Noun classifiers in Hong Kong Sign Language

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As most other sign languages, Hong Kong Sign Language (HKSL) makes use of verbal classifiers for the purpose of spatial predication. However, a thorough study of the Asian SignBank shows that these same classifier handshapes occur in 76% of all HKSL nouns. In this paper, I argue that these classifier handshapes embedded in nouns are in fact noun classifiers. Under the framework of Distributed Morphology, classifier handshapes are underspecified roots in root compounds which can be assigned the nominal category when merged with a nominal functional head in syntax. The function of these classifiers is to identify, and categorize a discourse referent, and they are full-fledged classifiers according to standards set by the general linguistic literature on classifiers. In addition to verbal and noun classifiers, I also briefly show how HKSL uses mensural numeral classifiers to intervene between mass nouns and numerals within the NP. Taken together, this means that HKSL employs three different types of classifiers: verbal, noun, and numeral classifiers.

Keywords: classifier typology, Distributed Morphology, Hong Kong Sign Language, noun classifiers, numeral classifiers, root compounds, verbal classifiers

1. Introduction

In sign linguistic research, there is a general consensus that verbal classifiers exist in all sign languages studied to date.[1] These classifiers are handshape morphemes which encode certain semantic properties of their antecedents, to which they refer outside of the predicate. Verbal classifier constructions are also known as classifier predicates. These classifier predicates express the spatial relations between referents as well as their movements. For example, in (1), illustrated in Figure 1, a Hong

1. With the exception of Adamorobe Sign Language (Zwitserlood 2012: 158).

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Kong Sign Language (HKSL) native signer tells the story of how two dogs ran into each other.[2]

(1) DOG TWO WALK+CL:animate.entity$_1$
>> WALK+CL:animate.entity$_2$
'Two dogs encountered each other.'



Figure 1. HKSL sentence in (1): 'Two dogs encountered each other.'

These classifier handshapes are bound morphemes that combine with verbal roots (i.e., movements) of verbs of motion and location. Supalla (1986) called these classifier handshapes 'agreement markers', since they mark agreement with discourse referents.

In HKSL, the classifier handshapes that are considered verbal classifiers when combined with the verb root in classifier predicates are also frequently attested in nouns. However, oddly enough, when used in nouns, they are not recognized as classifiers, but rather as examples of iconicity, lexicalization (Schembri 1996; Meir 2001). In previous research, the existence of classifiers within the sign language noun phrase has been claimed only twice (Bergman and Wallin 2001; Dékány 2015). Bergman and Wallin analyze Size-and-Shape-Specifier (SASS) morphemes that follow nouns in Swedish Sign Language, and Dékány analyzes morphemes that optionally occur between numerals and nouns in Hungarian Sign Language. The present paper analyzes classifier handshapes that are an integral part of the phonological make-up of a nominal sign.

I argue that the classifier handshapes occurring in nouns need also be considered as classifiers – noun classifiers to be specific – as they serve the purpose of referent agreement and noun classification. Furthermore, they abide by all

2. Data were taken from the Hong Kong Sign Language Corpus (http://www.cslds.org/hkslcorpus/) of The Centre for Sign Linguistics and Deaf Studies (CSLDS) of the Chinese University of Hong Kong (CUHK). As for the notation convention: in (1), the two lines represent signs articulated by the two hands, but the second line is only used when both hands are articulating different signs; ">>" indicates a weak hand hold, i.e., the weak hand holds the sign DOG while the dominant hand signs TWO.

requirements for classifiers laid out in the general linguistic literature. For this research, I consulted corpus data from The Asian SignBank (ASB).[3] My research shows that 76% of all nouns contain a classifier handshape. Due to this high percentage of classifier occurrence, I believe a reanalysis of HKSL nouns and their handshape component is necessary in order to show that the choice of handshape for nouns is less arbitrary or iconic than previously assumed. I propose a formal account of classifier handshapes in HKSL by adopting the theoretical framework of Distributed Morphology (following Zwitserlood 2003, 2008).

In Section 2, I will introduce different types of classifiers that have been distinguished in the spoken and sign language literature. In Section 3, I will give a descriptive analysis of the HKSL noun classifier data. In Section 4, I will show how the framework of Distributed Morphology can account for the occurrence of classifier handshapes in nouns and why they should be considered noun classifiers. In Section 5, I will argue that in addition to verbal and noun classifiers, HKSL also uses numeral classifiers and make mention of some cross-linguistic evidence of other languages that use more than one type of classifier. Furthermore, I will discuss why a Distributed Morphology account is the most suitable analysis for these data.

In terms of conventions, please note that when the term "classifier" is used, it refers specifically to one of the three above-mentioned types of classifiers and not to classifier handshapes. When the (iconic) handshape morphemes are meant, the term "classifier handshape" will be used to refer to them.

2. Spoken and sign language classifiers

Classifiers are overt morphemes that occur in surface structures under specifiable conditions. The meanings of these morphemes derive from denoting salient characteristics of the referent noun (Allan 1977).

2.1 Numeral classifiers

Different types of classifiers can be distinguished, the most widely known type of classifier being the numeral classifier. This type of classifier is included in all classifier typologies from different researchers (e.g., Allan 1977; Croft 1994;

3. The Asian SignBank (http://cslds.org/asiansignbank/), The Centre for Sign Linguistics and Deaf Studies (CSLDS), Department of Linguistics and Modern Languages, The Chinese University of Hong Kong (CUHK).

Aikhenvald 2000; Grinevald 2000). In Cantonese, for example, numeral classifiers are obligatory in expressions of quantity (2).

(2) a. sāam bún syū [Cantonese]
three CL:PUBLICATION book
'three books'
b. sāam gá chē
three CL:VEHICLE car
'three cars'

According to Croft, the function of numeral classifiers is enumeration (1994: 147). This means that they serve the purpose of the "individualisation of units" for entities that can be counted (1994: 162).

2.2 Verbal classifiers

In addition to numeral classifiers, other types of classifiers have been argued for, including verbal classifiers, concordial classifiers, and intra-locative classifiers (Allan 1977), possessive classifiers (Croft 1994), as well as deictic classifiers and noun classifiers (Aikhenvald 2000). As mentioned above, verbal classifiers have been the most relevant to sign linguistic research. For both signed and spoken languages, it has been argued that these classifiers occur with verbs of motion and location and vary depending on the arguments of the predicate (Allan 1977). Aikhenvald (2000) further mentions that verbal classifiers categorize the referent arguments of verbs according to salient characteristics, which is why they can be termed classifiers. Consider the following examples from Cherokee (Blankenship 1997; in Aikhenvald 2000: 161), which show that the object argument determines the classifier that attaches to the verb (given in bold face).

(3) a. Wèésa gà-**káà**-nèè'a. [Cherokee]
cat 3SG.A+3SG.O-CL:LIVING-give:PRES
'She is giving him a cat.'
b. Àma gà-**nèèh**-néé'a.
water 3SG.A+3SG.O-CL:LIQUID-give:PRES
'She is giving him water.'
c. Àhnàwo gà-**nvv́**-nèè'a.
shirt 3SG.A+3SG.O-CL:FLEXIBLE-give:PRES
'She is giving him a shirt.'
d. Gànsda àà-**d**-éé'a.
stick 3SG.A+3SG.O-CL:LONG-give:PRES
'She is giving him a stick.'

e. Kwàna àà-**h**-nèè'a.
peach 3SG.A+3SG.O-CL:COMPACT-give:PRES
'She is giving him a peach.'

Similarly to what has been described for verbs that combine with verbal classifiers in spoken languages, classifier predicates in sign languages are morphologically complex structures, as they consist of verb stems – i.e., the movement component – that combine with handshape (classifier), location (agreement), and possibly aspectual affixes. In verbs of motion and location, the classifier handshapes are bound morphemes that serve to mark agreement with discourse referents (Supalla 1986: 183). Three criteria that determine an element's status as a morpheme are (i) discreteness, (ii) meaningfulness, and (iii) productivity. Verbal classifiers meet all three criteria because, (i) the components of a classifier predicate can be broken down into meaningful units, and the classifier handshape is one of those discernible meaningful units of the predicate; (ii) the classifiers in these predicates denote a referent according to salient characteristics, which makes them inherently meaningful; and (iii) the classifiers can combine with different verb stems, movements, locations, etc., and thus create an in principle infinite number of predicates.

The example in (1) above contains the classifier handshape that is used for animate entities that walk on four legs. This classifier can thus be used for referents such as dogs, cats, horses, etc. When producing a classifier predicate, the signer first introduces the referent (i.e., the noun DOG in Figure 1) and then uses the classifier handshape to refer to this referent in the predicate and in the subsequent discourse. In the case of (1), the two dogs walk towards each other. The signer expresses this action by moving the classifier handshapes towards each other in space.

2.3 Noun classifiers

The function of noun classifiers is to characterize the referent nouns with which they co-occur within a noun phrase. They are independent of other constituents outside the noun phrase (Aikhenvald 2000). Aikhenvald (2000: 81) lists the following five properties of noun classifiers: (i) semantics determines the choice of noun classifier (see (4) below); (ii) it is possible that several noun classifiers occur within one noun phrase; (iii) a noun can co-occur with different classifiers and this brings about a change in meaning, as shown in (5) below; (iv) languages have varying sizes of noun classifier inventories and varying degrees of grammaticalization; and (v) noun classifiers may be used anaphorically and as markers of syntactic functions (see (6) below).

(4) Xil [naj Xuwan] [no7 lab'a]. [Jacaltec; Aikhenvald 2000: 82]
saw CL:MAN John CL:ANIMAL snake
'(man) John saw the (animal) snake.'

(5) a. batang limau [Minangkabau; Aikhenvald 2000: 84]
CL:TREE lemon
'lemon tree'
b. buah limau
CL:FRUIT lemon
'lemon fruit'

(6) A. nyundu duguur-mu gada-any [Yidiny; Aikhenvald 2000: 87]
you+NOM house-ABL come-PAST
'Have you just come from the house?'
B. (yiyi) ngayu bulmba-m gada-any
(yes) I+NOM CL:HABITABLE-ABL come-PAST
'(Yes), I've just come from the camp.'

In (4), the noun classifier *naj* classifies the referent *John* as a man, and the classifier *no7* classifies the snake as an animal; in (5), the classifier changes the meaning of the noun phrase; and in (6), the classifier *bulmba* ('habitable') is used in an answer to a question in order to refer to a house without having to repeat the head noun *duguur* ('house'), which was used in the original question.

Not only do noun classifiers classify their referent according to salient characteristics, they are overt morphemes which constitute a morphosyntactic subsystem (Grinevald 2000); therefore, they have a position in the syntactic representation. This means that they exist on an intermediate level between grammatical and lexical morphemes. Noun classifiers are not independent lexical items, instead they serve the grammatical function of classifying nouns. In contrast to verbal classifiers, the only function of noun classifiers is classification, whereas the former do also have anaphoric and referencing functions.

2.4 Perspectives on classifier handshapes occurring in nouns

The classifier handshapes that are used in HKSL classifier predicates (i.e., verbal classifiers) also frequently occur in HKSL nouns. In what follows, I will briefly touch upon several explanations that have been offered in previous research regarding the question as to why, in sign languages, classifier handshapes occur within lexical nouns. In contrast to these previous accounts, I will argue that such classifier handshapes in nouns are better analyzed as noun classifiers.

2.4.1 *Schembri (1996): Lexicalization*

Schembri (1996) argues that classifiers occurring in nouns are the result of a process of lexicalization by which an originally productive classifier predicate as a whole has become a part of the lexicon and is thus "frozen". Schembri mentions that in Australian Sign Language (Auslan), many nouns are lexicalized signs that are derived from handshape morphemes participating in productive classifier constructions, such as TREE, which involves an object classifier, TICKET, which makes use of an SASS, or BAG, which has developed from a handling classifier (see Figure 2). According to Schembri, the use of classifier handshapes for the formation of new signs is a highly productive process (1996: 95).



Figure 2. Auslan signs TREE (left), TICKET (center), and BAG (right) (adapted from Schembri 1996: 94)

Lexicalization entails that multi-morphemic signs come to consist of a single morpheme. The classifier handshapes no longer express agreement with discourse referents. Additionally, the movement component in a lexicalized sign is semantically less significant – i.e., referring to spatial relations – than that in a classifier predicate.

2.4.2 *Accounts on Swedish Sign Language and Hungarian Sign Language*

Observations of what appear to be classifiers within the NP exist for two other sign languages, namely Swedish Sign Language (STS) and Hungarian Sign Language (HSL). According to Bergman & Wallin (2003), the free SASS-like morphemes that follow nouns within an NP are noun classifiers. As is true for spoken language noun classifiers, these STS noun classifiers are derived from their respective nominal counterparts and identify inherent features of a noun. Though STS noun classifiers look very similar to SASSes, they are actually different in both manual and non-manual aspects. According to Bergman & Wallin (2003), whenever (i) the non-manuals accompanying the noun (i.e., borrowed lexicalized

mouth movements) spread onto the subsequent SASS and (ii) the movement of the SASS is reduced (i.e., is less clearly articulated), that SASS should rather be considered a noun classifier.

This distinction is illustrated in the examples in (7), the relevant signs being depicted in Figure 3. Figure 3a shows the SASS sign that follows the noun MIRROR in example (7a); Bergman & Wallin (2003) gloss this SASS as outline-SQUARE. The SASS functions here as an adjectival predicate and is accompanied by the adverbial modifier 'protruding lips'. Note also that the square-shaped movement is clearly articulated. Figure 3b shows the sign which combines with MIRROR within a noun phrase in (7b), and which the authors gloss as CL-SQUARE. As a classifier for MIRROR, the sign CL-SQUARE has a reduced movement (i.e., a weaker form of the outline-SQUARE movement, which thus appears rounder). Also note that in (7b), the mouthing *spegel* ('mirror'), which occurs simultaneously with the noun, spreads onto the classifier. Additionally, eye contact (+C) with the addressee is maintained during the articulation of the whole noun phrase, including the classifier ('bl' = blink).

(7) a. eyes: +C---------- bl hands
hands: POSS-C MIRROR outline-SQUARE
mouth: min spegel [protruding lips]
'My mirror is about this size.'

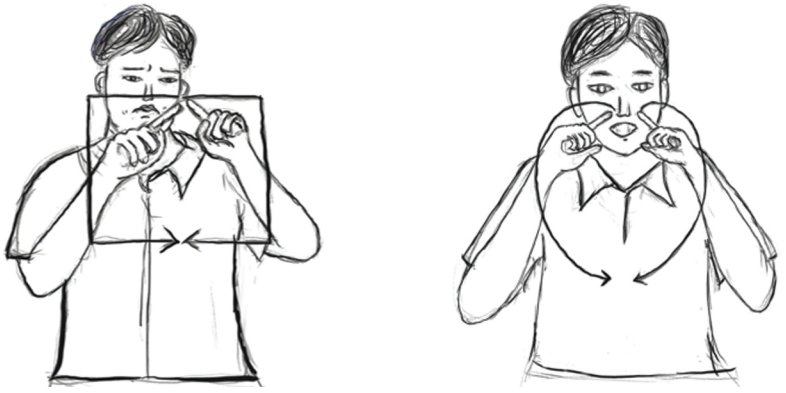
b. eyes: +C----------
hands: EXIST MIRROR CL-SQUARE
mouth: spegel----------
'There was a mirror (in the bathroom).'

[STS; adapted from Bergman & Wallin 2003: 36]

Another example of sign language classifiers occurring within the noun phrase has been reported for HSL (Dékány 2015). However, since these classifiers intervene between the numeral and the noun, they more resemble numeral classifiers. Dékány mentions two of these HSL classifiers: DARAB 'piece' and SZAL 'long and thin', the former being used in the following examples: THREE DARAB FLOWER 'three flowers'; THREE DARAB TREE 'three trees'; FOUR DARAB EGG BASKET THROW 'I have put four eggs into the basket.' These HSL numeral classifiers are entirely optional. It is unclear under what circumstances speakers prefer to use them (2015: 109–171).

2.4.3 *The issue of precedency*

Meir (2001) offers an account of classifier handshapes appearing in verbs in Israeli Sign Language (ISL). In contrast to Schembri (1996), who argued that classifier



a. **b.**

Figure 3. (a) STS tracing SASS outline-SQUARE in (7a) with non-manual adverbial 'protruding lips'; (b) STS noun classifier CL-SQUARE in (7b) with mouthing *spegel* ('mirror') (adapted from Bergman & Wallin 2003: 36)

handshapes become part of nouns through lexicalization of verbal predicates, Meir argues that classifier handshapes become part of verbs through noun incorporation (cf. Glück & Pfau 1998).

Meir observes that classifiers mark the referent argument in verbal predicates, but are non-referential – meaning that they do not refer to specific individuals unless their antecedents have been introduced in the discourse by means of a noun phrase. For example, in SPOON-EAT, the 'spoon' handshape does not refer to any specific spoon but to the manner of eating (2001: 302). Furthermore, classifiers cannot introduce new referents into the discourse. For example, it is impossible to produce a classifier predicate (e.g., MOVE-CL:C) without the referent (e.g., CUP) already having been introduced (2001: 302).

Meir distinguishes two categories of classifiers based on the thematic roles of the discourse arguments: (a) Theme classifiers and (b) Instrumental classifiers (2001: 303). Theme classifiers are bound morphemes – affixes – and are only specified for handshape and orientation. They attach to all verbal roots. An example of a Theme classifier would be CL:C 'a cylindrical object'. In contrast, Instrumental classifiers are free morphemes – noun roots – and are specified for handshape, location, and movement. If these phonological specifications clash with that of a root, the two may not be combined (2001: 306f). An example of an Instrumental classifier is SPOON in SPOON-FEED. These two types of classifiers combine with verbal roots to form predicates with different morphosyntactic properties. This process of *noun incorporation* takes two forms: (i) classifier noun incorporation and (ii) compound noun incorporation. In ISL, Theme classifiers are involved in classifier noun incorporation: the noun argument is incorporated into the verb

but not saturated (meaning the verb retains the same number of arguments). The referent argument has to be from within the class of objects classified by the classifier morpheme. Due to the fact that no change occurs in the argument structure of the verb, doubling (i.e., co-occurrence of the verbally attached classifier morpheme and its referent NP, see (8)) and stranding (i.e., head noun modifiers appearing in the clause with a null head-N, see (9)) are allowed in clauses containing these constructions.

(8) BOOK INDEX$_b$ HE$_a$ $_a$GIVE-CL:flatC$_i$ [ISL; Meir 2001:308]
'He gave me this book.'

(9) RED CL:B(vehicle)-GO_UP_HILL [ISL; Meir 2001:308]
'The red (one) is going uphill.'

Instrumental classifiers play a role in compound noun incorporation. In this process, the incorporated noun argument is saturated, which leads to the argument structure becoming intransitive. These constructions do not allow for doubling (10) or stranding (11).

(10) *I SPOON BABY INDEX$_a$ $_1$SPOON-FEED$_a$ [ISL; Meir 2001:304]
'I fed the baby with a spoon.'

(11) *STAR$_{(distributive)}$ NEW I TELESCOPE-LOOK [ISL; Meir 2001:306]
'I watched the stars with the new telescope.'

Classifiers occur both in nouns and in verbs, and their occurrences in nouns and verbs must be accounted for in their own right. According to Schembri's analysis, classifier handshapes in nouns originate from verbal predicates, and Meir's account explains this phenomenon by arguing that verbs incorporate nouns. Despite accounting for the same phenomenon, both these explanations require both types of classifiers to be dependent on the existence of the other. In what follows, I would like to offer a formal account that does not require either verbal classifiers to precede nominal ones or vice versa, but that instead accounts for both simultaneously and equally. In this sense, the present paper expands and formalizes on an account offered by Supalla & Newport (1978), who, in their discussion of the derivation of related nouns and verbs in ASL, argue that both are derived from a common underlying form. In other words, they also argue that neither the verb nor the noun precedes the other, but that there is an abstract underlying representation for both items – a theoretical assumption that is reminiscent of acategorial roots as assumed in Distributed Morphology (see Section 4.1).

2.5 Interim summary

In this section, I have introduced several types of classifiers that have been discussed in the literature, most importantly numeral, verbal, and noun classifiers. Of these three of classifiers, verbal classifiers have been discussed most extensively in sign linguistic research.

In what follows, I will give a descriptive analysis of HKSL data which show that the classifier handshapes that are used as verbal classifiers in classifier predicates also frequently occur in HKSL nouns. As shown by Schembri's (1996) and Meir's (2001) accounts above, in such cases, the classifier handshapes are not usually treated as classifiers. In Section 4, I will argue that classifier handshapes occurring in HKSL nouns are noun classifiers, and I will answer the question as to how the grammar generates these structures. For this purpose, I will introduce a theoretical framework that accounts for the occurrence of classifier handshapes in HKSL nouns, namely Distributed Morphology.

3. HKSL noun classifiers

3.1 Methodology

For the purpose of this research, I have analyzed all HKSL nouns documented in the Asian Signbank (http://cslds.org/asiansignbank/) of the CSLDS. For each lexical entry, I analyzed whether a classifier handshape was used. Whether a certain handshape could be considered a classifier handshape was determined by answering one of two questions: (i) Does this handshape occur as a verbal classifier in classifier predicates? (ii) Does this handshape denote a salient characteristic of the referent in a manner similar to the way that verbal classifiers denote salient characteristics and classify referents? If either of these questions was answered affirmatively, then the handshape in question was deemed a classifier handshape. All nouns containing classifier handshapes were further analyzed for (a) type of classifier handshape; (b) what aspect of the referent the classifier handshape denoted; (c) the semantics of the referent; and (d) the phonetic details of the handshape. In the following section, I will present the results of this corpus research.[4]

4. The fact that this research is based on corpus data brings with it the limitation that I cannot make any claims regarding possible restrictions on the combinations of handshapes, movements, and locations for noun classifiers. As pointed out by an anonymous reviewer, studies about verbal classifiers in sign languages have discussed such restrictions (e.g., Supalla 1990; Benedicto & Brentari 2004). I hope that in future research, I will be able to address whether such restrictions exist for HKSL noun classifiers.

3.2 *HKSL data*

The total number of lexical signs studied is 700. Through my analysis of the corpus data, I found that 532 (76%) out of these 700 contain classifiers.

Table 1. Occurrence of classifier handshapes in nouns

	All nouns	Compound nouns
Containing classifiers	532 (76%)	137 (86.7%)
(of which containing multiple classifiers)		73 (53.3%)
Not containing classifiers	168 (24%)	21 (13.3%)
Total:	**700**	**158**

Consider the following examples: the lexical item KETTLE (Figure 4) contains a handling classifier; DIAMOND (Figure 5) is not a compound but contains two classifiers:[5] an entity classifier representing the diamond directly and a body part classifier to agree with the hand of a referent wearing a diamond ring; APPEARANCE (Figure 6) does not contain a classifier at all but instead involves a deictic handshape.



Figure 4. HKSL sign KETTLE: handling classifier

5. In Santoro's (2018) account of sign language compounds, signs such as DIAMOND, which contain two classifiers, would be considered a simultaneous compound (2018: 91). According to Santoro's use of DM (see Section 4.1), simultaneous compounds are derived by the merger of two roots under a root phrase, which is then assigned a syntactic category (nP). This analysis is not only true for signs that contain two classifiers, but for any sign that uses both hands as independent articulators (2018: 29).



Figure 5. HKSL sign DIAMOND: entity classifier (right hand) and body part classifier (left hand)



Figure 6. HKSL sign APPEARANCE: no classifier

3.2.1 *Compound signs*

Of the 700 lexical signs in the ASB, 542 were monomorphemic and 158 were bimorphemic or multimorphemic (i.e., compounds). As shown in Table 1, of these compound signs 137 (86.7% of the total 158 compound signs) contain classifiers. The 158 compound nouns each consist of two or more components. There were 21 compound signs in which none of these components contained a classifier. Of the 137 compound signs that did contain classifiers, 10 items contained a classifier in the first component, 54 items contained a classifier in the second or third component, and 73 items contained classifiers in both components (see Table 2).

For instance, the compound that we gloss as FLUORESCENT.LIGHT (Figure 7) consists of the components LIGHT.BULB, with an entity classifier, and adjectival tracing for a horizontal cylinder, thus being a compound of which only the first component contains a classifier (i.e., LIGHT.BULB^CYLINDER). The compound NOTICE (Figure 8) consists of the components ANNOUNCE and the classificatory

Table 2. The distribution of classifier handshapes in compound nouns

Compounds	Exocentric	Endocentric (L)	Endocentric (R)	Total
First component contains a CL	1	2	7	**10**
Second component contains a CL	15	1	38	**54**
Both components contain a CL	21	6	46	**73**
No component contains a CL	9	2	10	**21**
Total	**46**	**11**	**101**	**158**

tracing entity classifier FOUR-SIDED.FLAT.OBJECT. This makes it an example of a compound noun of which the second part contains a classifier (i.e., ANNOUNCE^FOUR-SIDED.FLAT.OBJECT). KNIT.HAT (Figure 9) is a compound of which both components contain a classifier. The first component HAT contains a handling classifier, and the second component KNIT contains an entity classifier (i.e., HAT^KNIT). Finally, the compound AFTERNOON.TEA (Figure 10) contains no classifiers in either of its components.



Figure 7. HKSL compound FLUORESCENT.LIGHT (i.e., LIGHT.BULB^CYLINDER)

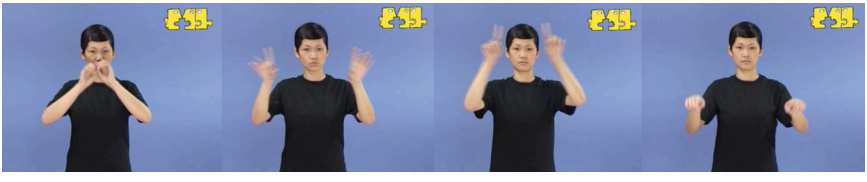


Figure 8. HKSL compound NOTICE (i.e., ANNOUNCE^FOUR-SIDED.FLAT.OBJECT)

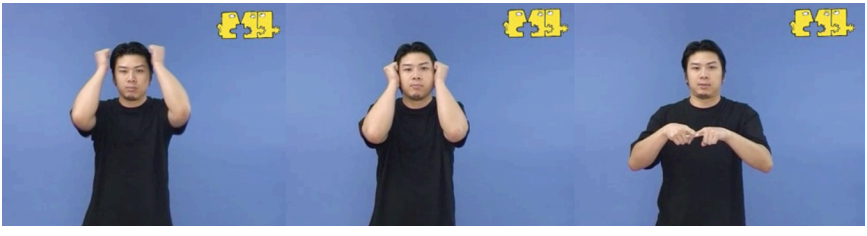


Figure 9. HKSL compound KNIT.HAT (i.e., HAT^KNIT)

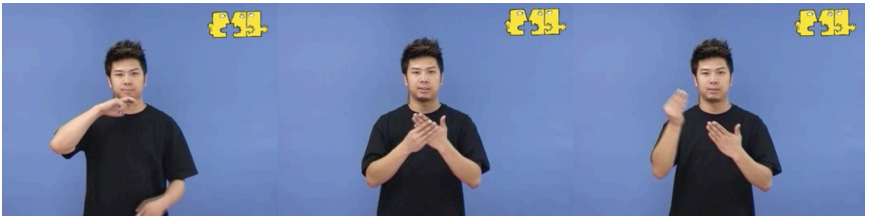


Figure 10. HKSL compound AFTERNOON.TEA

Compound signs in HKSL may be either exocentric or endocentric. Though endocentric compounds in HKSL may be either right- or left-headed, there is a strong preference for right-headed compounds (see Table 3).

Table 3. Headedness of compound nouns

		Total
Compounds	Exocentric	**46**
	Endocentric (L)	**11**
	Endocentric (R)	**101**
Not compounds		**542**
Total		**700**

Of the 158 compound nouns found in the ASB, 101 were right-headed (63.9% of 158), 46 of the compounds were exocentric (29.1%), and only 11 of the compounds (7%) were left-headed. The data of the corpus study show that classifiers mostly occurred in the right components of the compound signs (34.2%) or in both components (46.2%). Only 6.3% of the left components of compound signs contain classifiers. The preference for headedness of compounds thus correlates with the location where classifier handshapes are most frequently observed. This most likely relates to the classificatory function of classifiers: since the head of the compound is the referent, it makes sense that classifiers occur there.

3.2.2 *Nouns without classifiers*

It should not go unnoticed that not all nouns in HKSL contain a classifier, in fact 168 (24%) of nouns have no classifier embedded in them. This should, however, not undermine the argument of the present paper that noun classifiers exist in HKSL. Firstly, I would like to refer to Grinevald's condition for classifiers, which is that classifiers must not classify all nouns (2000: 62), as that would instead constitute a system of noun classes (rather than classifiers). Secondly, the vast majority of nouns without classifiers are abstract concepts, like IDEA or PAIN. The purpose

of classification is the categorization of objects in the world. Abstract concepts are much harder to categorize than, for example, apples, bananas, and melons. The fact that signs for abstract concepts do not contain classifiers can be seen as a form of classification in and of itself: concrete objects go with classifiers while abstract concepts do not. Lastly, there exists no requirement or condition that would stipulate that noun classifiers must obligatorily occur with all nouns in a language. In other words: The existence of noun classifiers in HKSL is not contested by the fact that not all nouns contain a classifier.

3.2.3 *Productivity*

Although the choice of classifier depends on what aspect of the referent is being singled out for identification, there is a difference between noun and verbal classifiers in this respect. As verbal classifiers are productive structures, a signer can decide on the spot which classifier to use to represent a referent, for example, when trying to emphasize a certain bodypart of the referent. For verbal classifiers, the decision regarding the choice of classifier can also depend on the transitivity of the verb root. In contrast, noun classifiers are a part of a noun, and since nouns are lexical items, they cannot be modified. Once a noun has been admitted to the lexicon, the classifier handshape that is incorporated in it will always emphasize one particular aspect of the referent. For example, the sign WATERMELON contains an entity classifier for squash-like referents (Figure 11); if one wanted to refer to the manner of eating a watermelon by using a handling classifier, the classifier would have to appear in the verbal predicate.

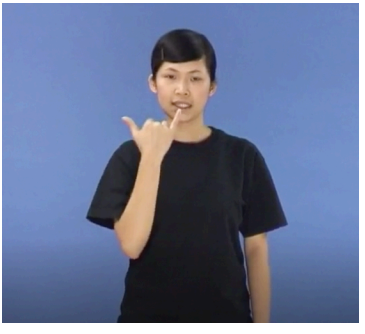


Figure 11. HKSL sign WATERMELON: entity classifier

Unless a new noun is created to exist alongside WATERMELON with an entity classifier (much like the two nouns for 'gun', where one contains an entity and the other a handling classifier, see Figure 19 below), there can be no noun for 'watermelon' with a handling classifier. However, the notion that the choice of classifier

is determined based on what inherent characteristic of the referent is emphasized continues to hold true for noun classifiers.

3.3 *Classification and agreement*

The classifier handshapes occurring in HKSL nouns meet criteria to be considered noun classifiers as laid out by Grinevald (2000). Firstly, classifiers need to be overt morphemes appearing in close proximity to their referents. In sign languages, the distinction between phonemes and morphemes is less sharp than in spoken languages. The five phonological parameters of sign languages are – though sub-lexical – often not meaningless. For example, many signs with a location specified for *forehead* probably has to do with the mind, the brain, or the head. At the same time, it is also these parameters that are commonly used in processes of derivational and inflectional morphology. The division between phonemes (the smallest meaningless, sub-lexical units in a language) and morphemes (the smallest meaningful components in a language) is therefore not always clear-cut, and the five parameters mentioned here are often referred to as phonomorphemes (e.g., Pfau et al. 2012:79). This is in large part related to the high level of iconicity in sign languages, meaning that phonological components often bear meaning and are therefore also morphemic. Although it might seem troubling for our discussion that classifier handshapes can therefore not be considered as morphemes in the strictest sense, I believe that the phonomorphemes of sign languages should neither be considered morphemes nor phonemes, nor a lesser version of both categories, but rather as full instances of both. Furthermore, the classifier handshapes do co-occur with their referents, not next to them, as in the spoken language examples discussed above, but rather "inside" of them, as a form of simultaneous compounding. This is due to the modality of sign languages in which non-concatenative structures are prevalent.[6] Classifier handshapes are

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6. I would like to thank the anonymous reviewer, who suggested comparing the HKSL noun classifier data to Drapeau & Lambert-Brétière's (2011) analysis of stand-alone classifiers in the Algonquian language Innu. The parallel between my analysis of HKSL noun classifiers and Innu stand-alone verbal classifiers is the absence of a classifier-external NP that introduces the semantic argument. Drapeau & Lambert-Brétière argue that for the argument can be omitted because "the classifier suffices to express the existence of a peripheral participant" (2011:311). Despite this similarity, I do think that the absence of external NPs for HKSL noun classifiers requires a different explanation than Drapeau & Lambert-Brétière give for Innu stand-alone verbal classifiers. According to my analysis, simultaneous compounding allows for noun classifiers to occur "within" the nouns. Unlike verbal classifiers, these noun classifiers are not used for reference tracking thus they differ in function to the Innu verbal classifiers. For these verbal classifiers, it is necessary that the referent of the classifier is clear either through prior introduction through an external NP or through context. However, since HKSL noun classifiers co-occur with their respective referents, there is no confusion as to what the classifier refers to.

on the continuum between lexical and grammatical items as they are not independent lexical items and serve the grammatical purpose of classifying nouns.

Additionally, HKSL noun classifiers meet the criteria laid out in Section 2 to be considered morphemes, namely (i) discreteness, (ii) meaningfulness, and (iii) productivity. Regarding (i), similar to classifier predicates, nominal signs can be broken down into meaningful units (DM: the roots within the root compound). The classifier handshape is one of those discernible meaningful units of the sign. Regarding (ii), under the DM framework, all roots in the root compound contribute meaning to the overall meaning of the root compound. This includes the root for the handshape. Regarding (iii), the classifier handshapes can combine with different roots in different root compounds to represent different referents. In other words, the same classifier handshape can occur in any number of nominal signs.

Noun classifiers also constitute a semantically motivated system of classification. Because the handshape morphemes systematically arrange referents in groups or categories according to their characteristics, they thus exhibit clear classificatory functions. In other words, for each referent, a choice is made whether the referent is something that can be held, used, or touched by use of a handling classifier; whether it can be wholly or partially represented at varying degrees of abstractness using entity classifiers; or whether the referent specifically uses (parts of) the body and can be represented through body part classifiers. This classification necessarily starts out from the referent and its salient characteristics. Finally, it is important to note that HKSL noun classifiers do not classify all nouns, as has been addressed above.

This classifier analysis thus argues that noun classifiers are agreement markers (Supalla 1986), and not a form of lexicalization (cf. Schembri 1996) or incorporation (cf. Meir 2001). Glück & Pfau (1998) also explicitly argue against an incorporation account of classifier handshapes and offer a detailed discussion of how verbal classifiers (in German Sign Language) function as agreement markers. In their analysis, classification is (subject- or object-) agreement, and thus an instance of inflection. The inherent properties of arguments in a certain phrasal projection trigger classification. Based on these inherent properties, classifiers are assigned (1998: 8). In contrast, Kimmelman et al. (2020) argue (for Russian Sign Language) that only some types of classifiers involved in classifier predicates are agreement markers, namely entity and body part classifiers.

4. A DM perspective on HKSL noun classifiers

My analysis of HKSL noun classifiers is inspired by Zwitserlood's (2008), who uses Distributed Morphology (DM) in relation to sign language classifiers. Other

analyses that have made use of DM in accounting for certain sign language phenomena include Glück & Pfau (1999), who use it to account for complex patterns of verbal inflection, and Ribera-Llonc et al. (2019), who take an exo-skeletal approach to explaining the difference in morpho-phonological properties of noun-verb pairs. Furthermore, Benedicto & Brentari's (2004) account of verbal classifiers as heads of functional projections could be considered as a DM-type analysis. Zwitserlood argues that signs containing classifiers have internal morphology and often co-exist with their productive predicate counterpart (2008: 252f; see Section 4.2 below). In other words, these nouns are not lexicalized classifier predicates, instead their formation is a productive morphosyntactic process (2012: 172).

4.1 *Introduction to Distributed Morphology*

DM was first introduced in the 1990s by Halle and Marantz (Halle 1990; Halle & Marantz 1993). Its main premise is that the morphological and syntactical domains are governed by the same processes: the internal structure of words is operated by syntax which is the only computational component of the grammar (Kelly 2013). Prior to the introduction of DM, it had been assumed that all lexical and morphosyntactic materials were located in the Lexicon and merged at different levels of syntax during the computation. However, DM gets rid of the role traditionally assigned to the Lexicon and distributes lexical material throughout other components. The *Narrow Lexicon* provides functional heads, lexical roots, and Encyclopaedic listings to the syntax (Alexiadou et al. 2007: 491). Functional heads host morphosyntactic features and drive the syntactic computation. Lexical roots are acategorial and obtain a lexical category by merging with functional heads. For example, the root *break* (√break) can take on the properties of a verb, noun, or adjective, depending on whether it combines with a verbal or nominal functional head in syntax (Kelly 2013: 1f). This is called the Root Hypothesis of DM (Marantz 1997). Each root is unique in the sense that they each possess their own Vocabulary and Encyclopedia Entries. After Spell Out, the Vocabulary provides the morphological components of the grammar: translating syntactic features into concrete realizations.

4.2 *Zwitserlood's (2003, 2008) account of NGT classifier handshapes*

According to Zwitserlood (2003, 2008), signs containing classifier handshapes are a product of grammatical inflection. All phonological parameters are morphemic DM roots. These morphemes are phonologically underspecified and that is what allows for them to combine into complex, compositional "root compounds". Root compounds do not have a grammatical category: they are morphologically headless until they are introduced in the syntax (see Figure 12).

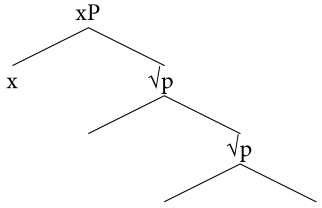
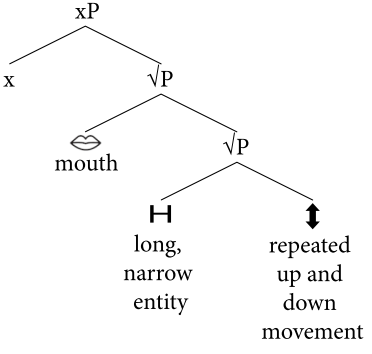


Figure 12. Morphologically headless compositional root compound (adapted from Zwitserlood 2008: 260)

The classifier morphemes in root compounds do not relate to syntactic arguments (Zwitserlood 2012: 172). They fulfill not only the grammatical function of agreement marking, but also serve a lexical function (2008: 255): they contribute lexical information (after Spell Out at PF) to the overall meaning of the sign, i.e., its componential meaning.

The example used by Zwitserlood (2008) is the NGT sign TOOTHBRUSH/ TO.BRUSH.TEETH, an exocentric compositional sign with the componential meaning "long, straight & thin entity repeatedly moves up and down near the mouth" (Figure 13a).





a. **b.**

Figure 13. (a) NGT sign TOOTHBRUSH / TO.BRUSH.TEETH (adapted from Zwitserlood 2008: 259); (b) the root compound structure of the sign in (a) (adapted from Zwitserlood 2008: 260)

The rootPhrase is thus merged under a category node x (Figure 13b). The grammatical category of the rootPhrase (√P) will be determined as either n or v once it is introduced in the syntax. The structure is then moved to Logical Form (LF), where it accesses the Encyclopedia, and Phonological Form (PF), where the sign receives its Meaning and Vocabulary Items. DM thus enables the reading and

explanation of these signs as morphologically complex. It has also become evident that, just as verbs, nouns can contain roots and affixes with lexical meaning (2008: 260–262).

Zwitserlood's analysis shows the difference between classifier predicates and nouns containing classifier handshapes. On the surface, some classifier predicates and nouns may appear to have the same phonological make-up. Take, for example, the HKSL noun KETTLE and the verb TO.POUR (Figure 14 below, repeated from Figure 4).



Figure 14. HKSL sign KETTLE / TO.POUR

Zwitserlood uses the NGT noun ESCALATOR and the classifier predicate LEGGED.ENTITY.MOVE.UP (Figure 15) to illustrate the phenomenon.



a. **b.**

Figure 15. (a) NGT noun ESCALATOR and (b) classifier predicate LEGGED.ENTITY.MOVE.UP (adapted from Zwitserlood 2008: 254)

The two signs look similar, however, they differ greatly in morphological structure. The classifier predicate's root compound contains a morphosyntactic feature bundle [+DIR] which projects an internal argument (Theme). Due to the presence of this argument, the root compound also contains Φ-features for the classifier and the locus (Zwitserlood 2008: 266). Therefore, two more rootPhrases are merged within the root compound: a Source and a Goal, each with a locus Φ-feature. Since there remain unchecked Φ-features, agreement nodes are merged

above the root compound, and these agreement nodes take on the Φ-features (see Figure 16). At this point, the structure can be shipped off to LF and PF, after which Vocabulary items can be inserted.

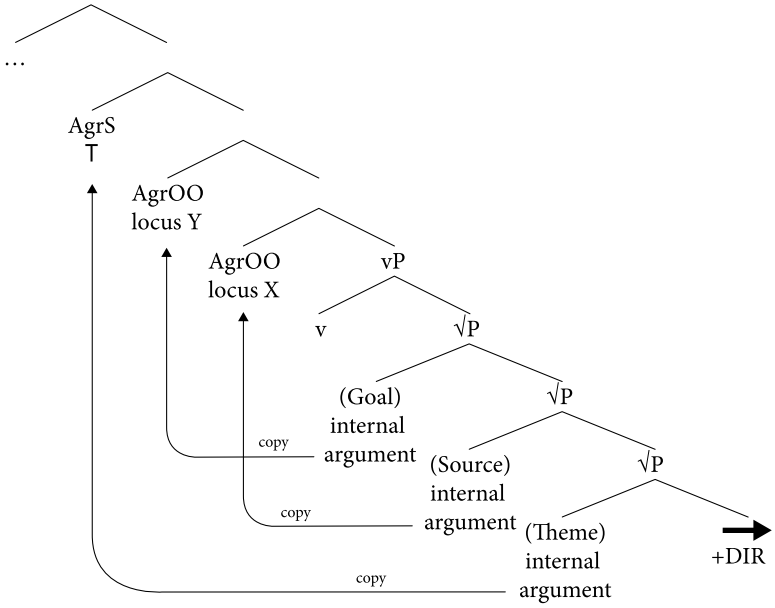


Figure 16. DM structure for the NGT classifier predicate LEGGED.ENTITY.MOVE.UP (adapted from Zwitserlood 2008: 268)

As for the noun ESCALATOR (Figure 15a), which looks very similar to its verbal counterpart, there are no agreement nodes merged on top of the root compound. Instead, the movement root [+DIR] merges with an internal argument and three more feature bundles: [+legged], [+high], and [+low], specifying handshape and the beginning and end locations of the movement (Figure 17). After merging with a little n node, the structure is shipped off and Vocabulary items are inserted during Spell-Out.

In sum, for nouns containing classifier handshapes, all phonological features for handshape are merged below the little n node. The handshape has a lexical function. The computation is complete once it reaches small nP and after Spell-Out there is only Vocabulary insertion and no more morphological operations. In the nominal domain, the roots for location and movement are of equal status with that of handshape; whereas in the verbal domain, location and movement are realized through the merging of agreement nodes.

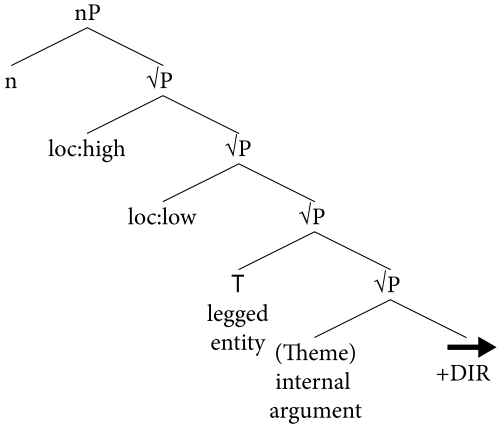


Figure 17. DM structure for the NGT noun ESCALATOR (adapted from Zwitserlood 2008: 269)

4.3 *A DM account of HKSL noun classifiers*

DM mechanisms allow us to account for the occurrence of classifier handshapes not only in verbal predicates (cf. Zwitserlood 2008; Section 4.2 above), but also in nouns. The merging of roots (e.g., location roots, movement roots, handshape roots) into a rootPhrase creates a compound consisting of morphemes with lexical meaning. In my interpretation, the classifier handshapes in these rootPhrases are noun classifiers. Since they are one of the roots, they are an integral part of the elements that make up a sign.

Contrary to Schembri (1996) and Meir (2001), Zwitserlood's DM account does not require her to chime in on a causality dilemma: whether the nouns come first or the verbs. This analysis can also be applied to HKSL: classifier handshapes pay no heed to the grammatical category of the sign they occur in. This is due to the fact that grammatical category, according to DM, is not determined in the Lexicon, but assigned through syntactic operations during computation long after a handshape root has been merged into a root compound, before Spell-Out.

As a first example, let us consider the HKSL noun KETTLE and the verb TO.POUR (Figure 14). The two signs have the exact same morphophonological make-up and a componential meaning that can be paraphrased as "grasping a small and narrow entity and tilting it downward". All of the components contribute to the meaning of the sign, and the root compound can be used as a noun or a verb. Figure 18 shows how all the morphosyntactic feature bundles for movement [+tilt], handshape [+grasp.narrow.entity], and location [+elbow.height] are merged under a category node little x. This x-node could be little v or little n

depending on whether the rootPhrase combines with a verbal or nominal functional head.

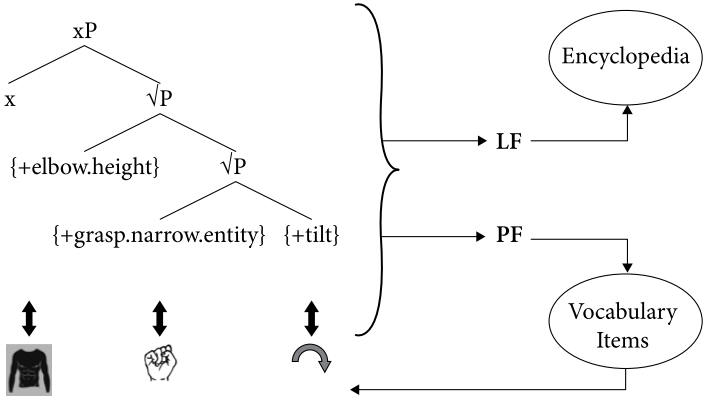


Figure 18. Derivation of the HKSL sign KETTLE/TO.POUR

Figure 18 shows that the handshape is a bound morpheme in the root compound. If the compound is merged under a category node n, this handshape will be considered a noun classifier in the noun KETTLE.

The two different HKSL signs for GUN also provide interesting examples to illustrate the mechanisms of DM. GUN can be articulated using an entity classifier (Figure 19a) or a handling classifier (Figure 19b). The different componential meaning of both signs is as follows: GUN (entity) is "an entity with a long and thin extension", while that of GUN (handling) is "hold entity with long and thin extension by hooking index finger".



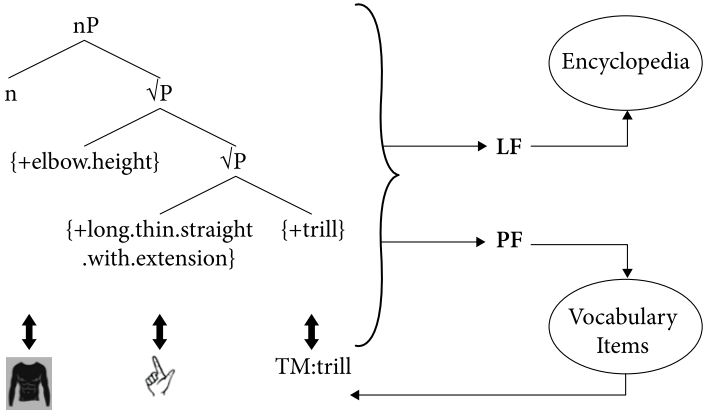
a.



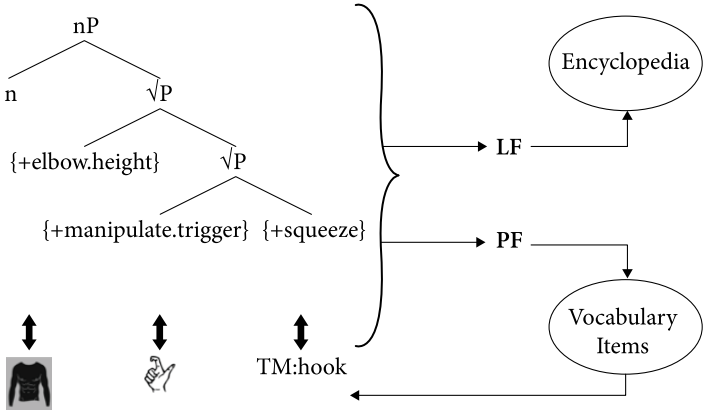
b.

Figure 19. Two variants of HKSL sign GUN: (a) with entity classifier; (b) with handling classifier

The difference in componential meaning is most clearly visible in the first feature bundle merged under the lowest rootPhrase: [+long.thin.straight.with.extension] (Figure 20a) versus [+manipulate.trigger] (Figure 20b). Since all components contribute to the overall meaning of the sign, a difference in feature bundle thus leads to a different classifier handshape. Yet, in both examples, the handshape functions as a noun classifier.



a.



b.

Figure 20. Derivation of the two variants of HKSL GUN: (a) variant with entity classifier in Figure 19a; (b) variant with handling classifier in Figure 19b

HKSL has both exo- and endocentric compounds.[7] Compounds contain two or more roots (Harley 2011: 130; Okubo 2013; Santoro 2018). For exocentric compounds, both Harley (2011) and Zhang (2007) propose a structure where two rootPhrases are sister nodes. Such a structure adequately reflects the fact that compounds consist of two or more root(Phrases), see Figure 21a. For a compound noun, two rootPhrases are bundled as sister nodes below another rootPhrase which is merged with the category node little n. The fact that the two rootPhrases are sister nodes means they are equal in status, and neither of them functions as a head. The rootPhrase they are bundled under ensures that the two other rootPhrases can be merged with the category node in order to receive a grammatical category. The higher rootPhrase represents the componential meaning of both components of the compound and not just that of the several roots. Endocentric compounds, on the other hand, do contain a head and must therefore have a different derivational structure. As shown in Figure 21b, I propose that the head rootPhrase is a sister node to the category node little n because it is that rootPhrase that heads the compound. The non-head rootPhrase is merged as a sister node to nP. The derivational structure in this image is left-headed. For right-headed compounds, the non-head rootPhrase would be on the left side of the structure.



a. **b.**

Figure 21. (a) Structure of an exocentric compound in DM; (b) structure of an endocentric compound in DM

A HKSL example of an exocentric compound is CHEF (or COOK), as it consists of the parts TO.COOK and CL_{TRACE}:LONG.VERTICAL.CYLINDER, as shown in Figure 22.

The componential meaning of the highest rootPhrase is "tousling movement with both hands in front of torso + tracing long vertical cylinder on top of head" (Figure 23). The two lower rootPhrases are formed just like those of non-compound signs discussed above.

7. For more on compounds in sign languages, the reader is referred to Santoro (2018). Santoro also mentions the use of iconic handshapes, i.e., classifiers, in sign language compounds.



Figure 22. HKSL sign CHEF (a compound of TO.COOK + CL_{TRACE}:LONG.VERTICAL.CYLINDER)

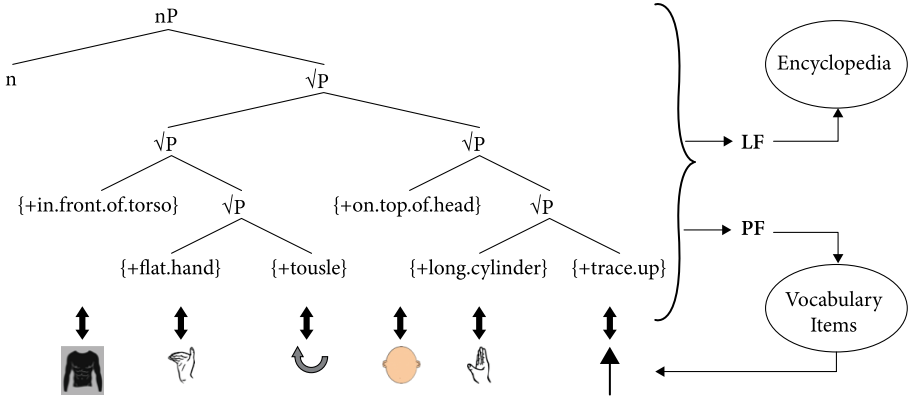


Figure 23. Derivation of the HKSL exocentric compound CHEF

These two rootPhrases are equal in status and are bundled under a higher rootPhrase node before merging with the category node n to receive a grammatical category.

An example of a HKSL endocentric compound is KNIT.HAT (see Figure 9 above), which consists of the components HAT and KNIT (left-headed). The feature bundle of the head rootPhrase of the compound, HAT, is the sister node of the category node little n. KNIT complements the head by being the sister node to nP, as shown in Figure 24.

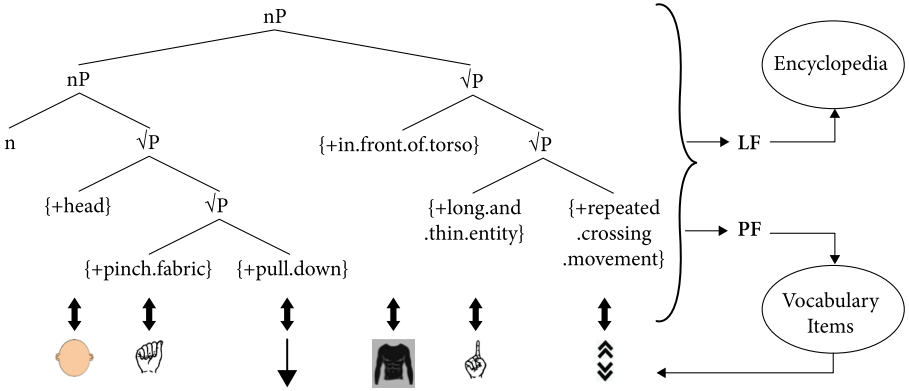


Figure 24. Derivation of the HKSL endocentric compound KNIT.HAT

5. Discussion

Though this paper is first and foremost a DM analysis of HKSL noun classifiers, this account would not be complete if I did not also discuss how HKSL – now argued by me to contain more than one type of classifier – typologically fits in with other languages (Section 5.2). However, for the picture to be complete, I first need to introduce a third type of classifier that occurs in HKSL, namely mensural numeral classifiers (Section 5.1).

5.1 A third type of classifier: Numeral classifiers

In addition to verbal and noun classifiers, HKSL also uses numeral classifiers. These numeral classifiers are of the mensural kind, not the sortal kind (Cheng & Sybesma 1999). The purpose of these mensural numeral classifier is to intervene between mass noun and numeral in order to create countable units for enumeration. Nevertheless, HKSL is not a "numeral classifier language" (Chierchia 2010), such as Cantonese or Mandarin. Numeral classifier languages always require the intervention of numeral classifiers between nouns and numerals, regardless of whether the noun is count or mass. An example of Cantonese has been given in (2) above.

Numeral classifiers are perhaps the most widely known type of classifier. This is also the type of classifier whose existence is least contested since it appears in all classifier typologies from different researchers (e.g., Allan 1977; Croft 1994; Aikhenvald 2000; Grinevald 2000, among others). According to Croft (1994: 147) its function is enumeration, i.e., counting entities. HKSL does allow for the direct combination of nouns and numerals for count nouns, however, for mass nouns the intervention of a numeral classifier is necessary (Koenders 2023).

(12) SAND *(CL:TINY.PARTICLE) THREE
'three grains of sand'

Typologically, HKSL thus patterns with number marking languages such as English (13) and Dutch (14) (Chierchia 2010).

(13) a. * three rices
b. three grains of rice

(14) a. * drie water [Dutch]
'three water'
b. drie glazen water
'three glasses of water'

The following are examples of HKSL numeral classifiers:

(15) a. WATER CL:cup THREE
'three cups of water'
b. OIL CL:bottle TWO
'two bottles of oil'
c. SAND CL:pile THREE
'three piles of sand'

I assume that WATER CL:cup (15a) is indeed a noun combined with a mensural classifier and not a compound noun WATER^CUP. There are two important differences between WATER CL:cup and an actual lexical compound noun from the ASB, like MILK (COW^DRINK.FROM.CUP), shown in Figure 25, which also contains the classifier handshape .[8]



Figure 25. The HKSL compound noun MILK (COW^DRINK.FROM.CUP)

First, there is evidence from constituency tests that shows that the components WATER and CL:cup are separable (16), whereas COW and DRINK.FROM.CUP are not (17). Once separated, they lose their composite meaning.

8. Note that I assume that DRINK.FROM.CUP is a noun (i.e., 'a drink that is drunk from a cup').

(16) A: PLEASE GIVE$_1$ WATER.
'Please give me water.'
B: WATER WHAT? WATER CL:bottle? WATER CL:cup? WATER CL:bowl?
'What do you mean? A bottle of water? A glass of water? A bowl of water?'
A: WATER CL:cup.
'A glass of water.'

(17) A: * PLEASE GIVE$_1$ COW.
'Please give me milk.'
B: * COW WHAT? COW^BOTTLE? COW^CUP? COW^BOWL?
'What do you mean? A bottle of milk? A glass of milk? A bowl of milk?'
A: * COW^DRINK.FROM.CUP.
'A glass of milk.'

In (16), the questions asked by B show that the noun WATER can combine with different types of measure words; however, in (17), separating the two parts of the compound noun COW^DRINK.FROM.CUP in PLEASE GIVE$_1$ COW does not render the intended meaning 'Please give me milk'. Without the second part of the compound (DRINK.FROM.CUP), the sign COW cannot be interpreted as meaning 'milk'. It is the combination of both parts that creates this meaning, i.e., "cow's drink" means 'milk'. The combination of WATER and CL:cup has no such composite meaning, and the classifier is interchangeable depending on the unit of measure the signer wishes to express.

Secondly, the classifier handshape for 'cup' () in the second part of COW^DRINK.FROM.CUP does not have the function of creating a unit of measure. There are two pieces of evidence to support this claim. The first piece of evidence comes from "classifier handshape mismatch data".

(18) MOTHER $_3$ASK$_1$ $_1$HELP$_3$ BUY COW^DRINK.FROM.CUP.
'Mother asked me to help her buy milk.'

Despite the fact that the compound meaning 'milk' contains the classifier handshape  in the phonological make-up of its second part, native HKSL signers interpreted (18) as referring to cartons or bottles of milk – in other words, whichever unit of measure milk sold in the supermarket comes in. In contrast, it is impossible to interpret WATER CL:cup as referring to any unit of measure of water other than a cup of water. This is because in the phrase WATER CL:cup, the classifier handshape (which classifies a cup) does create a unit of measure since it is a mensural classifier.

The second piece of evidence comes from the fact that mensural classifiers can be modified. Cheng & Sybesma (1999) show this for Mandarin mensural classifiers (19), but similarly, CL:cup in WATER CL:cup can be manually and non-

manually modified (20), while the classifier handshape in DRINK.FROM.CUP cannot (21) (the non-manual which we gloss as 'aug' (for augmentative) involves wide open mouth, wide open eyes, and intense expression).

(19) 一 大 張 紙 [Mandarin; Cheng & Sybesma 1999: 516]
yi dà zhāng zhǐ
one big CL:sheet paper
'one large sheet of paper'

(20) a. WATER CL:CUP$^{\text{aug}}$ LARGE
b. WATER CL:CUP$^{\text{aug}}$%fingers spread
'a huge cup of water'

(21) a. *COW^DRINK.FROM.CUP$^{\text{aug}}$ LARGE
b. *COW^ DRINK.FROM.CUP$^{\text{aug}}$%fingers spread
'a huge cup of milk'

In (20a) and (21a), the sign LARGE modifies the respective sign containing the classifier handshape for 'cup'. However, this is ungrammatical for (21a). In (20b) and (21b), it is the sign containing the classifier handshape () itself that is modified by non-manuals that convey the huge size of the cup, and the classifier handshape itself is also adjectively modified (indicated by the % symbol in the transcription). By articulating the classifier using spread fingers, the size of the referent 'cup' is visually represented in the sign. However, the modification of the classifier handshape in (21b) renders the NP ungrammatical, whereas this modification is allowed for (20b). These examples thus show that CL:cup in (20ab) behaves similarly to the Mandarin mensural classifier in (19). I therefore conclude that CL:cup in WATER CL:cup is a mensural classifier.

Finally, HKSL numeral classifiers also meet the three morphemic criteria discussed for verbal and noun classifiers above, namely (i) discreteness, (ii) meaningfulness, and (iii) productivity. Regarding (i), within the NP these mensural numeral classifiers are a discernible meaningful unit. Regarding (ii), the measuring function of these numeral classifiers entails that it creates a meaningful new unit, namely a unit of counting. Finally, regarding (iii), the same numeral classifier can combine with different mass nouns (e.g., WATER/OIL/MILK/PETROL CL:bottle 'a bottle of water/oil/milk/petrol').

5.2 A typological perspective on HKSL classifiers

In the preceding sections, I have argued that HKSL makes use of classifier predicates (i.e., verbal classifiers), that the majority of HKSL nouns contains noun classifiers, and that numeral classifiers intervene between numerals and mass nouns. Grinevald (2015:104) hints at the possibility that future research on sign languages could reveal that, in addition to verbal classifiers, "there might be other loci of classifying elements corresponding possibly to numeral classifiers, and maybe noun classifiers too […]". This happens to be exactly what I have been arguing for thus far. Table 4 provides an overview of the different classificatory elements used in HKSL.

Table 4. An overview of HKSL classifiers

Type of classifier	Morphosyntactic locus	Function	Classifier inventory
Verbal classifiers	Bound morphemes attached to verbal roots of movement and location	Spatial predication	Entity classifiers; Handling classifiers; Body part classifiers
Noun classifiers	Bound morpheme in root compound merged under a category node n	Classification and introduction of discourse referents	Entity classifiers; Handling classifiers; Body part classifiers
Numeral classifiers (Measure words)	Free morphemes within the NP that intervene between numerals and mass nouns	Enumeration and individuation	Entity classifiers; Handling classifiers

Note that for semantic reasons, body part classifiers cannot occur as numeral classifiers. For English speakers, this might seem counter-intuitive since in English, it is possible to measure amounts using body parts, e.g., *a handful of water* or *a fistful of sand*. However, in sign language classifier typologies, the classifiers used to express the same meaning as these two English examples would be handling classifiers (i.e., showing the manipulation of the referents – WATER and SAND, respectively – by the agent's hands). Sign language body part classifiers strictly represent (parts of) a referent's body and are not used to measure a portion of another referent.

As mentioned above, there is a significant overlap in classifier handshapes for noun and verbal classifiers. Referents can be denoted by a classifier handshape in both the noun – i.e., through a noun classifier – or in the predicate – i.e., through a verbal classifier. In some cases, these noun-verb pairs use the same classifier handshape. For example, HKSL AIRPLANE and TO.FLY both make use of the entity

classifier for planes, and KETTLE and TO.POUR (Figure 14) both make use of the same handling classifier.

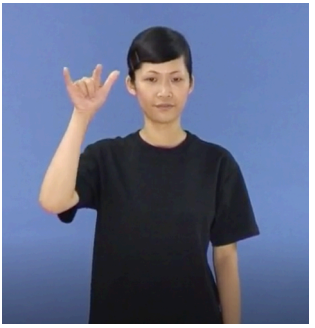


Figure 26. The HKSL sign AIRPLANE / TO.FLY

In other cases, the noun classifier and the verbal classifier make use of a different classifier handshape to denote the same referent. For example, the noun DOG and the classifier predicate ANIMATE.ENTITY.WALKS.



a.



b.

Figure 27. (a) The HKSL noun DOG; (b) the HKSL classifer predicate ANIMATE.ENTITY.WALKS

Using the DM account sketched above, it is not necessary to decide whether the nouns of these noun-verb pairs are lexicalized verbs or whether the nouns have been incorporated into the verb. Instead, it all comes down to whether the xP root compound merges with a small n or a small v in syntax – only in the former case, the handshape is considered a noun classifier. Merger with a category node is what provides the root compound with its lexical category, despite the fact that they share the same phonological make-up.

According to Grinevald (2003, 2015), several independent classifier systems may co-occur in a single language. These systems may each occur in a different morphosyntactic locus and have separate semantics and classifier inventories. The inventories of classifier systems can vary widely regarding the amount of classifiers, i.e., classifiers can range from classifying at a very generic level to being so specific that they can be called unique, i.e., classifying only a single referent (Grinevald 2015: 815). Table 4 shows that HKSL makes use of three types of classifiers: (a) verbal classifiers, (b) noun classifiers, and (c) numeral classifiers (or measure words). These three types of classifiers differ in their morphosyntactic loci, i.e., "where" they occur, as well as their function.

In Akatek and Minangkabau, noun classifiers and numeral classifiers coexist (Aikhenvald 2000: 187). In Akatek, for example, numeral classifiers are morphemes that are affixed to the nouns that classify nouns regarding animacy and humanness. The numeral classifiers are independent morphemes, and they classify nouns with respect to shape, size, and form. It is thus clear that the loci and function of these classifiers do not overlap.

The description of Akatek also shows similarities with HKSL. In HKSL, noun classifiers are also bound morphemes that are part of the noun, though the scope of classification of HKSL noun classifiers is broader than Akatek's animacy and humanness. HKSL noun classifiers classify nouns by representing (part of) the referent, by referring to how the referent is manipulated (cf. Denny's (1976) analysis of classifiers that classify referents according to their "use"), or by how the referent agrees with (parts of) the body. The Akatek numeral classifiers, similar to HKSL numeral classifiers, represent the shape, size, and form of referents, i.e., SASSes. Akatek numeral classifiers include *kupan* for curved referents, *xenan* for extended referents, and *pilan* for big round or oval three-dimensional referents (Aikhenvald 2000: 188). HKSL numeral classifiers denote the size and shape of the containers used to create a unit of counting. Grinevald (2003: 96f) also mentions that in the study of spoken language classifiers, many researchers have found that classifiers rely on the shape of referents (e.g., Adams & Conklin 1973; Denny 1976; Allan 1977).

The classifier inventory for the three types of HKSL classifiers is by and large identical. This means that a morpheme that can be used in a classifier predicate as a verbal classifier can also occur as a noun classifier or a numeral classifier.

(22) a. COW^DRINK.FROM.CUP *Noun classifier*
'milk'

b. TABLE CUP BE.LOCATED+CL:CUP *Verbal classifier*
'The cup is on the table.'

c. WATER CL:CUP THREE *Numeral classifier*
'three cups of water'

However, spoken language data show that other languages also use one set of morphemes in different classifier environments (Aikhenvald 2000: 210). For example, in Kilivila (Lawton 1993; Senft 1986, 1996), the same set of about 2,000 morphemes combines with demonstratives, adjectives, and numerals.

6. Concluding remarks

In this paper, I have argued for a Distributed Morphology (DM) account of HKSL noun classifiers. In contrast to previously proposed accounts (Schembri 1996; Meir 2001), DM allows for nouns containing noun classifiers to exist alongside their verbal classifier counterparts, as well as exist independently without verbal counterparts. This is a better representation of the data because not all noun classifiers can be derived from verbal classifiers (cf. Schembri 1996). The DM account implies that all classifier signs have internal morphology – which enables them to more directly represent the referents (an essential function of classifiers) – and that they are the result of a productive word/predicate formation process (Zwitserlood 2008).

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