 'marriage'. We argue that their phonological and semantic relatedness cannot be explained unless these lexical elements are seen as formed from a common abstract root. As shown in Fig. 8, once the abstract root combines with a verb/noun-deriving pattern, they give rise to actual words.

Figure 8. The templatic derivation of the words MARY, DIVORCE, and SPOUSE

Root:

√ Neutral space

Pattern:

Root	Template	Word
√ Neutral space	Verbal template	MARRY
	Verbal template	DIVORCE
	Nominal template	SPOUSE

It is evident that the TİD root, composed of bi-featural phonological unit, is not signable on its own. Roots also lack a fixed or precise semantic interpretation but acquire various interpretations when they combine with different nominal and verbal patterns. Indeed, many TİD roots acquire several interpretations in different environments. Let us take the example of the root with the 'financial/monetary' abstract meaning. When combined with different templates, it derives 12 different yet semantically related words/signs (i.e. MONEY, PAY, PAYMENT, COST, SALARY, BANK, MARKET, CASH, TRADE, MARKET, GAMBLING and CREDIT), three of which is shown in Fig. 9.

Figure 9. PAY, PAYMENT and SALARY in TİD

| PAY | PAYMENT | SALARY |

In the SL literature, a number of studies have attempted to solve the following question: What criteria make it possible to empirically identify the lexical category of a sign? Recent studies suggest that word formation cannot take place in the lexicon but must take place in syntax. The Distributed Morphology

(DM) approach (cf. Chomsky 1998; Halle and Marantz 1993, and subsequent work) adopts a 'single engine hypothesis', according to which, syntax is responsible for both word formation and phrase structure. Following DM tradition, we propose that roots in TİD as atomic lexical units do not bear any syntactic or functional material intrinsically. When an acategorical root is merged with a head bearing a category feature, it becomes an actual word/sign such as a noun, verb, etc. Consider TİD signs BURN and FIRE, whose common root has as core/abstract meaning of a certain event-releasing heat, light, and various reaction products. This core/abstract meaning is manifested in both the noun FIRE and the verb BURN.

We have so far seen that there are many questions to be resolved when looking at the relationship between the types of verbs and the agreement mechanism. That all of the verb classifications specific to SLs have so far proposed that agreement is a basic or decisive factor brings to mind the question whether VTs have an agreement-based distribution. Based on TİD data, we will argue below that they do.

4 A Templatic Model for Verbal Agreement

Even though the agreement-based verb classification in SLs is accepted widely, what the formal/grammatical features that distinguish verb types from each other are is a matter of interest. In addition, although AVs have two subclasses, i.e. single and double AVs, the number of arguments of the verb is not the underlying cause of this distinction. Contrary to claims on phonological constraints (e.g. Meir et al., 2007), on the other hand, in TİD body-anchored verbs such as LOVE and ANGER do not agree with any of their arguments, while LOOK and SEARCH having similar phonological constraints do agree with their two arguments. In this respect, besides the fact that a grammatical feature is explained directly by phonological reasons is a theoretical problem for phonologically-based analyses, the fact that the number of arguments does not determine the number of agreements shows that there is also a need for a different approach to account for the issue in question. Note that although LOVE, FIND and ASK are all transitive verbs in TİD, they are of different types: plain verb, single AV and double AV, respectively. This clearly indicates that there is no direct connection between the argument structure of the verb and its type, namely, whether it agrees with its arguments and, if it does, how many arguments it agrees with.

The signing space is formally used as either a topographical or a referential component to indicate a signer's frame of reference (e.g., Perniss and Özyürek 2015). Any word/sign in SL is produced with the movement of the hand in this space, moving in a certain trajectory. Following our assumption that verbal templates in SLs can be characterized in terms of agreement, the planes that the

movement takes place within the space and how it agrees with its referential arguments are the main issues that need to be discussed.

In general, the agreement mechanism is simply defined as the movement that takes place between the related locations of the arguments of specific verbs listed arbitrarily in the lexicon to establish grammatical relations. However, there are various analyses that claim that agreement depends on syntactic and/or semantic motivation, and that syntactic and spatial agreement are two different types, hence the differentiation between AVs and SPVs (e.g., Shepard-Kegl, 1985; Padden, 1983/1988; Janis, 1992; Mathur, 2000 and others). We argue, on the contrary, that whether a particular verb will show agreement or not depends on the locus feature of the verb and, as we stated before, there is no structural difference between spatial and person agreement, so it is necessary to postulate a single φ-feature (locus) for the AVs and SPVs.

Before moving on to our proposal on verbal types, it is necessary to discuss the terms *location/place of articulation* and *locus*, which are often associated with agreement and used interchangeably. These two terms, we claim, are in fact related to two different phenomena, (i) phonetic and (ii) morpho-syntactic, although they have a similar mechanism from the viewpoint of the realization of AVs. From this point of view, although they have a certain connection in terms of the signing space they occupy, they should not be expected to overlap at all times due to different linguistic phenomena they are related to. As a phonological term, location (LOC) refers to the place(s)/position(s) in space where the articulation of the sign takes place and, according to the Prosodic Model (Brentari, 1998), is an IF of the root. Generally speaking, it can be defined as either 'certain parts of the body' (e.g., head, nose, non-dominant hand, etc.) or 'the neutral space'. The parts of the body can compose the root due to deictic-metaphoric reasons (e.g., mental verbs take place in the head position: THINK, FORGET, UNDERSTAND, etc.). By contrast, the neutral space is unmarked in this respect, which makes it a candidate for being the default location for referential purposes. As for 'locus', on the other hand, we consider it a morpho-syntactic term that refers (albeit descriptively) to the agreement potential of a VT in the sense that only those verbs that have a locus/loci in their VTs can enter into an agreement relation, while every verb, be it an AV or not, need to have (a) location(s) to be articulated as a sign.

In this respect, agreement, which can be formalized as 'the 'movement' between arguments in the referential system', typically involves the representation of φ-features of the NP arguments, and functionally is a part of the referential system of the language. Besides, we take that agreement belongs to syntax and that verb types, as mentioned above, are determined by the morpho-syntactic potential (locus) of the verbal patterns/templates rather than phonological constraints or internal properties of lexical categories.

The reason why the verb's agreement potential is partially related to its phonological 'location' is that in the citation form the verbal sign is produced at a location on the signer's body or in the signing space. On the other hand, its capacity to agree with one or two arguments should be dependent on the functional characteristics of the VT with respect to the 'locus'. To illustrate this claim, consider the phonological structure of the verb BELIEVE that consists of two locations, nose and non-dominant hand (see Fig. 10). As these locations are both body parts and the loci associated with referential space should have the feature [-body anchored], they are not qualified as loci. As a consequence, BELIEVE appears as a plain verb. The agreement verb RIDICULE, on the other hand, has two locus features so that it can agree with two different arguments, although phonologically it takes place in one location in the signing space (see Fig. 10). These examples therefore support our claim that although location and locus are related notions, they are linked to different linguistic phenomena.

Figure 10. Locations associated with the verbs BELIEVE and RIDICULE

BELIEVE — Location 1: Nose; Location 2: Non-dominant hand

RIDICULE — Location 1: Neutral space
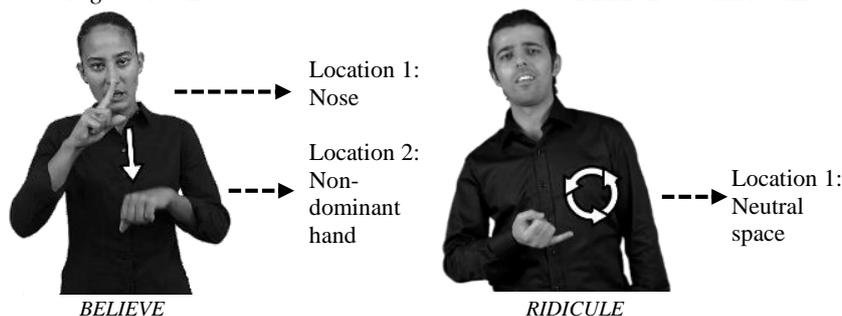
On the other hand, note that SLs enable words to realize by the movement of the hand in one or more of the X-Y-Z coordinate planes due to the nature of the modality. As for the relation between the coordinate planes and the agreement mechanism, we have observed that in TİD referential NPs are assigned a certain location only on the horizontal (X-Y) plane. Hence, in our account, agreement does not present the topographical relationships in the signing space; it takes place in a single layer, the horizontal plane. Thus, verbs such as AGREE, WIN etc. that move along the vertical plane (Z) coincide with a single locus in the horizontal plane, and thus can agree with only one argument.

It should also be mentioned that although the mechanism that combines the abstract root with a verbal template is difficult to observe, we think that the root-template relation is a bi-directional one that performs a mapping relation in terms of feature-limitation. Despite the conditions required by the VT, there is no direct access to underspecified core meaning of the root. In this two-way interaction, a certain root coming together with a different VT can
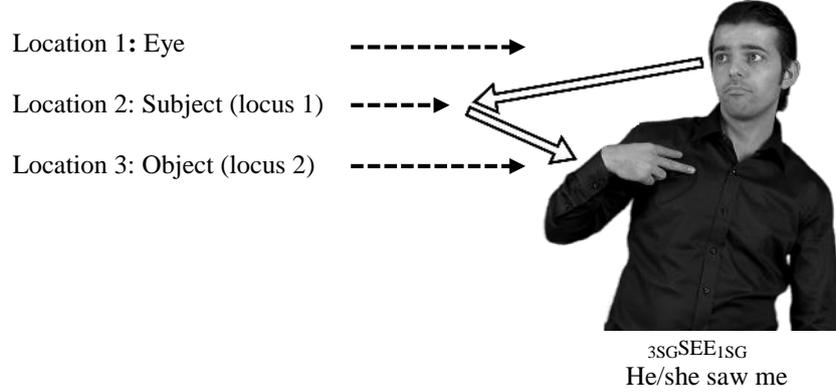
derive new words. Consider the following templatic model we propose for verbal agreement:

Figure 11. Templatic model for verbal agreement in sign language
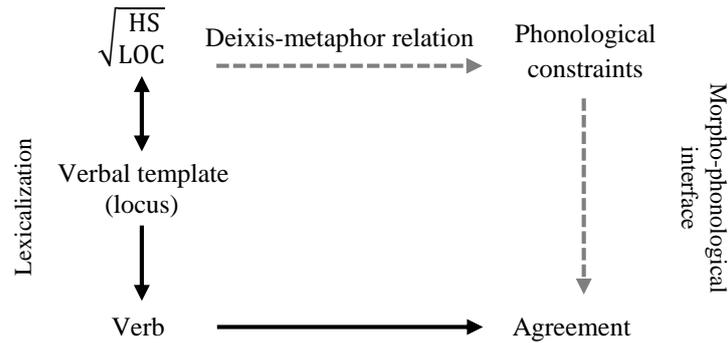
As seen in Fig. 11, the root, underspecified lexical and phonological core, becomes a pronounceable/signable verb when it combines with the VT in the lexicalization process. At the bi-directional phase between the root and VT, the features and limitations of both determine the verb's potential of having locus. Thus, it may or may not be an agreement verb due to its VT. Note, on the other hand, that roots with a semantic core related to a 'mental activity' use the 'head' and those related to 'seeing' use the 'eye' as locations. Our claim is that while the semantic content of the SL root is partially definable and predictable from the nature of the modality, a root holding a marked location such as the 'head' or the 'eye' creates some kind of phonological constraint at the morpho-phonological interface in terms of agreement. Body-anchored verbs such as SEE, CALL, INFORM, etc. permit double agreement but due to such a phonological constraint they also have an extra, 'marked' location (e.g. the head, the eye, etc.). Thus, these verbs have two loci, each associated with a different location, and an extra location on the signer's body, which is required by the phonological constraint just mentioned. In TİD, this is the case for a relatively small number of verbs such as SEE shown in Fig. 12.

Figure 12. Differences between location and locus in body-anchored verbs: SEE

Location 1**:** Eye

Location 2: Subject (locus 1)

Location 3: Object (locus 2)

$_{3SG}SEE_{1SG}$
He/she saw me

Our observations discussed so far allow us to argue that TİD has root-and-pattern morphology similar to the Semitic languages. As mentioned above, we have analyzed the verbs within the most common 2,000 words in the TİD corpus in terms of location and locus characteristics. As far as the agreement mechanism is concerned, out of 296 verbs in our corpus, 90 verbs are plain verbs, 141 verbs are single AVs, and 61 verbs are double AVs[4]. In line with the templatic morphology framework, we hold that a VT reflects the morpho-syntactic features of a verb it is associated with. In this context, we argue that TİD has six different verbal patterns/templates, shown in Table 1, which can be characterized in terms of agreement. Since the root-template relationship is based on a mapping relation, the minimum conditions that the VT looks for in the root as well as the characteristic movement properties are also presented in the table. As mentioned before, we take agreement as the structural potential of the verb in respect to having locus/loci. Thus, whether a verbal root may enter agreement or how many arguments it can agree with depends on the VT it is associated with. In this case, differences between the VTs are not only phonological, but each VT holds a different agreement potential, i.e. zero, single or double agreement.

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[4]   In line with our assumptions discussed earlier, the so-called spatial verbs were considered double agreement verbs.

Table 1. Aspects of verbal templates in TİD

Template no	Minimum conditions for LOC	Verbal Templates		
		Movement pattern	Locus feature	Verb type
1.	(1) Body-anchored	Any type	-	Plain
2.	(2) Body-anchored	Straight-Path (vertical)	-	
3.	Neutral space	Any type	1	Single agreement
4.	Neutral space	Straight-Path (vertical)	1	
5.	Neutral space	Straight-Path (horizontal)	2	Double agreement
6.	Neutral space	Circular-path	2	

A final clarification: VTs may make some predictions for the argument structure of the verb; for example, the verbs that appear in VT5 (see 5.5) are often transitive or ditransitive. However, the agreement potential is unpredictable before a root combines with a verbal template. For example, the transitive LOVE and intransitive CRY have different argument structures, although they both appear in VT1, which does not hold any potential for agreement.

5 Verbal Templates in TİD

5.1 Verbal Template 1: Plain verb

To briefly characterize VT1, it contains the minimum condition that LOC of the root must be a marked status (i.e. body-anchored). Thus, verbs with this VT cannot get locus feature and, as a result, appear as plain verb. Although body-anchored verbs normally involve touching to certain areas of the body, verbs such as FORGET, UNDERSTAND, and THINK that do not involve physical contact but are realized close to a certain area of the body are also included in this category. The most common verbs that appear in the VT1 in TİD are: LEARN, ANGRY, LOVE, WANT, SMELL, HEAR, HELP, SLEEP. Let us now illustrate the visual appearance of VT1 in the signing space in Fig. 13, together with examples given in Fig. 14.

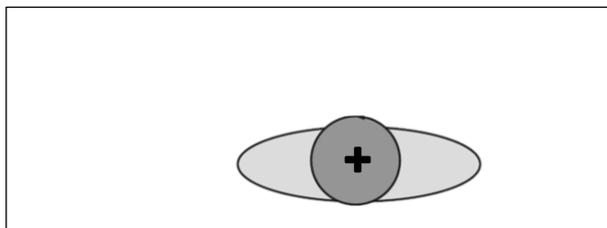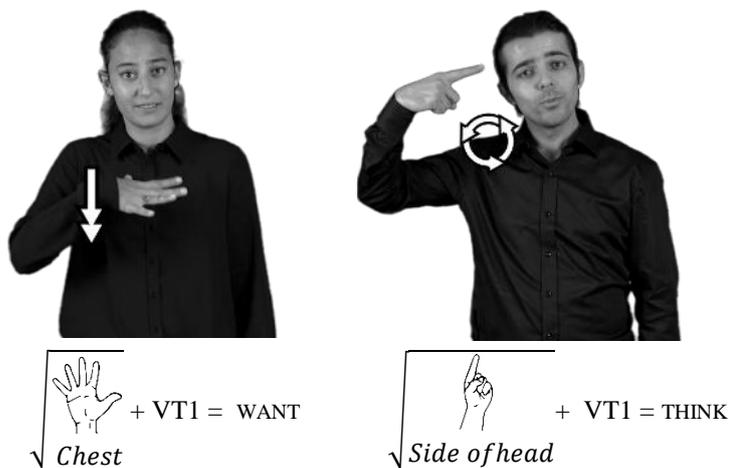*Figure 13. The appearance of VT1 in the signing space*

Figure 14. Examples of verbs in VT1 in TİD

$\sqrt{}$ Chest + VT1 = WANT $\sqrt{}$ Side of head + VT1 = THINK

5.2 Verbal Template 2: Plain verb

The morphological pattern of this VT, which requires two body-anchored locations, consists of the straight-path (vertical plane) movement. As the two different phonological locations in the vertical plane correspond to a single slot in the horizontal plane and this slot is located on the body of the signer, these verbs cannot agree with their arguments spatially. Let us now illustrate the visual appearance of the VT2 in the signing space.

Figure 15. The appearance of the VT2 in the signing space
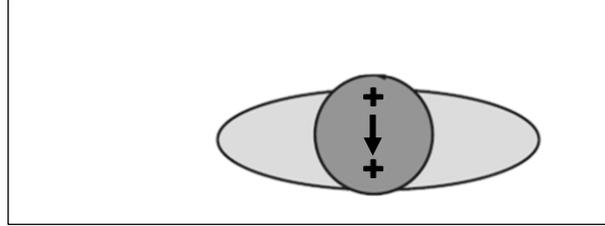
Contrary to the neutral space, it is observed that the marked locations with body-anchored status are explicitly exhibited in roots (e.g, *head, chest, eye* etc.). Although the verbs with the VT2 are similar to each other in terms of the status and number characteristics of LOC, it can be seen that they can vary in terms of positions on the body. Consider the difference between the LOCs of this type. BE-PATIENT consists of a straight-path movement from the chest line to the abdominal region and moves through the vertical plane (Z) on the body. The movement of BELIEVE, on the other hand, starts from the nose to the back side of the non-dominant hand (NdH). Although the initial chest and tail abdominal region of the movement is considered separate positions, they are actually parts of the torso which is a whole. The most common verbs that appear in the VT2 are: DRESS, SWEAT, REST, TO-BE-LAZY, SWEAR etc.

Figure 16. Examples of verbs in VT2 in TİD

$\sqrt{}$ + VT2 = BELIEVE $\sqrt{}$ + VT2 = BE-PATIENT

$\sqrt{Nose + NdH}$ $\sqrt{Chest + Stomach}$
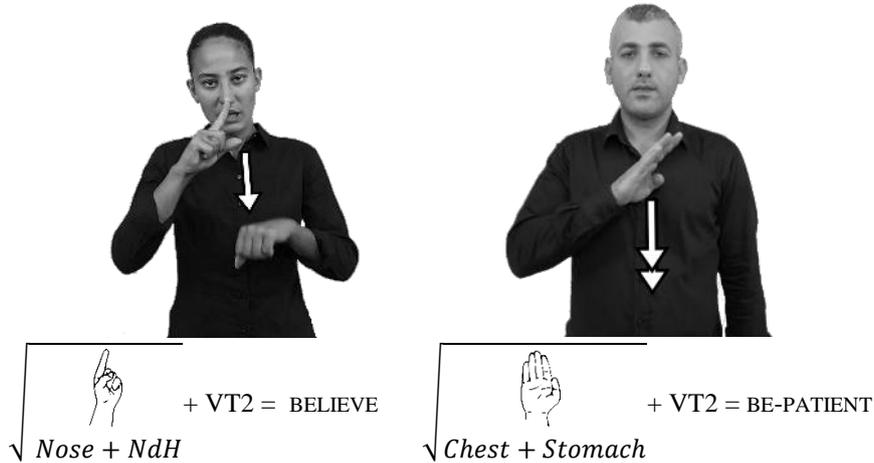
5.3   Verbal Template 3: Single agreement verb

This VT, which requires that at least one of the locations of the root should be in the neutral space, has a single locus feature; its locus, therefore, is found in a single slot in the horizontal plane. Thus, a verb with the VT3 can agree with its argument by signing it in the referential space where the related location is. When viewed from the perspective of location-to-locus match, the phonological position in which the verb is signed in the citation form matches the locus associated with the NP. In terms of our assumption that the horizontal plane is where agreement occurs, the verbs realized in this VT fill in one single slot in signing space. The most common verbs that appear in the VT3 in TİD are: CUT, SHUTDOWN, WALK-AROUND, BREAK, CALCULATE, CHANGE, FIND, SELL, and BREAKDOWN. Let us now illustrate the visual appearance of the VT3 in the signing space.
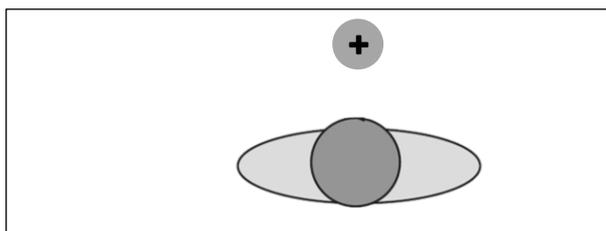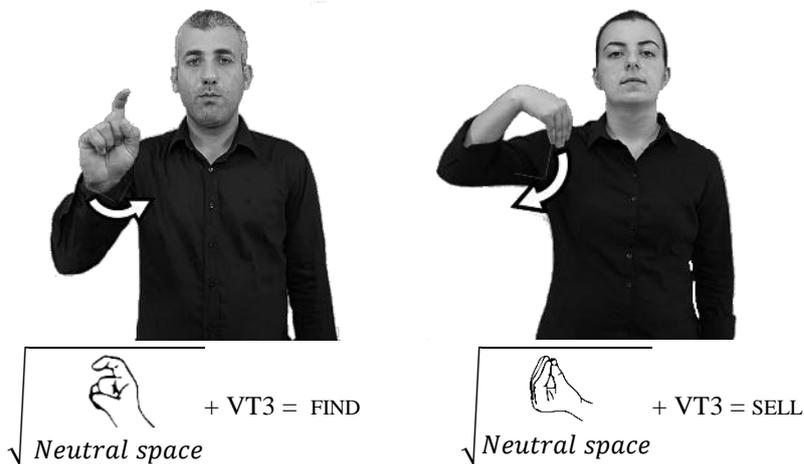
Figure 17. The appearance of VT3 in the signing space

Figure 18. Examples of verbs in VT3 in TİD

$\sqrt{}$ + VT3 = FIND $\sqrt{}$ + VT3 = SELL

Neutral space   *Neutral space*

5.4 Verbal Template 4: Single agreement verb

This VT is similar to VT2 in terms of the straight path movement in the vertical plane, but different from VT2 it has a single locus feature and its phonological location is in the neutral space. As mentioned before, vertical positions coincide with a single location in the horizontal plane, which corresponds to a (single) locus in our system. Thus, the verb having this VT agrees with its argument by moving to its associated position in the signing space, i.e. its locus. The direction of the movement in the vertical plane, i.e. top-to-bottom or bottom-up, does not affect the agreement realization, but is linked to the metaphorical content of the verb. The most common verbs in TİD that appear in VT4 are GROW, WIN, DECREASE, STEM, LOSE, MAKE, SAVE etc.

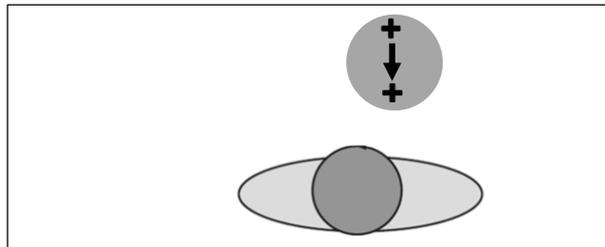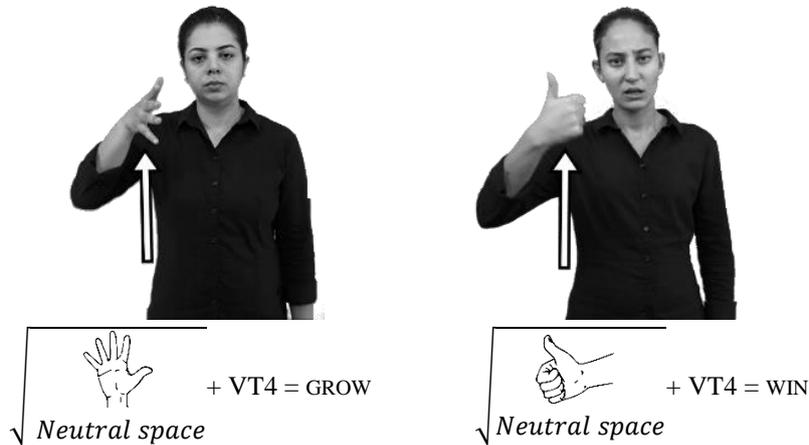*Figure 19. The appearance of VT4 in the signing space*

Figure 20. Examples of verbs in VT4 in TİD

*5.5   Verbal Template 5: Double agreement verb*

The morphologic structure of VT5, which has a phonological requirement that the positions of arguments should be in the neutral-space, consists of the straight-path movement in the horizontal plane. Due to the fact that it has two locus features, it agrees with its arguments via movement between the loci associated with them. Note that the verbal movement between the two loci is allowed because the root does not contain marked, body-anchored locations. Let us illustrate the visual appearance of VT5, which is the most common type in TİD among the verbs with double agreement.

*Figure 21. The appearance of VT5 in the signing space*
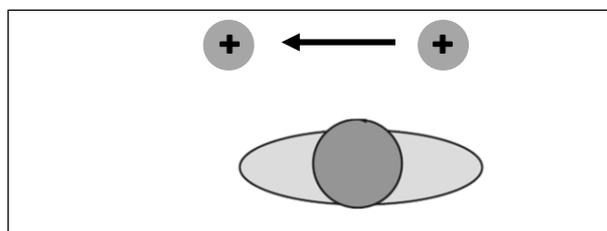
While Padden's classical verb classification evaluates person and location/spatial agreement verbs as separate classes (see Padden, 1990), in our database both types of verbs have the same VT, VT5, and exhibit similar morphological patterns. The examples of the most common verbs in VT5 include: ASK, GIVE, SUPPORT, MOVE, PLACE, SEARCH, etc.

Figure 22. Examples of verbs in VT5 in TİD
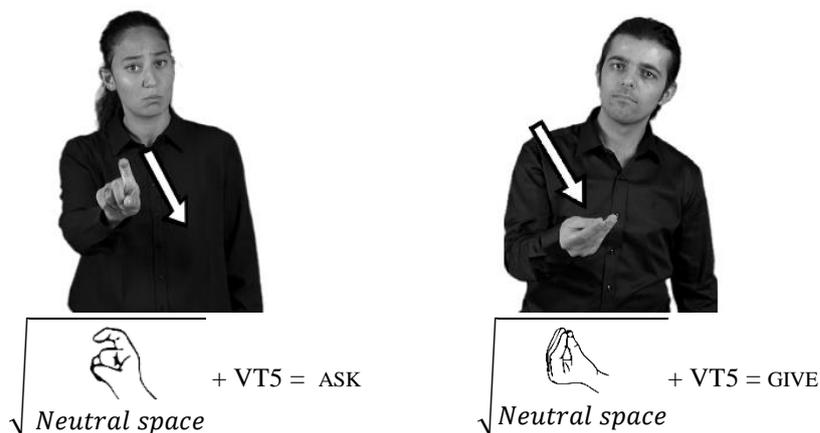
Finger-spellings, being a part of SLs, are used in the formation of some of the lexicalized signs borrowed generally from a SPL, by providing the phonological features of the sign language[5] (Battison, 1978; Brentari & Padden, 2001; Schembri & Johnston, 2007). For example, the words WARN, ANSWER, and ASK are the verbs that were derived from the first letters (U, C and S) of the words with the same meanings in Turkish, i.e. *uyarmak*, *cevaplamak*, and *sormak,* respectively. When looked at from the VT theoretic perspective, that a word/unit that has been borrowed from a language with another communication channel shows agreement indicates that VTs in general have morphological productivity, which in turn supports the existence of VTs that are structurally as well as morphologically independent of morphologically underspecified roots. In addition, roots in lexicalized finger-spellings do not have a marked location (e.g., nose, head), so they appear in neutral space; this supports the assumption that the roots in SLs take the neutral-space location by default.

Figure 23. Lexicalized finger-spelling verbs: WARN and ANSWER
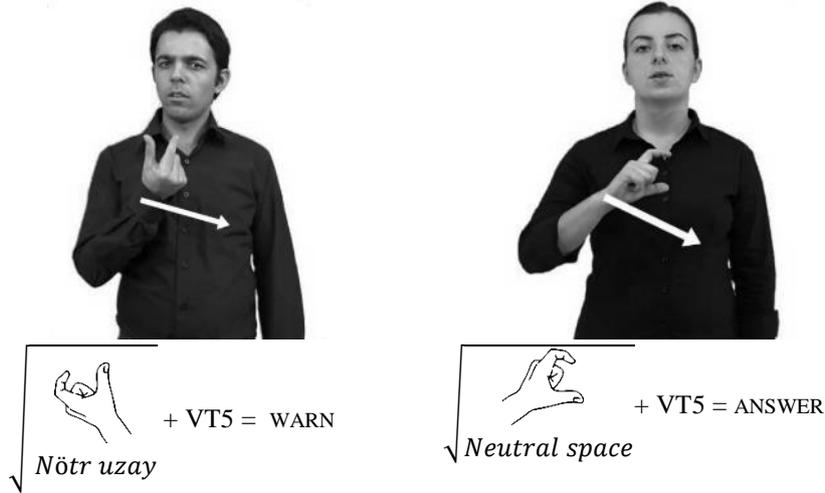
5.6   Verbal Template 6: Double agreement verb

It has generally been assumed that double agreement verbs always take place with straight-path movement, made towards the locus associated with the arguments of the verb. In contrast to this assumption, the verbs with VT6,

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5   See Kubus (2008), Kubus & Hohenberger (2011), Taşçı (2012) and Taşçı & Göksel (2014) for lexicalized finger-spellings in TİD.

which show double agreement, are articulated/signed in a single location in the signing space. In the realization of the verbs of this type, each side of the handshape is directed towards a different argument of the verb indicating agreement. In terms of the distinction between locus and location, we see that there is no one-to-one matching between them and the place of articulation of the verb is in the middle of the two associated loci. The fact that the phonological location does not overlap with the argument's loci, that is, the absence of the same slot in the horizontal plane, supports the view that such a distinction is necessary for different grammatical planes. The most common verbs in VT6 are: SKIM-OVER, RIDICULE, CHEAT, CAMERA-SHOOT, EXPLAIN.

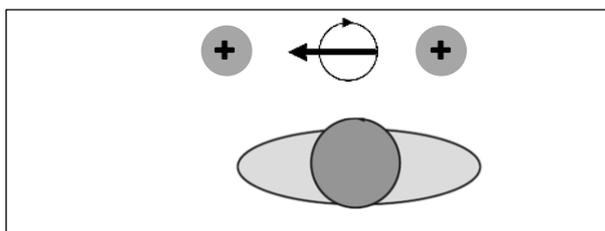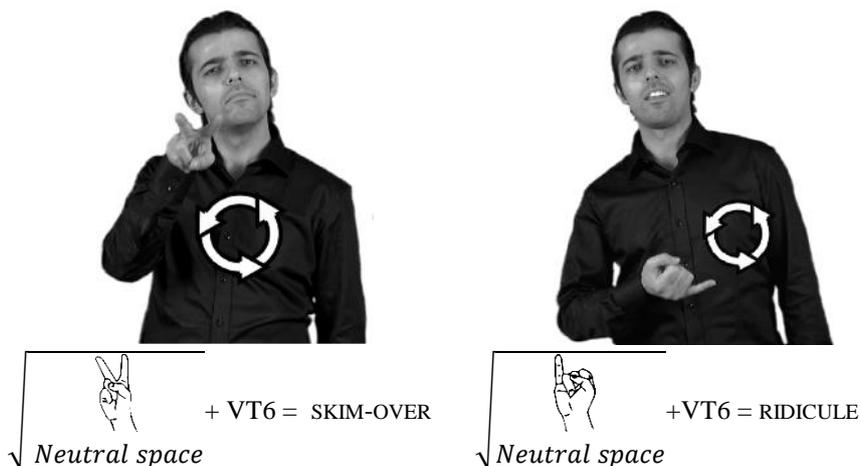*Figure 24. The appearance of VT6 in the signing space*

Figure 25. Examples of verbs in VT6 in TİD

$$\sqrt{\qquad} \quad + \text{VT6} = \text{SKIM-OVER} \qquad \sqrt{\qquad} \quad +\text{VT6} = \text{RIDICULE}$$

$\sqrt{\textit{Neutral space}}$ $\sqrt{\textit{Neutral space}}$

6   Discussion and Conclusion

According to the Prosodic Model, as one of the IFs of signs, location is related to the semantic content of the underspecified root although it has no direct effect on the template in the agreement defining task. In this respect, the type of

the verb and the structural characteristics it holds on agreement are determined by the VT with which it is combined. Moreover, the fact that the agreement takes place in the horizontal plane and that the distribution of the VTs is carried out according to this plane reveals the structural characteristic of agreement-based morphological verb classification. Agreement can thus be regarded as a feature of the VT in which the verb appears, not as an intrinsic property of its own.

This is evident also from the fact that even if the semantic content of lexicalized finger spellings of verbs borrowed from Turkish such as WARN, ANSWER, and ASK are directly related to the source language (See Kubus, 2008; Kubus & Hohenberger, 2011; Taşçı, 2012; Taşçı & Göksel, 2014), their morpho-syntactic potential for agreement completely depends on the VT in which they appear. In terms of the modality, it is not expected that the roots of the words in SPLs, which use spatial relations in a very limited fashion, contain locational information. For this reason, the borrowed unit is only the first letter's handshape of the loan word, an IF of the root. Thus, there is nothing in the root of such a loan verb to explain its agreement properties, leaving the VT as the only candidate, which is responsible for agreement.

With many words that have been derived from a root containing the numerical handshape in the TİD lexicon, these semantically related words demonstrate the productivity of the roots with different patterns in derivation. From this perspective, it can be seen that when, for example, the "1" handshape is combined with nominal templates (NT) they formed many words, such as SOMEONE, ONE-DAY, A-THOUSAND, TEN, HUNDRED, SOMETHING, FIRST, ONCE-MORE. In addition to the lexical examples, when the numerical handshapes appear in VT5, nonlexicalized verbs are derived which can be defined as "scoring goals" or "giving away goals" based on the signer perspective (see Fig. 26). The numerical handshape forming the root indicates the number of goals while the VT specifies the agreement properties of the verb and makes the underspecified root into pronounceable/signable string.

Figure 26. Nonlexicalized verbs in TİD: 2-KICK-GOAL

+ VT5 = 2-KICK-GOAL

Neutral space
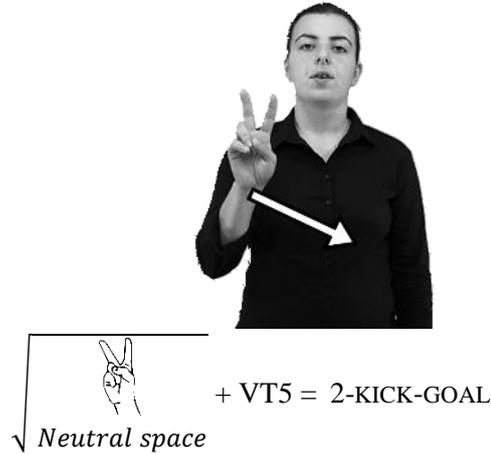
In respect to agreement, another interesting aspect of SLs is that classifiers can agree with either single or double arguments. A classifier in a SL is a handshape that generally moves in space, in a certain position, and represents a certain entity in terms of form-meaning relationship. When looked at from this point of view, the classifier handshapes are accepted as units that indicate the intrinsic features of objects or living things, such as FLAT-THIN-OBJECT, ROUND-SMALL-OBJECT etc. (see. Liddell, 2003). Schembri (2003) has argued that it is difficult to determine which criteria to use in classifier categorization in SLs because of their complex semantic content.

In TİD, the root with the semantic content of 'round object', which consists of Whole Entity Classifier handshape (see Arık, 2013) derives words such as BALL, BALLOON, SPHERE, WORLD, BOWLING etc. when used with various NTs. As seen in Fig. 27, if this root combines with VT4 in the vertical plane, nonlexicalized units with a semantic content such as BALL-FALL, BALL-DROP, or LEAVE-BALL will be derived. Also, when the same root combines with VT5 on a horizontal plane, nonlexicalized double AVs such as BALL-GIVE, HAND-OVER-BALL can be derived. This provides strong evidence that VTs have an intrinsic morpho-synactic agreement mechanism.

Figure 27. Nonlexicalized classifier verbs with different VTs in TİD
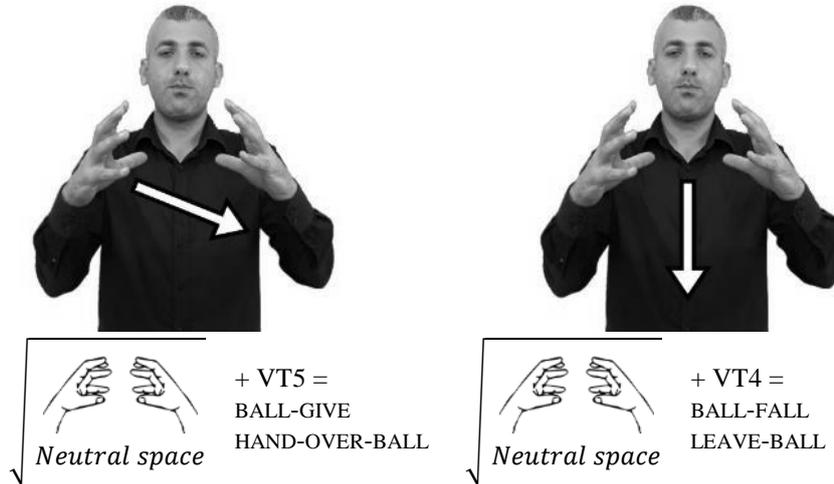
In terms of the status of the classifiers in word formation, it is stated that a classifier appears in some kind of dependent structure (McDonald, 1982; Engberg-Pederson, 1983). In addition, Engberg-Pederson (1983) suggests that the classifier handshapes are the core units of classifier verbs, although she does not present any morphological analysis. From the point of view of templatic morphology, a classifier handshape is directly related to semantic relations and is considered the abstract root core. Also, the root can only be pronounceable/signable by its combination with a template, so it can be said that classifier handshapes are dependent elements. Glück & Pfau (1998, 1999), Zwitserlood (2003), and Benedicto & Brentari (2004) propose, following the morpheme-based view suggested by Supalla (1982), that the classifier is a functional element and encodes agreement between the loci in the signing area as an agreement marker. Benedicto & Brentari (2004) also point out that the classifier which incorporates into the verb is linked to its (in)transivity. One of the crucial problems of this viewpoint is to determine which verb root the classifiers are attached to and how their morphological combination is realized. In other words, even if a classifier verb can take semantic interpretations such as "to give", "to hold over", or "to move" due to the semantic primitives (+animate, +place etc.) of the NP arguments that it agrees with, there is no linguistic evidence that the classifier attaches to the related verbs to derive the indented verbal meaning. That the same classifier verb gains different meanings (e.g., BALL-GIVE or BALL-MOVE) in different sentences also weakens this assumption.

There are various unlexicalized as well as lexicalized words/units consisting of classifier handshapes in the TİD lexicon. Let us now examine the root of the verb GIVE-STEER (giving someone the steering wheel to drive) seen in Fig. 28: it has a two-handed handshape and is articulated in neutral space. When this root combines with the NT consisting of a repetitive and asymmetric path movement, the word STEERING-WHEEL is derived. When it appears with VT3, which permits agreement, the nonlexicalized verb GIVE-STEER is derived instead. This view, which allows nonce formation, indicates that templatic formation is a productive mechanism in SLs.

Figure 28. Nonlexicalized classifier verbs: GIVE-STEER
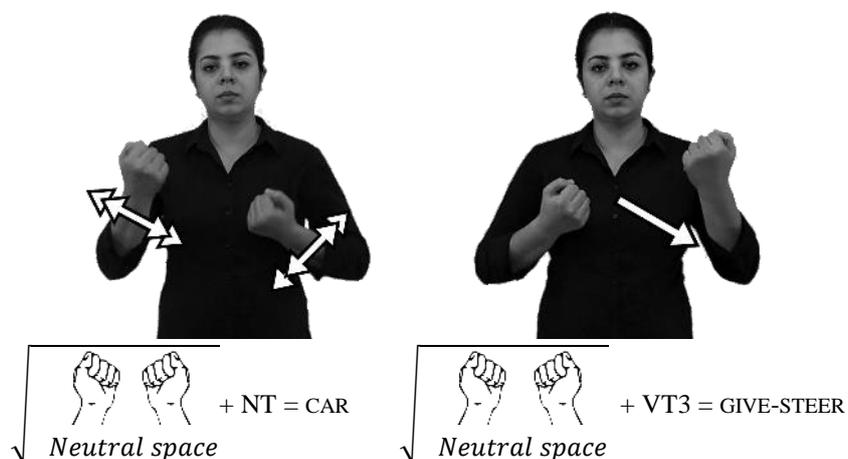
Furthermore, there are also examples of lexicalized verbs in the lexicon, which are made up of the same root but can combine with different VTs. For example, the root having the semantic core of 'to prefer or decide (to do something)' derives the single agreement verb CHOOSE-1 when it combines with VT4, while it derives the double agreement verb CHOOSE-2 when it combines with VT5 (see Fig. 29). From this, we can also claim that VTs may be directly linked to lexical diversity.

Figure 29. Lexicalized verbs with different VTs: CHOOSE-1 and CHOOSE-2

$\sqrt{}$ *Neutral space*   + VT4 = CHOOSE-1 $\sqrt{}$ *Neutral space*   + VT5 = CHOOSE-2
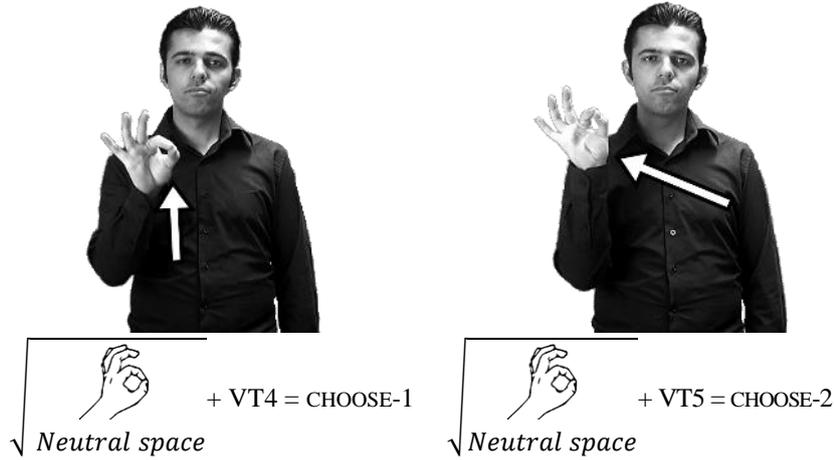
We conclude that in TİD both the derivational and inflectional mechanisms are seen to be more easily decomposable if the perspective of Templatic Morphology is used. This enables us to argue that TİD's morphology is similar to that of templatic languages in that IFs hold an abstract lexical core meaning while prosodic features enable the root to become a pronounceable/signable string. We also argue that in TİD the root is underspecified for its category, i.e. acategorical, which is further evidenced by unlexicalized verbs and loan words that are very productive in the language. In this system, the acategorical word combines with a morphological template, a VT, NT etc., to have a lexical category. As for verbal morphology which we focus on in this study, it is seen that Padden's (1990) classical verb classification based on agreement has a number of theoretical as well as empirical gaps, one of which being the fact that there are unignorable transitions between the types of verbs. These issues call for an account for the relation between agreement and verbal morphology. We propose that it is the VT, more specifically the status/value of the locus feature of the VT (and not its thematic or phonological structure) that combines with a (verbal) root, which determines its agreement properties.

Acknowledgements

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Abbreviations

AUSLAN	Australian Sign Language
AV	Agreement verb
BAV	Backward agreement verb
dist	Distributive
DM	Distributed Morphology
DO	Direct object
HS	Handshape
IO	Indirect object
ISL	Irish Sign Language
LOC	Location
NdH	Non-dominant hand
NGT	Dutch Sign Language
NT	Nominal template
ÖGS	Austrian Sign Language
SL	Sign language

SPL   Spoken language
SPV   Spatial verb
TİD   Turkish Sign Language
VT   Verbal template