(published in *Linguistic Typology* 22(2). 307-326; doi: 10.1515/lingty-2018-0011)

The last word on polysynthesis:
A review article on the *Oxford handbook of polysynthesis* (edited by Michael Fortescue, Marianne Mithun and Nicholas Evans, 2017)

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1. An impressive volume

This book contains 44 chapters on polysynthetic patterns, of which 20 are grammatical sketches of little-known languages with intriguing grammatical structures: 11 languages of the Americas, 3 languages of Sahul, and 6 languages of (mostly northeastern) Eurasia. Ten further chapters take an areal or diachronic perspective, and again the Americas and Sahul are prominent, but Eurasia is not completely neglected. Three chapters discuss the acquisition of relevant languages on three continents. The remaining 11 chapters deal with general issues, such as complexity, phraseology, the lexicon, head marking, the notion of the "word", and the sociolinguistic environment. This is obviously a very impressive volume, and anyone who wants to make general statements about grammatical patterns of human languages should be aware of the often surprising phenomena that are presented here in an accessible way.

Some examples of the kinds of verbal expressions that lead linguists to speak of "polysynthesis" are given in (1)-(5), taken from different chapters of the handbook.

(1) Aleut (M. Fortescue, p. 224, taken from Bergsland 1997: 106)
kuri-za-qaða-naaRi-itu-uðahli-lakaq
smoke-HAB-quit-try.to-want.to-even-1SG.NEG.PRS
'I don't even want to try to quit smoking.'

(2) Nanti (Arawakan; A. Aikhenvald, p. 299, taken from Michael 2013)
no-tota-borit-ak-i
1SG.SBJ-cut-leg-PRF-REAL.1
'I cut my leg.'

(3) Sora (Munda; G. Anderson, p. 945, taken from Ramamurti 1931: 40)
ɲam-kid-te-n-ai
seize-tiger-NPST-INTR-1.SBJ
'I will seize the tiger.'

(4) Yimas (New Guinea; W. Foley, p. 817)
na-n-way-mpi-ira-ya-ntut
3SG.NOM-3SG.ERG-turn-SEQ-ALL-come-RM.PST
'She turned and came towards him.'

(5) Marrithiyel (Australia, Western Daly; R. Nordlinger, p. 796, taken from Green 1989)
guninj-felbatj-ngusra-nimbini-ya
3NSG.SBJ.REAL.go-jump-creek-TRIAL-PST
'They (the three of them) jumped over the creek.'

The handbook is thus so comprehensive that it is hard to imagine that it will ever be superseded. It has something definitive about it, and I suspect that subsequent scholarship will take a different direction, rather than try to go further in the same direction. In fact, I think that this is necessary, and I will make this argument in the subsequent sections. The handbook can thus be seen as the last word on the traditional topic of polysynthesis.

The following remarks should not be seen as negative or overly critical, but as desiderata for any future progress in the comparative study of grammatical patterns of this kind. The editors have done an excellent job in doing what they aimed to do: to reflect the state of the art, and to assemble a rich set of generally very good papers on languages whose patterns may not be otherwise readily accessible. But I will argue that by presenting it so thoroughly, the urgency of going beyond this state of the art becomes particularly clear. And I would think that the next stage in our understanding of these patterns will not contain the term "polysynthesis" anymore.

2. From taxonomy to correlation

Any scientific enterprise begins with classification or taxonomy, and even though it is difficult to classify entire languages, macro-types such as OV vs. VO languages,

dependent-marking vs. head-marking languages, and agglutinating vs. isolating languages continue to be popular. The macro-type "polysynthetic" goes back to the early 19th century, just like the types "isolating" and "agglutinating", i.e. to a time when linguists were only just learning about worldwide diversity of language structures, but did not want to limit themselves to observations at the micro-level. Impressionistically, the grammatical structures of North American languages seemed very different to them from the European and East Asian languages, and this impression has continued to be influential – the examples in (1)-(5) strike many contemporary linguists as somehow different from what we know from English, Russian, or Chinese.

But what exactly is different here? How can we pin down our intuitions? How is a "polysynthetic language" identified? A scientific taxonomy would minimally require an explicit and precise definition of the key categories, and of course ideally also some justification for why one wants to single out languages falling into a particular category. In the 19th century, classifications of language types were sometimes associated with anthropological classifications, and many Western intellectuals thought that different cultures could be ranked or somehow arranged on an evolutionary scale. Thus, arranging language types on some scale (or on some other general evolutionary schema, e.g. a cyclic development from isolation to fusion and back to isolation) became popular in the 19th century, and the general idea has not completely disappeared from the literature even now, although the evidence for such developments is not overwhelming (cf. Haspelmath 2018).

The present handbook contains some ideas about the diachronic development of polysynthesis, but no big claims, so it is not immediately clear why one wants to have a polysynthetic type at all. The introductory chapter by the editors does not provide a clear justification for the type, but simply begins by discussing the term *polysynthesis*, giving two definitions on the first page:

(6) a. The term polysynthesis is generally understood in linguistics as extreme morphological complexity of the verb (p. 1)

b. "Essentially, then, a prototypical polysynthetic language is one in which it is possible, in a single word, to use processes of morphological composition to encode information about both the predicate and all its arguments ... allowing this word to serve alone as a free-standing utterance without reliance on context" (p. 1, cited from Evans & Sasse 2002: 3-4)

But the editors also note that "the essence of polysynthesis" has remained "a topic of ongoing discussion" (p. 1), and this discussion is carried out, for example, in T. Givón's chapter ("Is polysynthesis a valid theoretical notion?"), in Jerrold Sadock's chapter ("The subjectivity of the notion of polysynthesis"), and in Michael Fortescue's ("What are the limits of polysynthesis?"). What struck me about all this discussion of what polysynthesis might be is that it evidently presupposes that there is a meaningful notion, but no justification of this presupposition is given.[1] That the existence of the notion is presupposed is particularly clear in a section heading in Fortescue's chapter ("Towards a definition of polysynthesis", p. 122), which presents the formulation of a definition as an ongoing task, rather than as a starting point. But why should there be an "essence" of polysynthesis to begin with? If one does not assume that linguistic types are governed by innate parameters of the biological language faculty, then the task of comparative linguists is to set up clearly defined comparative concepts (Haspelmath 2010), not to find out what the best definition or the "essence" of some suggested notion is, because there might not be anything in the world that corresponds to the notion.

On p. 4 of the introductory chapter, the editors mention a possible justification of the polysynthesis notion: the clustering (or correlation) of features. On the one hand, it could be that grammatical types correlate with particular social conditions of the speaker communities, an idea that is pursued in Peter Trudgill's chapter ("The anthropological setting of polysynthesis", see §7 below). On the other hand, it could be that there are other grammatical features that correlate with polysynthesis, such as

– relative elaboration of verb morphology, e.g. through causatives and desideratives
– head marking also on nouns (i.e. possessive person indexes)
– absence of case-markers on nouns
– absence of adpositions
– absence of nonfinite verb forms for subordination
– pragmatically based order of major clause elements (S, O, V)

In order to find out whether these hypothesized correlations are true, one would need to carry out a systematic comparison of a substantial number of languages, something that the present volume does not attempt to do. The editors could have asked every expert to fill in a questionnaire and could thus have created an expert-based database

[1] After sharing an earlier version of this article with the editors, they distanced themselves from this presupposition. But surely, most readers will take the publication of a "handbook of X" to carry the presupposition that X exists.

(along the lines of the *Atlas of Pidgin and Creole Language Structures*, Michaelis et al. 2013), but as they did not do this, we cannot tell whether any of the correlations are correct. And since we do not know whether any of the correlations hold, we cannot be sure that a notion of polysynthesis is needed.

The editors themselves do not seem to be overly optimistic: "Correlations posited on the basis of a few languages have not always been borne out once more languages were considered" (p. 4). Perhaps the strongest claim of correlations that is found in the literature, Baker's (1996: 496-499) claim that polysynthesis is a macroparameter that predicts over a dozen syntactic features, plays almost no role in this handbook. One of Baker's innovative suggestions, that polysynthesis correlates with the absence of infinitives, is discussed by Nicholas Evans in his chapter on polysynthesis in northern Australia, but Evans finds counterevidence (p. 318) and writes at the end of the chapter that the data he considers "suggest that the typological traits associated with polysynthesis are not strongly linked" (p. 333).

But is polysynthesis a single feature? Not everyone agrees, as we will see in the next section.

3. Polysynthesis as a cluster concept or a quantitative concept

Instead of being a single feature, polysynthesis could be a cluster concept, defined by a range of criteria, only some of which need to be fulfilled (famously, Keenan (1976) proposed a definition of "subject" as a cluster concept). Thus, Fortescue proposes (p. 122) that a polysynthetic language must be both HOLOPHRASTIC (in the sense of 6b above, i.e. allow the expression of subject and object indexes as part of the verb) and allow more than one "lexically heavy" morpheme within a verb, where the latter notion can be satisfied by noun incorporation as in (7a), or "lexical affixes", as in (7b), or verb-internal adverbials, as in (7c).

(7)a. Chimariko (California; C. Jany, p. 277)
h-iṭa-wiʔmu-t
3-hand-take-ASP
'he took his hand'

b. Sliammon (Salishan; H. Watanabe, p. 638)
łatš-uyʔ-əm
splash-hand-MIDDLE
'splash water with one's hand'

c. Central Alaskan Yupik (A. Woodbury, p. 542)
quuyurni-arte-llru-yaaqe-llini-
smile-suddenly-PST-alas-evidently-
'evidently suddenly smiled but alas'

The additional criterion of allowing a second "lexically heavy" element is required because otherwise all languages that may express both subject and object as person indexes in the verb would count as polysynthetic, e.g. Bantu languages like Swahili ("which very few linguists would be happy to call polysynthetic", as W. Foley notes, p. 338).

But is this more than a move to keep the number of languages that fall into the polysynthetic class small? Indeed, if Swahili counted as polysynthetic, then so would Bulgarian and Spanish (which also have both subject and object cross-indexes), and in fact about half of the languages in Siewierska's (2005) sample of 379 languages worldwide. The definition in (6b), which does not mention "lexically heavy" elements, is clearly broader than the image that the term "polysynthesis" evokes. However, we do not know whether verb-internal heavy morphemes correlate with holophrasis – some languages have noun incorporation but only subject indexing (and no object indexing), or no argument indexing on the verb at all (see, e.g. Creissels & Dramé 2015 on incorporation in Soninke, a Mande language). And if two different features do not correlate with each other, then a cluster concept defined on the basis of these features will hardly be particularly significant.

So could one work with an alternative definition that does not arbitrarily add "lexically heavy" morphemes, but simply measures the degree of morphological complexity of the verb, as in (6a) above? Dahl's chapter on "Polysynthesis and complexity" explores various ways in which complexity can be measured, but he finds that none of the measures he considers pick out the languages that are traditionally regarded as polysynthetic. He also notes that incorporation constructions are in some sense less complex than non-incorporated constructions, e.g. in that they tend to lack number and case marking.

Several of the authors imply that there are degrees of polysynthesis, by calling certain languages "strongly polysynthetic" or "mildly polysynthetic". If these statements are intended eventually to become scientific claims, then the notion of polysynthesis must be quantifiable, along the lines of Greenberg's (1960) study and Dahl's various complexity measures. Alternatively, one could think of the notion as a prototype, so that some languages are "core" or "(proto)typical" polysynthetic languages (as also seen in definition 6b), or maybe there could be "canonical plysynthesis" (see note 15). But such moves, too, must be justified by showing that the prototype (or the canon) exists not only in some linguist's imagination, but in reality.

I should also note that at least one prominent author in the volume, Johanna Mattissen, does not require holophrasis in her definition of polysynthesis, only incorporation. Thus, she also includes languages like Haida or Maidu (in western North America), which lack verbal person marking, and Paumarí and Urubu-Kaapor (in South America), as well as Nivkh (in East Asia), which have only subject or only object indexing. Since Mattissen has long had a special interest in Nivkh, a language without holophrasis (Mattissen 2003), this is understandable, but it seems to be a minority position.

4. The notion of "word"

Another problem for a definition of polsynthesis is the need to identify words. This is explicit in (6b), but the definition in (6a) also needs this concept because morphological and syntactic patterns can only be distinguished if we can tell words apart from affixes and phrases. A number of authors mention that this distinction is not straightforward, e.g. Aikhenvald and Foley, but the general attitude seems to be that this problem can somehow be solved ("this issue need not detain us unduly here", Foley on p. 337).

Only one of the chapters addresses it head on: B. Bickel & F. Zúñiga's chapter on "The "word" in polysynthetic languages". They note that over the past few decades, "the notion of word has been successfully decomposed" (p. 159) into a variety of more fine-grained notions, which are not always isomorphic (morphosyntactic words, phonological words, prosodic stems, clitic groups, etc.).[2] They try to tease apart the various ingredients of wordhood into variables concerning the elements (with respect to selection, inflection, and variation), and the ways in which they can be said to cohere (or show integrity). They conclude that "when one brings all variables together, it becomes clear that the space of variation in possible polysynthetic words is gigantic ... positing a single notion of a polysynthetic word will fail to do justice to the empirical complexities" (p. 167). This is then further illustrated by listing some of the domains for phonological and morphosyntactic regularities in Mapudungun (Chile) and in Chintang (a Trans-Himalayan language of Nepal), showing that they overlap only very partially.

[2] This chapter is unusual in the amount of attention it gives to phonological issues. Although some or many linguists seem to have the intution that phonological properties play an important role in characterizing words and (poly)synthesis, this is actually not reflected in the papers in the volume under review.

Bickel & Zúñiga's chapter thus seems to be in full agreement with my (2011a) paper and leads to the conclusion that it is unclear whether one should distinguish between syntax and morphology, at least with our present knowledge.

So why do so many linguists have a strong intuition that words exist in some deeper sense, and why do so many linguists keep asking how words can be identified (thus making an unjustified presupposition)? Is it only due to the power of orthography which establishes deeply ingrained stereotypes? Or are these intuitions an indication that there is something to the "word" notion after all, and that we should keep searching? This is a key question that any serious future work on these topics needs to address. Clearly, we cannot simply go on with business as usual.

5. Defining "affix" and "incorporation"

However, even if we do not have sufficient reasons to think that there is a general privileged domain "word" that a notion of "polysynthesis" is based on, we can still try to articulate in a general way how languages with many (what appear to be) affixes differ from languages that are more like English or Chinese. Let us compare the examples in (8) and (9) to their English counterparts.

(8) Purepecha (Mexico; C. Chamoreau, p. 687)
thiri-ra-a-x-ka
eat-CAUS-3PL.OBJ-AOR-ASS.1
'I gave to eat to them.'

(9) Adyghe (Caucasus; Y. Lander & Y. Testelets, p. 953)
w-jə-mə-ʁe-λeʁʷəž'-ew
2SG.DAT-3SG.ERG-NEG-CAUS-see-while
'while it does not let you see [it]'

If there were no distinction between morphology and syntax, couldn't we write these alternatively as in (10)-(11), with no change in information?

(10)	*thiri*	*ra*	*a*	*x*	*ka*	
	eat	make	them	AOR	I.ASS	('I gave to eat to them.')

(11)	*w*	*jə*	*mə*	*ʁe*	*λeʁʷəž'ew*		
	to.you	he.ERG	not	let	see	while	('while it does not let you see [it]')

Or could we write the English translations as *I-gave-to-eat-to-them*, and *while-it-does-not-let-you-see-it*? The general view seems to be that this is not possible, that English is not holophrastic, but that its clauses contain separate elements, which are not all part of a verb word. Is there any basis for this view apart from the orthography?

I am now less pessimistic than in the past and I think that the answer is yes: The main reason why linguistic forms are written separately is that they can occur separately, i.e. on their own in an uninterrupted utterance. For example, in English, we can answer a question (e.g. *Who did you give to eat to?*) by *to them*, while Purepecha presumably does not allow its form *a* [3PL.OBJ] to be used on its own. Similarly, speakers of English can answer the question *Does it let you see it?* by *it doesn't*, whereas Adyghe presumably does not allow *jə-mə* [3SG.ERG-NEG] to occur on its own. I say "presumably" here, because the sketches in the handbook are not explicit about this, and descriptive grammars usually do not say either whether a form can occur on its own or not. However, when an author writes several forms in a single word (separated by hyphens in linguists' descriptions), I think that this always means that the non-root forms cannot occur on their own – in other words, they are BOUND FORMS, using a term that has been current since Bloomfield (1933: 160).

The opposite conclusion cannot be drawn: English *to* (as in *to them*) can hardly occur on its own, and neither can *while* or *let* (or for that matter*, let you*), so these are bound forms which nevertheless are written separately. It seems to me that the main situation when authors write (non-root) bound forms separately is when they are PROMISCUOUS with respect to their hosts: For example, English *to* occurs not only attached to nouns (*to places*) and pronouns (*to them, to whom*), but also to adjectives (*to nice places*) and to determiners (*to these places)*,[3] and English *while* occurs attached to verbs (*while leaving*), or to nouns (*while people were leaving*), or to determiners (*while the guests were leaving*), and so on. Thus, a form that cannot occur on its own and that always occurs on roots of the same category (always on nouns, or always on adjectives, or always on verbs) is very likely to be written jointly with the root, i.e. as an affix:[4]

[3] A reviewer suggests that the crucial feature of English *to* is not its promiscuity, but the fact that it combines with a phrase. But since there is no clear definition of "phrase" as a comparative concept, the definition in terms of promiscuity is better in the present context.

[4] Thus, in contrast with earlier work, I am now proposing a definition of 'affix' as a comparative concept. But this does not give us a definition of 'word' yet (see note 11).

(12) An affix is a non-promiscuous bound form which is not a root.

This definition of *affix* contains the further specification that the form should not be a root, and this notion in turn can be defined semantically (as in Haspelmath (2012: 123): roots are morphs that denote things, actions or properties).[5]

There are surely orthographic affixes (or ORTHOFIXES) that are not affixes in the sense of (12) because they can actually occur on different host types. For example, a subclass of Turkish subject indexes can occur on verbs or on nouns:

(13) *çocuk-lar-sınız* 'you are children'
child-PL-2PL.SBJ

(14) *yapı-yor-sunuz* 'you are doing'
do-IMPF-2PL.SBJ

These forms are generally written jointly with the root, but by the definition in (12) they are not affixes because they are promiscuous. Thus, there is no complete match between orthographic practice and the definition in (12), but it comes fairly close. In fact, it comes so close (and is so straightforward to use) that I think that it can be used as a standard comparative concept in typology.[6] It seems that by the definition in (12), all the bound non-roots in the Purepecha and Adyghe examples are affixes, except perhaps Adyghe *-we*, which perhaps attaches to non-verbs as well. By contrast, all the English elements that are written separately are indeed non-affixes, including the grammatical element *not* (in *does not*), because it can occur with roots other than verbs (e.g. *not big, not water*), though *-n't* (in *doesn't*) would be regarded as an affix, as it only occurs on (auxiliary) verbs.

[5] As defined in (12), *affix* is a cluster concept, and as I noted in §3, "if two different features do not correlate with each other, then a cluster concept defined on the basis of these features will hardly be particularly significant". It is quite unclear whether non-root bound forms have a particular propensity to be non-promiscuous, so 'affix' may not be a particularly significant concept. Still, because the term *affix* is widely used, it is useful to have a general definition for it (= a definition as a comparative concept) that overlaps very highly with traditional usage (both in particular languages and in typology).

[6] I thank Harald Hammarström for discussion of this issue, which eventually led me to the proposal in (12).

But "polysynthetic" languages also stand out in that they allow noun incorporation (or incorporation of other "lexically heavy" morphemes). So how could we define *noun incorporation* in a rigorous way as a comparative concept? The papers in the handbook do not seem to be worried about defining noun incorporation,[7] and all existing definitions in the literature seem to define noun incorporation in terms of the "word" notion, which cannot be used (as we saw earlier).[8] It seems to me that there are three crucial ingredients to typical noun incorporation patterns:

(15) noun incorporation:
– the noun occurs next to the verb root, at most interrupted by affixes
– the noun occurs in a special position which cannot be occupied by ordinary argument nominals
– the noun is not case-marked or number-marked and cannot be modified by articles, demonstratives or adjectives

If any of these were absent, it seems that we would not call the construction incorporation, at least not without much hesitation. Thus, the German construction in (16a) does not qualify (unquestionably), because when the verb is finite, the noun *Auto* is not adjacent to the verb *fahren*, as seen in (16b).

(16) a. *Wir möchten heute Auto fahren.*
we would.like today car drive
'We would like to go by car today.'

b. *Wir fahren heute Auto.*
we drive today car
'We go by car today.'

[7] In the generative community (not represented in this handbook), there is also a lot of discussion of noun incorporation, but likewise very little concern with definitions, and apparently little progress (Massam (2017: §1) writes: "There is a lot of disagreement about exactly what constitutes noun incorporation ... the field is rich with proposals and counter-proposals as to its true nature").

[8] That noun incorporation cannot be defined in terms of "word" or "inflection" is a point that I already made in a blogpost in 2012 (http://dlc.hypotheses.org/135). At the time, I proposed to simply give up the term *noun incorporation*, but since it has long been very popular and will no doubt continue to be used, it seems a better strategy to propose a good definition that matches existing usage to a significant extent.

In Turkish, bare caseless nouns in object function can only occur directly in front of the verb, as in (17a), in contrast to accusative-marked objects, as seen in (17b).

(17) Turkish (Aydemir 2004: 465-466)

a. *Yasemin anahtar kaybet-ti.* (**Anahtar Yasemin kaybetti*.)
Yasemin key lose-PST
'Yasemin lost keys (or a key).'

b. *Anahtar-ı Yasemin kaybet-ti.*
key-ACC Yasemin lose-PST
'Yasemin lost the key.' (OR: 'The key was lost by Yasemin.')

So does (17a) represent a case of noun incorporation? I would say that it does not, because the definite nominal can occur in the same position (*Yasemin anahtarı kaybetti*, which is basically equivalent to (17b)). Of course, in an abstract analysis, linguists may set up different structural positions for different types of objects (as they often do), but comparative concepts for typology need to rely on criteria that can be read off the concrete forms.

I thus propose the following definition of *noun incorporation*, which is a reformulation of (15):[9]

(18) A verb-object construction is a noun incorporation construction if the object is expressed by a noun that (i) occurs next to the verb root, at most separated by affixes, that (ii) occurs in a special position where ordinary nominals cannot occur, and that (iii) cannot be modified by an adjective.

The third criterion, non-modifiability by an adjective, is formulated in this very specific way because adjectives (in the sense of property-concept roots) are universal, while case-markers, number-markers or articles (which are also mentioned in the third criterion in (15) above) are not.[10] (Adjectives have not played an important role in identifying argument nominals, but it seems to me that they provide a good criterion for distinguishing ordinary argument nominals from incorporees).[11]

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[9] This definition also specifies that the noun should be an object, or more technically a P-argument (cf. Haspelmath 2011b for the definition of S, A and P). One might additionally include S-arguments, but this would not make a big difference, because no language has been claimed to have S incorporation but lack P incorporation.

[10] Alternatively, one could define *noun incorporation* as a construction that does not allow modification by demonstratives, which would result in a somewhat broader definition, because presumably all constructions that allow adnominal demonstratives also allow adjectives, though perhaps not vice versa.

[11] Since adverb(ial)s cannot be modified further, the third criterion does not work for "adverb incorporation", if one wanted to have such a category. In Fortescue's definition, such elements are said to fulfill the "lexically heavy" condition as well, but I do not know how to distinguish them from adverbs that just happen to occur next to the verb in a language with rigid order. Thus, I make no attempt at defining other types of incorporation that are not noun incorporation.

Thus, it does seem to be possible to define "affix" and "noun incorporation" without reference to "word",[12] and one might use these definitions as a basis for a more rigorous identification of polysynthetic languages. However, both definitions are rather complex and do not seem to single out particularly natural sets of phenomena. If a polysynthetic language were defined as a language that requires both affixal holophrasis (affixal subject and object person forms) and noun incorporation, one would get a highly complex set of conditions under which a language can be put in this class.

6. What are "lexically heavy" elements?

In addition to subject and object person forms (for holophrasis) and noun incorporation, polysynthetic languages are said to contain "lexically heavy" elements, also called "semantically heavy morphemes", "heavy verb morphology", or "heavy verbalizing affixes". The main motivation for this notion is the nature of Eskimo languages, where we find verb forms such as (19).

(19) Quaqtaq Inuktitut (L.-J. Dorais, p. 143)
kangirsu-miu-nngu-si-laur-sima-jut
Kangirsuk-dweller-become-start-PST-PFV-3PL.IND
'They had started to become dwellers of Kangirsuk.'

Eskimo languages have long been included in the North American polysynthetic type, but the apparent verb-noun combinations like *kangirsumiu-nngu* 'become a dweller of Kangirsuk' are different from more typical noun incorporation in that the "verbal" part can never occur on its own, and thus grammatically behaves more like a derivational suffix. But these derivational suffixes can have fairly concrete meanings in Eskimo languages. Likewise, we find "adverbial" affixes (with meanings like spatial orientation, posture, repetition, manner) in quite a few languages, and of course verb compounding constructions (as in Yimas, see (4) above) also count as polysynthetic if the requirement is that a verb form should be able to contain more than one "heavy" element.

[12] On the basis of the notions of 'root' and 'affix', one can define a notion 'affixed word', but I still do not know how to distinguish compounds from phrases, so I still do not have a definition of "word".

Unfortunately, I found no attempt to define "heavy" in the handbook, other than by saying that these forms correspond to separate lexemes in more analytic languages (such as English). While this sort of impressionistic typologizing may have been acceptable in the past, it is clearly unsatisfactory and needs to be replaced by more rigorous classification of grammatical patterns.

A constructive proposal that I would like to make is to replace "heavy" by "concrete", and to characterize concrete meanings as concrete action meanings, physical object meanings, and core property meanings (where by core properties, I mean age, dimension, value, and colour, cf. Dixon 1977). These concrete meanings can also be used to define the notion of 'root' in a cross-linguistic sense (Haspelmath 2012).[13] But this would mean that meanings such as 'become' or 'start' in (19) would not count as concrete meanings, and also quite a few of the adverbial meanings would not count. In fact, for Inuktitut, L.-J. Dorais (quoting Johns 2007) says that "the set of verbs involved in noun incorporation are all "light" verbs, that is, functional elements that exclude lexical or root material" (p. 143). Thus, on this stricter view, Eskimo would perhaps no longer be polysynthetic.

On the other hand, the "lexical affixes" of Salishan languages would count as concrete meanings. H. Watanabe lists a substantial number of Sliammon forms such as those in (20). (Forms called "lexical affixes" are also mentioned for Nuuchahnulth by T. Nakayama, p. 607, for Eastern Pomo by C. Jany, p. 275, and for Northern Paiute by M. Mithun, p. 51.)

(20) *-aʔana* 'ear' *-aʔaq* 'wind'
-inas 'chest' *-awt'tˣ* 'house'
-iyqin' 'hair' *-amił* 'food'
-law'i 'belly' *-aya* 'person'
-qin 'mouth' *-ukʷt* 'blanket'

[13] A reviewer asks about verbs like 'repair', 'improve', 'flee', 'approach', where it is unclear whether these are "concrete" meanings. I admit that the notion of 'concrete meaning' is vague, but this does not matter, because it is not necessary to delimit it for the definition to work. If necessary, one could simply list a set of concrete meanings (maybe called "core action meanings", analogous to core property meanings). A polysynthetic construction would in any event be expected to be productive and apply to a substantial number of elements, and if these do not include any clearly concrete elements, it would not count as polysynthetic.

These kinds of elements are called "affixes" in Salishan linguistics, but on my (2012) definition, they would count as roots in a typological context. Of course, there are language-particular reasons for calling these forms affixes rather than roots, but from a typological perspective, they must be called roots (recall from (12) above that affixes are by definition non-roots, in accordance with general usage).[14]

"Verb compounding" patterns as in (4) from Yimas, or (21) from Koryak are also combinations of two roots, but are they instances of "incorporation", and thus relevant to polysynthesis?

(21) Koryak (Chukotkan; M. Kurebito, p. 844)
k-ajmə-jewl-al-ŋ
IMPF-draw.water-bring-ANTIP-IMPF.3SG.SBJ
'He is drawing water and bringing it.'

Since there is no general definition of "word" or "compound", and since the definition of "noun incorporation" involves the impossibility of adjectives (as we saw in the preceding section), we do not seem to have a well-defined cross-linguistic pigeonhole for this construction. However, while studying serial verb constructions in some detail (Haspelmath 2016), I realized that such sequences of verbs in a single clause without a linking element must be subsumed under serial verbs, even if they are written as a single word. In African and Southeast Asian languages, serial verb sequences are typically not spelled as single words, but at least some of them cannot be separated and could thus be treated just like the Koryak verb sequence in (21).

A reviewer notes that the comparative concept definitions that I proposed in this and the preceding section only work in "canonical or default cases" (this is also true for my 2016 definition of serial verb construction). This is indeed typical of comparative concepts: As Croft (2016: 378) notes, extensionally large concepts do not serve well as comparative concepts, so that one often uses more specific concepts (such as P, defined as the patient of a physical-action verb) to focus on core areas where languages show little variation. Since comparative concepts are distinct from descriptive categories, this does not affect the descriptive counterparts in individual languages. Thus, incorporees may well have roles other than patient in many languages, and the slots occupied by verbs in verb-verb combinations may well have non-concrete meanings in languages.[15]

[14] The term "lexical" might suggest that one can in general distinguish between "lexical" and "grammatical" meanings, but the latter term is very hard to define in such a way that it corresponds to our intuitions (though see Boye & Harder 2012 for an attempt). Thus, I do not find it promising to try to characterize lexical affixes as affixes with a meaning that is not a grammatical meaning.

[15] The reviewer also notes that there is a similarity between this approach of core concepts for comparison and Corbett's canonical typology (e.g. Corbett 2005). However, in the approach followed here, one attempts to give precise definitions that may map imperfectly onto descriptive categories, but that to a very large extent conform with previous usage, both in typology and description. These definitions allow us to tell for each phenomenon whether it maps onto the comparative concept or not, thus allowing general (and possibly quantified) cross-linguistic statements. In canonical typology, the definition is also very precise and does not aim to cover more than a core, but the primary interest is in spelling out how non-canonical phenomena relate to it. Corbett and colleagues seem not to be interested in drawing

7. How does polysynthesis arise?

Quite a few of the authors make remarks about diachronic aspects, and there is an entire section with four chapters on diachrony (by E. Vajda, T. Givón, P. Bakker & H. van der Voort, and by E. Gruzdeva & N. Vakhtin), although perhaps the most far-reaching claims are made by Peter Trudgill in his chapter on "The anthropological setting of polysynthesis". He notes that polysynthetic languages are often spoken in small, isolated communities with dense social networks and argues that the complexity found in polysynthetic languages has a greater chance of arising (and surviving) under such circumstances (see also Trudgill 2011, where very similar arguments are made). His idea that "there is a natural tendency for languages to gradually get more complex over time" (p. 201) is consonant with Östen Dahl's idea that grammaticalization can be seen as the development of "mature" features in languages, which also takes a lot of time, while on the other hand intensive language contact can lead to rapid disintegration, as discussed and exemplified in the chapter by P. Bakker & H. van der Voort ("Polysynthesis and language contact"). This overall picture is confirmed by various observations that polysynthesis seems to be old and stable (e.g. Vajda on Yeniseian and Na-Dene, p. 363, Evans on Tiwi, p. 320, Mithun on person index paradigms in North America, p. 40).

boundaries, and quantified cross-linguistic generalizations cannot be formulated on the basis of the canonical definitions.

But when one looks more closely, there are some contradictions. Dahl's notion of "mature phenomena" properly applies to non-linear or opaque patterns, such as "partial or total fusion of morphemes, cumulative or portmanteau expression, suppletion, dependence on lexical classes" (p. 25), and such phenomena do indeed seem to be less widespread in languages with a recent history of substantial contact influences. But what is the relation between non-linear or opaque phenomena and polysynthesis? Subject and object indexes on the verb, noun incorporation, and a large number of other "morphological" parts of verb forms do not necessarily imply any kind of opacity. Various authors mention that their language does not show much fusion, most explicitly in Lander & Testelets's chapter on Adyghe ("the Adyghe word has a transparent structure and its morphology is close to the agglutinative prototype", p. 953). It is not clear to me to what it might be that opacity/nonlinearity and the existence of many verbal affixes and noun incorporation have in common. Both may exhibit "complexity" in some vague impressionistic sense, but opacity has to do with learning many different forms (thus presenting a challenge to the adult learner), while it is far less clear in what way transparent affixes (as defined in (12) above) would present a challenge to learners. If Trudgill showed that affixal expression per se presents difficulties for adult learners, this might support his claims, but one would then need to show that there are fewer difficulties in languages where the corresponding bound forms occur in a non-adjacent position, e.g. that Swedish *kung-en* 'the king' is somehow harder than English *the king* (where *the* is not an affix because the adjective *old* can come in between). A priori, one might on the contrary suspect that the Swedish pattern with a suffixed article is easier to learn than the English pattern, where the article cannot be so easily recognized by its position. It thus seems to me that we still have a long way to go before we really understand what is going on here.

8. Conclusion

This volume contains an enormous amount of interesting materials, but no really good reasons for treating all of them together under a single heading. I cannot help but feel that the notion of polysynthesis is primarily attractive because the languages concerned seem so exotic to linguists with a background in European languages.[16] In many areas of social science, it has taken scholars a long time before they recognized that a world-wide (or cross-species) perspective forces (or allows) us to abandon entrenched earlier views and notions that were strongly influenced by European or Western stereotypes.[17] Racial macro-types such as Blumenbach's five races of humankind (Caucasian,

[16] A reviewer notes that "one could hardly accuse the editors of this volume of being this type of linguist". Of course not, but I am not making accusations. I am rather trying to understand why certain ill-understood notions are still so widely used. This also applies to my own earlier work, where I simply presupposed that a notion of „word" exists. It was only more recently that I started wondering whether I naively continued a long tradition of word-based linguistics that is ultimately spelling-based.

[17] To some extent, this even applies to biology, as illustrated by the recently revised view (Odom et al. 2014) that female song is not unusual, but actually very widespread and probably ancestral in songbirds (though not widely found in Europe).

Mongolian, Ethiopian, Malayan and American), or psychological macro-types such as Jung's introverts and extraverts, are easy to remember and have become popular, but do not seem to have been scientifically validated. Morphological typology started in the early 19th century at a time when very little was known about the world's languages, and the old distinction between agglutinative and flective languages has not been validated either (Haspelmath 2009). From this perspective, it is not surprising that the present handbook cannot do much to convince the skeptical reader that the notion of polysynthesis is more than a remnant from the 19th century (that still manages to inspire authors to write highly useful survey chapters on little-known languages).

In Jerrold Sadock's chapter ("The subjectivity of the notion of polysynthesis"), he compares Eskimo and Hebrew and points out that if Hebrew "clitics" are regarded as affixes, then one might regard Hebrew as polysynthetic as well. He ends by quoting from Fortescue's chapter ("polysynthetic languages, far from representing a single homogenous type, are arguably the most diverse and complex languages on earth, at least as regards their morphology") and concludes: "Perhaps, then, a thorough and precise description of the morphology of each language and its ramifications in the lexicon, the syntax and the semantics is the best typology" (p. 114).

I would not be quite so pessimistic, because a few other holistic typologies have been much more successful, in particular the OV/VO typology (Dryer 1997) and the head-marking/dependent-marking typology (Nichols 1986), which have been validated by considering a substantial number of languages from around the world. So it may well be that we will eventually find more correlations (e.g. if a language has an applicative affix, then it also has affixed subject indexes; or if a language has noun incorporation, then it also has an applicative affix), and perhaps also some macro-types. The present handbook can thus hopefully provide a starting point for future more systematic studies, but in my view, the burden of proof is now on those who want to use "polysynthesis" as a technical term in linguistics (as the editors seem to agree, see note 1).

Acknowledgement

The support of the European Research Council (ERC Advanced Grant 670985, Grammatical Universals) is gratefully acknowledged.

Gloss abbreviations (other than those listed in the Leipzig Glossing Rules)

AOR	aorist
ASS	assertive
HAB	habitual
REAL	realis
RM	remote
SEQ	sequential

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