Chapter 27: The iconicity of affix order

Stela Manova
University of Vienna

Abstract: Iconicity is the motivated relationship between an affix and its position. Two affix-order strategies are recognized: template morphology (stipulated fixed order whereby affixes are assigned to slots) and layered morphology (step-by-step derivation involving semantic scope, as a rule). Meaning is associated with words, affixes, and positions. The iconicity of affix order varies from low (templatic) to high (scopal), with mixed templatic-scopal systems in between. The mirror principle and the relevance principle relate affix order to word order. Scopal ordering is compatible with both principles, templates are not. Affix order systems of many languages, initially analyzed as templatic, have, later when more data became available, been re-analyzed as scopal. A scopal relationship is easier to detect in combinations of two affixes (bigrams) than in longer sequences. Unmotivated affix order patterns, if analyzed in terms of bigrams and trigrams, turn out to be regular patterns. Affix order tends to be iconic.

Keywords: affix order, word order, iconicity, morphology, syntax, templates, semantic scope, mirror principle, relevance principle, n-grams

27.1 Preliminaries

Iconicity is a pervasive property of language (Perniss et al. 2010; Meir and Tkachman 2018, among many others) and it is also typical of affix order, although, as we will see, defining the iconicity of affix order is a challenging task.

   In an overview article titled "Iconicity" for *The Oxford Research Encyclopedia of Linguistics*, Meir and Tkachman (2018) write the following: "Iconicity is a relationship of resemblance or similarity between the two aspects of a sign: its form and its meaning." While this definition easily classifies the traffic sign in Fig. 27.1 as iconic, it could be problematic if applied to Fig. 27.2 that is actually also an iconic traffic sign but its interpretation requires some situational and conventional knowledge. That is, put outside its conventionalized context the sign in Fig. 27.2, for a person who does not know the traffic sign, allows for other interpretations, e.g. one could say that it resembles Fig. 27.3, which is a picture of a rope bridge.

Fig. 27.1: Iconic sign
Source: https://www.twinkl.fr/teaching-wiki/road-signs

Thus, Meir and Tkachman (2018) continue: "There are various types of iconicity: the form of a sign may resemble aspects of its meaning in several ways: it may create a mental image of the concept (*imagic iconicity*), or its structure and the arrangement of its elements may resemble the structural relationship between components of the concept represented (*diagrammatic iconicity*)." Diagrammaticity is the type of iconicity this chapter deals with. The focus is on evidence from written and spoken language and iconicity in sign and artificial languages is not discussed. The iconicity of sign language is the topic of chapter **XXX**, this volume.

      We analyze affix order trying to show that a unification in terms of a pattern (or a template) also involves (some degree of) iconicity. Compare with an icon: in order to properly reflect the variety of forms and meanings in life, an icon needs to be unique, which, on the surface, seems to be the opposite of having a pattern. Nevertheless, there is a particular number of basic geometric shapes (patterns) that are used in an icon. In a similar fashion, affix order patterns contribute to the iconicity of language.

Fig. 27.2: Conventional iconic sign
Source: https://www.eurekaafricablog.com/5-road-signs-every-pedestrian-know/

Fig. 27.3: Rope bridge
Source:

https://commons.wikimedia.org/wiki/File:Rope_Bridge_-_geograph.org.uk_-_1011456.jpg

As one could imagine, linguistic signs (words being the basic units) are more difficult to interpret than real-life non-linguistic signs and the situation becomes even more complex if one evaluates the iconicity of pieces of words such as affixes and their orders. The two above-cited definitions of iconicity by Meir & Tkachman (2018) are inapplicable to affix order because they treat form and meaning together, i.e. assume that form and meaning are inseparable, which is an oversimplification. Therefore, to avoid definitional issues in morphology, scholars separate meaning from form and model these two sides of a linguistic sign independently. Why is this necessary? Because two words sharing a piece of form such as an affix can:

(a)   be closely related semantically, e.g. *teach-er* and *lead-er*, both denoting a person that performs the action stated by the verbal base;

(b)   be relatively distant semantically, one meaning a person, the other one an object, e.g. *teach-er* and (*bottle*) *open-er*, though both mean doers;

(c) be completely unrelated semantically, e.g. *teach-**er*** and *slow-**er***.

Based on the assumed type of relationship between meaning and form, theories of morphology fall into three groups (Manova et al. 2020):

(i) Form and meaning emerge simultaneously, i.e. are inseparable:
Similar to Meir and Tkachman (2018), there are morphologists who claim that morphemes relate meaning and form (this is the case e.g. in Natural Morphology (Dressler et al. 1987) and in Minimalist Morphology (Wunderlich 1996, Stiebels 2011), among others); I will refer to this understanding as the classical definition of morpheme.

(ii) Meaning before form is the case in the so-called realizational morphology, with two subtypes:
 a. Meaning is assigned only at the level of the word (word-based or a-morphous morphology such as e.g. Paradigm-Function Morphology (Stump 2001), Word and paradigm morphology (Blevins 2016), Construction Morphology (Booij 2010)), i.e. morphemes are just markings (pieces of word structure) without meaning;
 b. Morphemes are abstract units corresponding to syntactic terminal nodes, roughly, morphemes have meaning but are not associated with a form from the very beginning (late insertion of phonological form), which is the case e.g. in the syntax-based Distributed Morphology (Halle and Marantz 1993).

(iii) Form before meaning (computational analysis and visual or audio recognition of a sign):
This is the case in computational approaches to morphology such as Unsupervised Learning of Morphology (Hammaström and Borin 2011). Psycholinguistic experiments involving visual or audio recognition of whole words or word structure also assume this type of relationship between meaning and form. Thus, one could speculate that all written and spoken signs, since involving visual or audio recognition, are actually from-form-to-meaning (recall the different interpretations of the traffic sign in Fig. 2: they were based on the formal side of the sign). Nevertheless, if there is something in the form of the sign that indicates what its meaning could be, we will classify the sign as iconic.

Iconicity is undoubtedly the most discussed semiotically driven parameter in linguistics (Bybee 1985, 2011; Croft 2008; Haiman 2008; Haspelmath 2008; Perniss et al. 2010; Meir 2010; Downing and Stiebels 2012; Siewierska and Bakker 2013; Kilani-Schoch and Dressler 2014; Dressler & Kilani-Schoch 2016, among others). As already mentioned, iconicity has been seen as referring to analogy relations between meanings and forms. This could be the explanation for why it has been discussed mainly, if not exclusively, within theories of type (i). For example, Dressler & Kilani-Schoch (2016) represent Natural Morphology (NM), while Stiebels follows the assumptions of Minimalist Morphology (MM) (Stiebels 2011).
 NM refers to Peircean semiotics (Peirce 1965). In NM, the basic semiotic and stored unit is the word (Wurzel 1984; Dressler 1988), more precisely the lexeme (Aronoff 1994). Morphemes are morphological constituents of words and thus signs on signs (Dressler &

Kilani-Schoch 2016:358). Peirce's (1965) concept of icons involves three types of hypoicons: images, diagrams, and metaphors. Images are the most iconic as they represent a direct similarity between signans and signatum, e.g. onomatopoeia such as *cuckoo*, whose sounds resemble the call of the bird. Images are, however, scarce in language. Therefore, the scale of morphological iconicity (constructional iconicity, Mayerthaler 1981) comprises first diagrams which show analogy between the relations of the constitutive parts of their signans and signatum, as in the affixations in (1).

(1) *book* → plural *book-s* (roughly, 'book-many')
    to teach → *teach-er* (roughly, 'teach-person who does')

Metaphors are characterized by only partial correspondence between form and meaning as in modifications, such as those in (2):

(2) *foot* → plural *feet*
    (to) sing → *(a) song*

Conversion (also called zero affixation) is non-iconic, (3), since there is addition of meaning but no change in form (Manova & Dressler 2005; Manova 2011):

(3) *cash* → *to cash-Ø*

Some morphologists assume that zero affixation and conversion are synonymous terms; for others zero affixation is an item-and-arrangement (IA) rule (something non-existing, a zero, is considered an item), while conversion is an item-and-process (IP) rule (the output of the rule is the result of the process of conversion). On IA and IP as models of grammatical description, see Hockett (1954)[1].

If addition of meaning is expressed by deletion of form (Manova 2011, 2020), the change is anti-iconic, as in (4) where nouns for countries are paired with nouns for inhabitants (i.e. addition of the meaning 'person'):

(4) *Sweden* → *a Swede*
    Turkey → *a Turk*

Compare with the diagrammatic derivations in (5) that express the same change in meaning:

(5) *England* → *an Englishman*
    Spain → *a Spaniard*

According to Peirce (1965), if the signans directly refers to the signatum, preferably to an adjacent signatum, the sign is an index, i.e. affixation of a marker to an immediately adjacent base is more iconic than non-adjacency. We return to the indexicality of adjacency in the next section.

---

[1] For the sake of completeness, Hockett (1954) also speaks of a word and paradigm (WP) model.

All the above classifications of derivations according to their iconicity are plausible and useful but they involve only single affixes, while this chapter is on the iconicity of affix order. In an overview paper on iconicity, Downing and Stiebels (2012)[2] tackle the iconicity of morpheme order in the languages of the world. However, since their paper is on morphological iconicity in general, only a single section focuses on affix order. Curiously, in the volume where Downing and Stiebels (2012) appears, the next chapter, Bye and Svenonius (2012), discusses non-concatenative morphology, i.e. non- and anti-iconic formations, see the examples in (2), (3) and (4), but contra Downing and Stiebels, Bye and Svenonius see non-concatenative morphology as iconic. Bye and Svenonius (2012) write the following: "[T]he full range of non-concatenative phenomena may be completely accounted for in piece-based terms using analytical tools that are independently necessary. These phenomena include mutation, infixation, ablaut or melodic overwrite, subtraction, metathesis, reduplication, and templates. First, lexical entries for affixes may be underspecified, lacking information about segmental or featural content, which is then filled in by the phonology. Second, the way in which the content of affixes associates to the word may be prespecified in crucial respects, and phonology may be faithful to prespecified structure. In either case, non-concatenative effects are exclusively down to the phonology, not the morphology, which is purely additive" (p. 427). Bye and Svenonius (2012) do not mention the term iconicity but their approach implies that all morphology is always iconic.

As mentioned many times, prototypically iconicity refers to form and meaning. Therefore, in this chapter, we do not follow Bye and Svenonius's (2012) line of analysis: treating affixes as underspecified abstract units is, by itself, anti-iconic. We consider words, their pieces such as morphemes, and the position of a morpheme in the word form. To illustrate the importance of position, imagine that the zebra crossing on Fig. 27.2 is not placed horizontally but vertically. How would such a change affect the meaning of the sign?

Therefore, meaning in morphology (affix) order is assigned to both morphemes and positions and is calculated similarly to how numerals mean in mathematics, e.g.: "the numeral 123 denotes a different number than 132, 213, 231, 312 and 321. The meaning of 123 is not 1+2+3 but 100+20+3: we need to know that the "1" is multiplied by 100, the "2" by 10 and the "3" by 1". No overt symbols represent this part of the value; instead, this manipulation depends solely on the position of the digit within the numeral" (Manova et al. 2020). Thus the same affixes in a different order, as a rule (i.e. in an iconically organized system), give rise to different readings, which is illustrated in (6). The phenomenon is known as semantic scope. The relevant morphemes are bolded for convenience.

(6) Scopal order of affixes: Yup'ik (Mithun 1999: 43)
    a. *yug-**pag-cuar***
       person-big-little
       'little giant'

    b. *yug-**cuar-pag***
       person-little-big
       'big midget'

---

[2] A reviewer noted that Bybee (1985) is also about the iconicity of affix order. Yet, Bybee (1985) does not speak of iconicity but of relevance, while Downing and Stiebels (2012) use the term 'iconicity'.

As shown in (6), the calculation of meaning in morphology involves the meaning associated with the morpheme ('little' and 'big' in (6)) and the meaning associated with the position of this morpheme (which morpheme is internal and which is external). A suffix that follows another suffix usually scopes semantically over it, i.e. has a broader scope and modifies the semantics of the suffix that immediately precedes it, the internal suffix thus has a narrower scope: in (6a) 'little' scopes over 'big', and therefore the meaning is '[little [big person]], i.e. little giant', while in (6b) 'big' scopes over 'little' and the meaning is calculated as '[big [little person]], i.e. big midget'.

Non-scopal relationship is illustrated in (7): in (7a) the order of the bolded morphemes is applicative-causative (-*ir-in*-), while in (7b) it is causative-applicative (-*in-ir*-). Nevertheless, (7a) and (7b) have the same reading 'he made me stir the soup with a spoon'.

(7) Non-scopal (non-iconic) order of affixes: Pulaar, Fuuta Tooro dialect (Paster 2005:182)
    a. applicative-causative
       *o   irt-**ir-in**-ii~   kam   supu   o   kuddu*
       3SG   stir-APPL-CAUS-PAST   1SG   soup   DET   spoon
       'he made me stir the soup with a spoon' (I used a spoon)

    b. causative-applicative
       *o   irt-**in-ir**-ii~   kam   supu   o   kuddu*
       3SG   stir-CAUS-APPL-PAST   1SG   soup   DET   spoon
       'he made me stir the soup with a spoon' (I used a spoon)

Therefore, with respect to the iconicity of affix order, we conclude that if the sum of the meaning of an affix (the meaning associated with that affix in isolation) and the meaning of the position where that affix is placed are in agreement with the meaning assigned at the level of the word, we have the highest degree of iconicity/diagrammaticity, as in (6).

There are two types of positional organization of morphological structure: templatic (low semantic compositionality/iconicity) and layered (high semantic compositionality/iconicity). Templates and layers are discussed in detail in section 2. The remainder of the chapter has the following structure. Section 3 introduces two affix order principles: the mirror principle and the relevance principle and also the idea of correspondence between word order and affix order. Section 4 analyzes data that cast doubt on the correctness of the two affix order principles introduced in the previous section: the data violate the relevance principle but are derivable by the mirror principle. An alternative analysis in terms of bigrams and trigrams provides a solution. In section 5 conclusions are drawn.

27.2 Templates, layers and iconicity: Is everything a matter of analysis?

The representations below are based on Manova & Aronoff (2010), while the ideas are mostly those from Manova (in press).

27.2.1 Layered morphology

Affixes A, B, C, D (usually category labels) attach to ROOT step by step, so that every following step adds some semantics to the previous one, which is demonstrated for suffixation in (9).

(8) Layered morphology (suffixation)

ROOT	A	B	C	D

(9)　　[[ROOT] A]
　　　　[[[ROOT] A] B]
　　　　[[[[ROOT] A] B] C]
　　　　[[[[[ROOT] A] B] C] D]

Derivation of layered prefixal morphological structure, happens analogically to that of suffixal structure, starting with the prefix that is closest to the root.

　　　　The step-by-step addition of affixes makes layered morphology semantically compositional and compatible with scopal affix ordering, introduced in (6). Based on the representation in (9), one could easily receive the impression that semantic compositionality implies scope, i.e. that the iconicity of a semantically compositional derivation is the same as that of a scopal derivation. Things are, however, not so straightforward. (10) is an example of semantic compositionality due to suffix repetition and illustrates the issue. Diminutivization is very productive in Bulgarian and one can derive not only first-grade diminutives (DIM1) but also second-grade diminutives (DIM2), and even third-grade diminutives (DIM3).

(10)　　Bulgarian (Slavic, Manova 2010): diminutive suffix repetition
　　　　dete 'child'　　→　　DIM1 *det-ence* 'little child'
　　　　　　　　　　　　　→　　DIM2 *det-enc-ence* 'very little child'
　　　　　　　　　　　　　→　　DIM3 *det-enc-enc-ence* 'very very little child'

In these derivations, semantics is undoubtedly compositional: noun → DIM1 'small/little noun' → DIM2 'very small/little noun' → DIM3 'very very small/little noun'. However, semantic compositionality is achieved through suffix repetition. Since the definition of a scopal relationship requires an affix with a broader scope and an affix with a narrower scope, i.e. presupposes different affixes, suffix repetition such as that in (10) proves that compositional semantics does not necessarily mean scopal relationship of the affixes involved. For the sake of completeness, double diminutives are quite common in some well-studied languages such as Romance (Talamo 2015; Merlini Barbaresi 2012) and Slavic (Szymanek and Derkach 2005; Manova 2010; Manova and Winternitz 2011; Manova 2015a; Manova, Ptáček, and Gregová 2017), although not all languages tolerate repetition of a diminutive suffix to the same degree, see e.g. Szymanek (2010) for Polish.

　　　　(11) and (12) provide further evidence that scope and semantic compositionality should be kept apart: unlike diminutive suffixes, in Slavic languages, non-diminutive derivational suffixes (i.e. suffixes that usually illustrate scopal relationship) can also be repeated but only on non-adjacent cycles:

(11)   Bulgarian (scopal order of *-ost* and *-en* with a repetition of *-ost*)
       revn-iv 'jealous' → *revn-ost* 'jealousy' → *revn-ost-en* 'devoted' → *revn-ost-n-ost*
       'devotedness'

(12)   Bulgarian (scopal order of *-en* and *-ost* with a repetition of both)
       lice 'face' → *lič-en* 'personal' → *lič-n-ost* 'person, personality' →
       lič-n-ost-en 'related to personality' → *lič-n-ost-n-ost'* '(greater) personality'

       In sum, a scopal derivation is always semantically compositional but a semantically compositional derivation is not always scopal (see also Manova (in press) on this issue). Scope is more iconic than semantic compositionality.

27.2.2 Template morphology

A template is a stipulated linear sequence of morpheme slots that, as a rule, are not related grammatically (syntactically, semantically or phonologically). The properties of templates are discussed in Simpson and Withgott (1986), Spencer (1991), Good (2003, 2011), among others. A template, such as that in (13), has the realizations in (14); A, B, C and D are usually category labels.

(13)   Template morphology

ROOT	A	B	C	D

Note that (8) and (13) have the same form, i.e. layered and template morphology can derive the same forms; they, however, do it in a different way. When the template in (13) is used for derivation, all suffixes attach simultaneously, see (14) where A1, A2, A3, A4 are suffixes that always occupy the slot A but never co-occur. The same holds for the suffixes in the slots B, C and D.

(14)   ROOT   A1   B1   C1   D1
       ROOT   A2   B2   C2   D2
       ROOT   A3   B3   C3   D3
       ROOT   A4   B4   C4   D4
       …

Templatic derivation of prefixed words, like templatic derivation of suffixed words, happens at once.
       As (14) clearly shows, template morphology does not allow variations, i.e. all A affixes always appear in slot A, all B affixes are always in slot B, etc. In template morphology slots (positions) are basic units of analysis. They are discovered by examining constraints on morpheme linearization, i.e. a template can be reduced to constraints on the relative linear order of morphemes when they happen to co-occur.

       The following is a summary of the characteristic features of layered and template morphology:

i.	Zero morphemes are prevalent in template morphology but not in layered morphology	
ii.	Layered morphology gives rise to headed structures, template morphology doesn't	
iii.	Layered morphology is constrained by some principle of adjacency, template morphology isn't	
iv.	Layered morphology doesn't permit an 'inner' morpheme to be chosen on the basis of what an 'outer' morpheme will be, template morphology permits this type of 'lookahead.'	

<div align="right">(Rice 2000: 11)</div>

In conclusion, layered morphology is iconic, template morphology is not, although having some order in terms of a single affix order pattern such as a template is certainly more iconic than having no order at all.

27.2.3 Mixed cases template-scope systems

Languages of the world are often seen as being either templatic or scopal. However, since templatic order, as a rule, involves semantic compositionality, it may be compatible with scope (15a) and there are many cases in which template and scope interact. Some examples from Chichewa (Bantu, Hyman 2003) follow.

(15) Templatic ordering
> **causative-reciprocal:** *mang-**its-an-***   bigrams
> a. 'cause each other to tie' [[tie]-cause-e.o.] (**templatic** & scopal)   AB
> b. 'cause to tie each other' [[tie-e.o.]-cause] (**templatic** & a-scopal)   AB

(16) Scopal ordering
> **reciprocal-causative**: *mang-**an-its-***
> 'cause to tie each other' [[tie-e.o.]-cause] (**scopal** & a-templatic)   BA

Mixed affix order systems involving scope and template at the same time have been characterized as being either scope over template (e.g. Athabaskan, Rice 2000) or template over scope (Pulaar, Paster 2005). Chichewa is of the latter type. In other words, if the dominant affix order is scopal, always when scope cannot derive a combination of morphemes, this combination is due to template. And vice versa, if template is the dominant ordering strategy in a language, all deviations from the template are due to scope.

27.2.4 Zero affixes

In the literature on iconicity, special attention has been paid to zero expression that is observed to correlate with unmarked members of grammatical categories (17a), i.e. with members that are considered to be basic or conceptually simpler (Jakobson 1971, Bybee 1985). In affixation, zero expression is called zero affix. It must be mentioned here that zero affixes in template and layered morphology, although both established in comparison to forms with an overt affix in the same position, have a completely different nature: zeros in template morphology are meaningless (just the slot is empty, 17a), while zeros in layered morphology mark addition of meaning, as shown in (17b).

(17)   Zeros

a. *book-Ø → book-s* (the slot for the expression of the number value is empty in the singular, established in comparison to the expression of the plural)

b. *(to) cut → (a) cut-Ø* (the zero suffix stands for edition of meaning and is established in comparison to nouns such as, e.g. *(a) writ-ing*, a result noun derived from the verb *to write*)

Conversion (zero affixation) in English (17b) was mentioned as an example of non-iconicity, (3) above. English word-formation has often been analyzed in terms of zero affixation, Marchand (1969), among many others, while English inflectional morphology (17a) has never been.

27.2.5 Variable and free affix order

When two affixes, A and B, occur in both orders AB and BA in a language, e.g. as in Chichewa, (15), (16) above, and these orders have different readings (15a and 16), we speak of variable affix order. If both orders AB and BA exist in a language but are associated with the same meaning, (15b and 16), we speak of free affix order.

　　　As we could see from the examples of affix order given so far, the majority of the analyzed cases involve two affixes, which makes them indexical (adjacent affixes); the notion of indexicality was introduced in Section 1. However, according to Bickel et al. (2007), Chintang (eastern Kiranti) is a case of free affix order of three affixes (trigrams, e.g. ABC), more precisely of three inflectional prefixes (bolded in (18) for convenience). In this case, A and C are non-adjacent, which implies that trigrams should be less iconic (indexical) than bigrams (AB and BC), but see the discussion below. The prefixes of interest are: *u-* 3rd person nonsingular actor; *kha-* 1st person nonsingular primary object; *ma-* negative. The abbreviations used are as follows: NS nonsingular, A actor, P primary object, NEG negative, PST past.

(18)　Chintang (Mulgãu) dialect; Bickel et al. (2007: 44)　　　trigrams (added by SM)
　　　(a)　***u-kha-ma-****cop-yokt-e*　　　　　　　　　　　　ABC
　　　　　　3NS.ACTOR-1NS.P-NEG-SEE-NEG-PASᴛ
　　　(b)　***ma-kha-u-****cop-yokt-e*　　　　　　　　　　　　CBA
　　　　　　NEG-1NS.P-3NS.A-SEE-NEG-PST
　　　(c)　***u-ma-kha-****cop-yokt-e*　　　　　　　　　　　　ACB
　　　　　　3NS.A-NEG-1NS.P-SEE-NEG-PST
　　　(d)　***kha-u-ma-****cop-yokt-e*　　　　　　　　　　　　BAC
　　　　　　1NS.P-3NS.A-NEG-SEE-NEG-PST
　　　(e)　***ma-u-kha-****cop-yokt-e*　　　　　　　　　　　　CAB
　　　　　　NEG-3NS.A-1NS.P-SEE-NEG-PST
　　　(f)　***kha-ma-u-****cop-yokt-e*　　　　　　　　　　　　BCA
　　　　　　1NS.P-NEG-3NS.A-SEE-NEG-PST
　　　　　　All meaning: 'They didn't see us.'

Bickel et al. (2007) argue that prefix permutability in Chintang is a consequence of phonological subcategorization properties of prefixes: prefixes take a phonological word as host, and, since there are several phonological words, variable ordering results. A recent statistical investigation (Mansfield, Stoll, and Bickel 2020) based on distribution of bigrams (two-morpheme combinations) has shown that prefix order in Chintag is not as free as previously claimed

(roughly, it is more iconic than it has been assumed before). 'Free' in Bickel et al. (2007) implied 'having no order' (although Manova & Aronoff (2010) and Rice (2011) classify Chintang as a case of phonological affix ordering). For the Chintang data, Mansfield, Stoll, and Bickel (2020) observe the following: 1) markers of the same category tend to be expressed in the same morphological position (Crysmann & Bonami 2016, in relation to paradigmatic alignment), and 2) morphological positions tend to be filled by markers of the same category (Stump 2001, in relation to featural coherence). Note that 1) and 2) both refer to 'position'. Actually, 1) and 2) describe the organization of template morphology (Stump 1997), see also the representation of the prototypical template in (14) above.

For the data in (18), Manova (2022) shows that with respect to formal change, the examples can be grouped in three pairs: a-b, c-f, and d-e; and that each pair can be derived by two simultaneous affix permutations involving bigrams: pair a-b is A**B**C : C**B**A, thus two simultaneous permutations of A and C with **B**; pair c-f is A**C**B : B**C**A, thus two simultaneous permutations of A and B with **C**; and pair d-e is C**A**B : B**A**C, thus two simultaneous permutations of C and B with **A**. As we could already see many times, permutation of two affixes (AB : BA) is a well-known affix ordering strategy relevant to scope and indexicality. Thus, although on the surface, Chintang's permutations involve three affixes and resemble affix hopping, e.g. in A**B**C : C**B**A order, it seems as if A and C hop over B, it consists of two permutations of neighboring affixes (i.e. involves adjacent affixes) and is thus indexical. We see Chintang affix order and its various (re-)analysis as evidence that affix order in the languages of the world is reducible to the two basic derivational strategies introduced in this section: fixed template order and flexible layered order, with permutation of neighboring affixes.

27.2.6 Affix order reanalysis

Chintang is not the only case of affix order reanalysis. There are a number of other cases in the literature when the morphological organization of a language and even that of a language family has been reevaluated, and an alternative more iconic analysis suggested. For example, Athabaskan languages were initially considered having template morphology. The Pan-Athabaskan verbal template is given in (19) (Hoijer 1971:125) (based on Good 2011 and Rice 2011; table version Manova, in press).

(19) The Pan-Athabaskan verbal template

1	2	3	4	5	6	7	8	9	10
ADV	ITER	PL	OBJ PRO	DEIC SUBJ	ADV	MODE/ TNS/ ASP	SBJ PRO	CLF	**STEM**

POSITION	DESCRIPTION
1	Adverbial
2	Iterative (lacking in some languages)
3	Pluralizing
4	Object, only in transitive verbs and some passives
5	Deictic subject

6	Adverbial
7	Mode/tense/aspect
8	Subject pronoun
9	Classifier
10	**Stem**

Rice (2000) convincingly demonstrates that significant portions of the template in (19) involve scopal ordering, which is best visible when the template is used for decomposition of real words and/or when neighboring positions are analyzed together, i.e. as bigrams of affixes (recall that the two reanalyses of Chintag in 27.2.5 both involved bigrams).

Downing and Stiebels (2012) made a similar observation regarding the analysis of the Kham (Magaric) morphology in Watters (2002), the template in (20). (21) exemplifies the template.

(20) Kham template (Watters 2002: 70) (table version SM, based on Downing and Stiebels 2012)

-1	0	1	2	3	4	5	6
				ALL	ELA	(LOC)	
				ABL	DEL		
PER	**STEM**	PL	CIS	LOC	LAT	(ADE)	NOML
				ADE			
				IN/ON	ORIENT		
				COM			

POSITION	DESCRIPTION
-1	Person
0	**Stem**
1	Plural
2	Cislocative
3	Allative, Ablative, Locative, Adessive, Interior/Exterior region case, Comitative
4	Elative, Delative, Lative, Orientation
5	(Locative), (Adessive)
6	Nominalizer

(21) Kham (Watters 2002:70): *u-zihm-ni-ka-o-ra-sə*

u-	zihm-	ni-	ka-	o-		ra-	sə
3SG-	house-	ABL-	LOC-	NOML-	‖	PL-	COM
(-1)	stem	**3**	**5**	**6**	‖	**1**	**3**

'with those from his house'

Since suffixes in positions 1 and 3 (*ra-sə* at the end of the word) occur after suffixes in positions 5 and 6 (*ka-o-*), Watters assumes two levels of affixation (marked by ‖ in (21)), i.e. the template ends with position 6 at the first level and is then replied at level two. Such recursion is, however, incompatible with the organization of template morphology, illustrated in (14). Therefore, we conclude that there is something wrong with either the template, (20), or with the analysis of the example in (21). Downing and Stiebels (2012) claim that the affix orderings at the two levels are compatible with semantic scope. Thus, another reanalysis in terms of scope.

All the above seems to indicate that purely templatic systems are most probably due to insufficient language knowledge. Templates are just the first approximation of an unknown (often endangered) language and with the deepening of the research grammatical relations between the slots of the template emerge. A highly insightful discussion of the templates of a large number of languages can be found in Mithun (2016). The author also addresses the arbitrariness of template morphology by providing diachronic evidence of how templates emerged.

To the best of my knowledge, the only template in the literature that has not been reanalyzed in terms of scope, partly at least, is that of Murrinh-Patha verbal morphology (22), cited here from Nordlinger (2010), but see also Nordlinger (2015) and later work.

(22) Murrinh-Patha verbal template (Nordlinger 2010)

1	2	3	4	5	6	7	8	9
CLF.SBJ.TNS	SBJ.NUM/OBJ	REFL/RECP	IBP/APPL	**LEXS**	TNS	ADV	SBJ.NUM/OBJ.NUM	ADV

POSITION   DESCRIPTION
1   Portmanteau encoding classifier stem, subject agreement and tense
2   Subject number marker/Object agreement marker
3   Reflexive/Reciprocal marker
4   Incorporated body part/Applicative marker
5   **Lexical stem**
6   Tense marker
7   Morpheme with ''adverbial'' meaning (manner, temporal, etc.)
                 (according to Blythe (2009) there may be more than one ADV in each position in the template)
8   Subject number marker/Object number marker
9   Adverbial

In (22), there are portmanteaus in slots 1, 2, and 8 (the dots between the category labels indicate a portmanteau), while in (19) and (20) no single slot accommodates a portmanteau. Portmanteaus are clusters of two or more morphosyntactic features expressed by a single morpheme and it is therefore hard to judge whether they combine with other morphemes based on scope or not. This peculiarity of the Murrinh-Patha template could be the explanation why it seems to be incompatible with scope.

27.3 Is affix order an iconic image of word order?

A significant portion of the research on affix ordering explores the so-called mirror principle (Baker 1985), also called syntactic ordering.[3]

(23) Mirror principle
All morphological derivations directly reflect syntactic derivations and vice versa.

This principle can be seen as following from grammaticalization: since morphological derivations are grammaticalized syntax (Givón 1971), the former mirror the latter. It should also be mentioned that due to the close relationship between syntax and semantics (syntactic relations between arguments can be defined semantically), a direct correspondence between semantic and syntactic structure has been assumed, too; this is especially true for scholars who explain affix ordering in terms of semantic scope (Rice 2000; Dixon and Aikhenvald (2002); Bickel and Nichols (2007), among many others). Put differently, morpheme order should be an iconic image of word order.

In a similar fashion, Bybee (1985) argues that the order of morphemes within a word reflects an earlier ordering of words within a sentence and since words that function together in a sentence tend to occur together there are implications for affix ordering. Bybee calls it the relevance principle.

(24) Relevance principle
"A meaning element is *relevant* to another meaning element *if the semantics content of the first directly affects or modifies the content of the latter*" (Bybee 1985: 13).

This is an iconic principle in which closeness in meaning is expressed by closeness in form. Relevance is the opposite of semantic scope, in the sense that the affix with the broadest scope is most general (i.e. least relevant) and is thus placed farthest away from the base (root/stem), whereas the most relevant affix has the narrowest scope and is thus the closest to the root/stem. On the basis of a comparative investigation of the verb morphology of 50 languages, Bybee establishes that the formal exponents of categories the semantics of which is more relevant to the content of the verb occur closer to the verb stem and postulates the following order of verb categories:

(25)   Affix order based on relevance (Bybee 1985: 211)
    a. (prefixation) MOOD-TENSE-ASPECT-VOICE-**Verb STEM**
    b. (suffixation) **Verb STEM**-VOICE-ASPECT-TENSE-MOOD

In an impressive cross-linguistic study on the order of three of the affixes from Bybee's study (Tense, Aspect, Mood, often referred to as TAM markers), Cinque (2014) analyzing all 24 possible combinations of the four morphemes, verb, aspect, tense and mood, establishes that 13 of the 24 possible orderings exist in the languages of the world, marked by √ in (25). An asterisk

---

[3] Templates and layers are not affix ordering principles but derivational strategies, the affix order principles are phonological, morphological, syntactic, statistical, psycholinguistics, etc., see Manova & Aronoff (2010) and Manova (in press).

indicates a non-existing four-morpheme combination; and an asterisk in brackets marks a spurious sequence of morphemes.

(26) All 24 combinations of verb stem (V), aspect, tense, and mood

a[4]. √   Mood Tns Asp **V**
b. √   Mood Tns **V** Asp
c. √   Mood **V** Tns Asp
d. √   **V** Mood Tns Asp

e. (*)   Tns Mood Asp **V**
f. (*)   Tns Mood **V** Asp
g. *   Tns **V** Mood Asp
h. *   **V** Tns Mood Asp

i. (*)   Asp Mood Tns **V**
l. (*)   Asp Mood **V** Tns
m. √   Asp **V** Mood Tns
n. √   **V** Asp Mood Tns

o. *   Mood Asp Tns **V**
p. √   Mood Asp **V** Tns
q. √   Mood **V** Asp Tns
r. *   **V** Mood Asp Tns

s. *   Tns Asp Mood **V**
t. √   Tns Asp **V** Mood
u. √   Tns **V** Asp Mood
v √   **V** Tns Asp Mood

w. (*)   Asp Tns Mood **V**
x. *   Asp Tns **V** Mood
y. √   Asp **V** Tns Mood
z. √   **V** Asp Tns Mood

Clearly some of the 13 existing orderings are more frequent than others in the languages of the world. Nevertheless, it is still unclear, if morphology is grammaticalized syntax and the latter is universal grammar, why have languages of the world needed to grammaticalize such a large number of patterns? Cinque (2014) shows that syntax (i.e. the mirror principle) can successfully derive all 13 patterns but this does not answer our question. In other words, the fact that languages of the world have 13 patterns for TAM markers casts doubt on the correctness of both the mirror principle and the relevance principle. The next section sheds light on this issue.

---

[4] The letters are those from Cinque (2014), since there are no j and k in the original text, these letters are omitted in (26) through (28) as well.

27.4 TAM orders in terms of bigrams and trigrams

We already mentioned a few times that in the literature on affix order templates and other unusual combinations of three morphemes (trigrams) have often been reanalyzed in terms of bigrams (recall about Chintang and Athabaskan; see also Ryan 2010; and Manova and Knell 2021) and it has then turned out that they are not as unusual as previously believed. Likewise for the linear orders of the TAM markers, Manova (2022) reanalyzes the 24 patterns in (26) in terms of bigrams and trigrams. She first divides the patterns into two groups based on affix position: the prefixal patterns are listed in (27) and the suffixal patterns are in (28). In prefixation (27), at least two morphemes precede the Verb stem (V), while in suffixation (28), at least two morphemes follow V.

(27) Prefixation

1.	a. √	**Mood Tns Asp V**	(default pattern = relevance principle, (25a))
2.	b. √	Mood Tns V Asp	
3.	p. √	Mood Asp V Tns	
4.	t. √	Tns Asp V Mood	
5.	e. (*)	Tns Mood Asp V	
6.	f. (*)	Tns Mood V Asp	
7.	i. (*)	Asp Mood Tns V	
8.	l. (*)	Asp Mood V Tns	
9.	w. (*)	Asp Tns Mood V	
10.	x. *	Asp Tns V Mood	
11.	o. *	Mood Asp Tns V	
12.	s. *	Tns Asp Mood V	

All bigrams violating Bybee's relevance principle are marked in dark gray. As can be seen from (27), all violations either do not exist in the languages of the world or are spurious examples.

(28)   Suffixation

1.	z. √	**V Asp Tns Mood**	(default pattern = relevance principle, (25b))
2.	y. √	Asp V Tns Mood	
3.	u. √	Tns V Asp Mood	
4.	q. √	Mood V Asp Tns	
5.	n. √	V Asp Mood Tns	(Mood-**Tns** permutation, cf. 1z)
6.	m. √	Asp V Mood Tns	(Mood-**Tns** permutation, cf. 1z)
7.	c. √	Mood V Tns Asp	(**Tns**-Asp permutation, cf. 1z)
8.	v √	V Tns Asp Mood	(**Tns**-Asp permutation, cf. 1z)
9.	d. √	V Mood Tns Asp	(Asp and Mood permutate with **Tns**, cf. 1z)
10.	h. *	V Tns Mood Asp	
11.	g. *	Tns V Mood Asp	
12.	r. *	V Mood Asp Tns	

According to the relevance principle, bigrams 5 through 8 and trigram 9 (all in light gray) should not exist but they do in the languages of the world. Intriguingly, it is the position of **Tns** that creates the problem in all n-grams in light gray. In other words, all violations of the relevance

principle in suffixation are due to a misplaced **Tns** morpheme. Thus, in suffixation in order to properly account for the existing orders, we need to allow **Tns** to violate the relevance principle. The behavior of the **Tns** marker should not be compatible with the mirror principle, either.

Note also that (27) and (28) undoubtedly show the importance of 'position' in affix order: prefixation and suffixation significantly differ, prefixation being more restrictive and thus true to the relevance principle and the mirror principle, while suffixation violates both principles. Thus for the order of the TAM markers in the languages of the world, we can conclude that prefixation is more iconic than suffixation. Interestingly, #9 in (28) involves two permutations around **Tns**: Asp and Mood permutate with **Tns** simultaneously, which is exactly the same pattern as the one found in Chintang, (18), i.e. even highly unusual orders of three affixes can be reduced to a single well-known type of a pattern. This seems to be evidence that affix order is uniform cross-linguistically, in the sense that a limited number of different orderings of two and three affixes (bigrams and trigrams) account for all affix order patterns in the languages of the world (see also Manova 2022 who observes exactly the same patterns of linear orders of elements in the verbal and nominal domain). Finally, recall what we said in section 27.1 about icons and basic geometric shapes, namely that a number of basic geometric shapes serves for the creation of all non-linguistic icons; in a similar fashion, a limited number of affixation patterns ensures the iconicity of affix order.

27.5 Conclusion

Iconicity is a relationship of resemblance between meaning and form, which implies that meaning and form are inseparable. However, in modern morphological theory meaning and form are usually modeled independently from one another. We discussed the iconicity of affix order assigning meaning to both morphemes and positions. The iconicity of affix order can be realized in terms of templates, semantic scope, the relevance principle and the mirror principle. Of these, templates are the least iconic (yet, having a single ordering pattern (template) is more iconic than having no pattern at all). Scopal ordering which is compatible with both the relevance principle and the mirror principle and implies semantic compositionality (step-by-step derivation) is the most iconic option. Scopal relationship is easier to detect in combinations of two affixes (bigrams) than in longer sequences of morphemes. Unusual affix order patterns, if analyzed in terms of bigrams, turn out to be regular patterns. The affix order systems of many understudied languages have initially been seen as templatic and later, when more data become available, these languages have been reanalyzed as scopal. Therefore we conclude that affix order in the languages of the world tends to be iconic (scopal).

References

Aronoff, Mark (1994). *Morphology by Itself*. Cambridge, MA: MIT Press.
Baker, Mark (1985). The Mirror Principle and morphosyntactic explanation. *Linguistic Inquiry* 16: 373-415.
Bickel, Balthasar, Goma Banjade, Martin Gaenszle, Elena Lieven, Netra Paudyal, Ichchha Purna Rai, Manoj Rai, Novel Kishor Rai, and Sabine Stoll. (2007). Free prefix ordering in Chintang. *Language* 83: 1-31.

Bickel, Balthasar, and Johanna Nichols (2007). Inflectional morphology. In *Language typology and syntactic description*, 2nd ed., edited by Timothy Shopen, 169-240. Cambridge: Cambridge University Press.

Blevins, James (2016). *Word and paradigm morphology*. Oxford: Oxford University Press.

Blythe, Joe. (2009). *Doing referring in Murrinh-Patha conversation*. Ph.D. thesis, University of Sydney.

Booij, Geert (2010). *Construction Morphology*. Oxford: Oxford University Press.

Bybee, Joan L. (1985). *Morphology: a study of the relation between meaning and form*. Amsterdam: John Benjamins.

Bybee, Joan L. (2011). Markedness: iconicity, economy, and frequency, in Song, Jae Jung (ed.), *The Oxford Handbook of Linguistic Typology*. Oxford University Press, 131–47.

Bye, Patrik, and Peter Svenonius (2012). Non-concatenative morphology as epiphenomenon, in J. Trommer (ed.), *The morphology and phonology of exponence*. Oxford: Oxford University Press, 427–495.

Chapter XXX. Iconicity in sign language, this volume.

Cinque, Guglielmo (2014). Again on tense, aspect, mood morpheme order and the "mirror principle", in P Svenonius (ed.), *The Cartography of Syntactic Structures*, vol. 9, *Functional Structure from Top to Toe*. New York: Oxford University Press, pp. 232–65.

Croft, William (2008). On iconicity of distance. *Cognitive Linguistics* 19.1, 49–57.

Crysmann, Berthold, and Olivier Bonami (2016). Variable morphotactics in information-based morphology. *Journal of Linguistics* 52: 311–74.

Downing, Laura J., and Barbara Stiebels (2012). Iconicity, in J. Trommer (ed.), *The Morphology and Phonology of Exponence*. Oxford: Oxford University Press, 379–426.

Dixon, R.M.W. and Alexandra Y. Aikhenvald (2002). Word: A typological framework, in R.M.W. Dixon and A. Y. Aikhenvald (eds.), *Word: A cross-linguistic typology*, 1-41. Cambridge: Cambridge University Press, 1-41.

Dressler, Wolfgang U. (1988). Preferences vs. strict universals in morphology: Word based rules, in M. Hammond and M. Noonan (eds.), *Theoretical Morphology*. San Diego: Academic Press, 143–54.

Dressler, Wolfgang U., Willi Mayerthaler, Oswald Panagl, and Wolfgang U. Wurzel (1987). *Leitmotifs in Natural Morphology*. Amsterdam: Benjamins.

Dressler, Wolfgang, and Marianne Kilani-Schoch (2016). Natural Morphology, in A. Hippisley and G. Stump (eds.), *The Cambridge Handbook of Morphology*. Cambridge: Cambridge University Press, 356-389.

Givón, Talmy. (1971). Historical syntax and synchronic morphology: An archaeologist's field trip". C*hicago Linguistics Society 7*. Chicago: University of Chicago.

Good, Jeffrey Craig (2003). *Strong linearity: Three case studies towards a theory of morphosyntactic templatic constructions*. PhD dissertation. University of California, Berkeley.

Good, Jeff (2011). The typology of templates. *Language and Linguistics Compass* 5: 731–747.

Greenberg, Joseph (1963). Some universals of grammar with particular reference to the order of meaningful elements, in J. Greenberg (ed.), *Universals of Language*, Cambridge: MIT Press, 40-70.

Haiman, John (2008). In defense of iconicity, *Cognitive Linguistics* 19.1: 35–48.

Halle, Morris, and Alec Marantz. (1993). Distributed Morphology and the Pieces of Inflection, in K. Hale and S. J. Keyser (eds.), *The View from Building 20*). Cambridge, MA: MIT Press, 111–176.

Hammarström, Harald, and Lars Borin (2011). Unsupervised learning of morphology. *Computational Linguistics* 37(2): 309–350.

Hockett, Charles F. 1954. Two models of grammatical description. *Word* 10: 210–231.

Haspelmath, Martin (2008). Frequency vs. iconicity in explaining grammatical asymmetries. *Cognitive Linguistics* 19.1: 1–33.

Hoijer, Harry (1971). Athapaskan morphology, in J. Sawyer (ed.), *Studies in American Indian languages. University of California Papers in Linguistics* 65. Berkeley: University of California Press, 113-147.

Hyman, Larry (2003). Suffix ordering in Bantu: a morphocentric approach. In G. Booij, and J. van Marle (eds.), *Yearbook of Morphology 2002*. Dordrecht: Kluwer, 245-281.

Jakobson, Roman (1971). *Selected Writings* [1931]. The Hague and Paris: Mouton.

Kilani-Schoch, Marianne, and Wolfgang U. Dressler (2014). L'iconicité dans la morphologie flexionnelle du français. *Le Français moderne* 1, 78–103.

Manova, Stela (2010). Suffix Combinations in Bulgarian: Parsability and Hierarchy-based Ordering. *Morphology* 20: 267–296.

Manova, Stela (2011). *Understanding morphological rules*. Dordrecht: Springer.

Manova, Stela (2014). Affixation. In *Oxford Bibliographies in Linguistics*, New York: Oxford University Press. doi: 10.1093/obo/9780199772810-0183

Manova, Stela (2015). Affix order and the structure of the Slavic word, in S. Manova (ed.). *Affix Ordering Across Languages and Frameworks*. New York: Oxford University Press, 205-230.

Manova, Stela (2020). Subtraction in Morphology, in *The Oxford Encyclopedia of Morphology*. Oxford University Press. Retrieved 30 Apr. 2023, from https://www.oxfordreference.com/view/10.1093/acref/9780190682361.001.0001/acref-9780190682361-e-572.

Manova, Stela (2022). The linear order of elements in prominent linguistic sequences: Deriving Tns-Asp-Mood orders and Greenberg's Universal 20 with n-grams, lingbuzz/006082. Retrieved 30 Apr. 2023.

Manova, Stela (in press). Ordering restrictions between affixes, in P. Ackema, S. Bendjaballah, E Bonet, and A. Fábregas (eds.), *The Wiley Blackwell Companion to Morphology*. Blackwell.

Manova, Stela, and Wolfgang U. Dressler (2005). The morphological technique of conversion in the inflecting-fusional type, in L. Bauer, Laurie and S. H. Valera (eds.), *Approaches to Conversion/Zero-Derivation*. Münster: Waxmann, 67–102.

Manova, Stela, and Mark Aronoff (2010). Modeling affix order. *Morphology* 20: 109-131.

Manova, Stela, and Kimberley Winternitz (2011). Suffix Order in Double and Multiple Diminutives: With Data from Polish and Bulgarian. *Studies in Polish Linguistics* 6: 115–138.

Manova, Stela, D. Ptáček, and R. Gregová (2017). Second-grade diminutives in Czech and Slovak: A contrastive study with data from corpora, in L. Repanšek, and Matej Šekli (eds.), *12. letno srečanje Združenja za slovansko jezikoslovje / 12th Slavic Linguistics Society Annual Meeting / XII ежегодная конференция Общества славянского языкознания*. Ljubljana: Založba ZRC, Inštitut za slovenski jezik Frana Ramovša, 121-122.

Manova, Stela, Harald Hammarström, Itamar Kastner, and Yning Nie (2020). What is in a morpheme? Theoretical, experimental and computational approaches to the relation of meaning and form in morphology. *Word Structure* 13: 1-21.

Manova, Stela, and Georgia Knell (2021). Two-suffix combinations in native and non-native English: Novel evidence for morphomic structures. In *All things morphology: Its independence and its interfaces,* edited by Sedigheh Moradi, Marcia Haag, Janie Rees-Miller, and Andrija Petrovic, 305-323. Amsterdam: Benjamins.

Mansfield, John, Sabine Stoll, and Balthasar Bickel (2020). Category clustering: A probabilistic bias in the morphology of verbal agreement marking. *Language* 96: 255-293.

Marchand, Hans (1969). *The categories and types of present-day English word-formation*, 2nd ed. München: Beck.

Mayerthaler, Wili (1981). *Morphologische Natürlichkeit*. Wiesbaden: Athenaion.

Meir, Irit (2010). Iconicity and metaphor: Constraints on metaphorical use of iconic forms. *Language* 86(4): 865-896.

Meir, Irit, and Oksana Tkachman (2018). Iconicity. *Oxford Research Encyclopedia of Linguistics*. Retrieved 30 Apr. 2023, from https://oxfordre.com/linguistics/view/10.1093/acrefore/9780199384655.001.0001/acrefore-9780199384655-e-343.

Merlini Barbaresi, Lavinia (2012). Combinatorial patterns among Italian evaluative affixes. *SKASE Journal of Theoretical Linguistics* 9: 2-14.

Mithun, Marianne (1999). *The languages of Native North America*. Cambridge: Cambridge University Press.

Mithun, Marianne (2016). Affix Ordering: Motivation and Interpretation, in A. Hippisley and G. Stump (eds.), *The Cambridge Handbook of Morphology*. Cambridge: Cambridge University Press, 149-185.

Nordlinger, Rachel (2010). Verbal morphology in Murrinh-Patha: evidence for templates. *Morphology* 20: 321-341.

Nordlinger, Rachel (2015). Inflection in Murrinh-Patha, in M. Baerman (ed.), *The Oxford handbook of inflection*. New York: Oxford University Press, 491–519.

Paster, Marry (2005). Pulaar verbal extensions and phonologically driven affix order, in G. Booij, and J. van Marle (eds.), *Yearbook of Morphology 2005*. Dordrecht: Springer, 155-199.

Peirce, Charles S. (1965). *Collected Papers*. Cambridge, MA: Harvard University Press.

Perniss, Pamela, Robin L.Thompson, and GabriellaVigliocco (2010). Iconicity as a general property of language: evidence from spoken and signed languages. *Frontiers in Psychology*, doi: 10.3389/fpsyg.2010.00227

Rice, Keren (2000). *Morpheme Order and Semantic Scope*. Cambridge: Cambridge University Press.

Rice, Keren (2011). Principles of affix ordering: an overview. *Word Structure* 4: 169-200.

Ryan, Kevin M. (2010). Variable affix order: Grammar and learning. *Language* 86: 758–91.

Siewierska, Anna, and Bakker, Dik (2013). Suppletion in person forms: The role of iconicity and transparency. In D. Bakker, and M. Haspelmath (eds.), *Languages across Boundaries*. Berlin: Mouton de Gruyter, 347–95.

Simpson, J., and Withgott, M. (1986). Pronominal Clitic Clusters and Templates, in H. Borer (ed.), *The Syntax of Pronominal Clitics. Syntax and Semantics 19*. New York: Academic Press, 149-174.

Spencer, Andrew (1991). *Morphological Theory*. Oxford: Blackwell Publishers.

Stiebels, Barbara (2011). Minimalist Morphology. Ms. University of Leipzig. Retrieved 30 April 2023, http://home.uni-leipzig.de/stiebels/papers/handbook_morphology_stiebels_mm-2011.pdf

Stump, Gregory T. (1997). Template morphology and inflectional morphology, in G. Booij, and J. van Marle (eds.), *Yearbook of Morphology 1996*. Dordrecht: Kluwer, 217-241.

Stump, Gregory T. (2001). *Inflectional Morphology*. Cambridge University Press.

Szymanek, Bogdan (2010). *A Panorama of Polish Word Formation*. Lublin: Wydawnictwo KUL.

Szymanek, Bogdan, and Tetyana Derkach (2005). Constraints on the derivation of double diminutives in Polish and Ukrainian. *Studies in Polish Linguistics* 2: 93−112.

Talamo, Luigi (2015). Suffix Combinations in Italian: Selectional Restrictions and Processing Constraints, in S. Manova (ed.), *Affix Ordering Across Languages and Frameworks*. New York: Oxford University Press, 175–204.

Watters, David E. (2002). *A grammar of Kham*. Cambridge: Cambridge University Press.

Wunderlich, Dieter (1996). Minimalist morphology: The role of paradigms. in G. Booij, and J. van Marle (eds.), *Yearbook of Morphology 1995*. Dordrecht: Kluwer, 93–114.

Wurzel, Wolfgang U. (1984). *Flexionsmorphologie und Natürlichkeit*. Berlin: Akademie-Verlag.