Polysynthesis: lessons from Northwest Caucasian languages

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1. Introduction

Polysynthesis has fascinated linguists ever since polysynthetic languages, characterised by exceptional morphological complexity of verbs, have come to their attention. However, despite considerable advances in the study of polysynthesis in the last few decades (e.g. Mithun 1988, Baker 1996, Evans & Sasse 2002, Mattissen 2004, 2006, Mahieu & Tersis 2009 and Fortescue et al. 2017), there is still no consensus as to how this notion should be defined and even whether it lends itself to a clear-cut definition at all, and, concomitantly, whether the class of "polysynthetic languages" can be delimited in a meaningful way (Zúñiga 2019).

Nevertheless, its problematic status notwithstanding, the notion of polysynthesis has proven useful for the advancement of typology and linguistic theory in that the study of polysynthetic languages has both allowed linguists to better understand a variety of apparently "exotic" phenomena, such as head-marking and polypersonalism, incorporation, "lexical affixation", templatic organisation of morphology and others, and offered new insights into the fundamental questions concerning the relations between morphology and syntax, inflection and derivation, lexical storage and online production etc.

While not attempting to provide my own solutions to the problems of definition and delimitation of polysynthesis, in this article I shall first review the definitions of polysynthesis and its characteristic features proposed in the typological literature (section 2), then briefly introduce the major parameters of typological variation in polysynthetic morphology (section 3), and finally present an overview of the polysynthetic properties of the Northwest Caucasian languages focusing on how they fit into the typological classifications proposed (section 4).

2. Delimiting polysynthesis

The term "polysynthetic" was coined by the French-American linguist and philosopher Peter (Pierre-Étienne) Duponceau (1760–1844) to refer to language structures "in which the greatest number of ideas are comprised in the least number of words" (Duponceau 1819, quoted after Zúñiga 2019: 1). Initially, the term was applied to the native languages of North America, e.g. Mohawk (1)[1], then to Chukotkan languages (2), but later similar structures were found in many other languages of diverse geographical regions, e.g. Dalabon in Australia (3).

[1] Abbreviations used in glosses: 1 — 1st person; 2 — 2nd person; 3 — 3rd person; A — agent; ABS — absolutive; ACC — accusative; ADD — additive; ADV — adverbial; AND — andative; BEN — benefactive; CAUS — causative; CMPL — completive; CNT — continuative; COM — comitative; COND — conditional; COORD — coordinative; CSL — cislocative; DAT — dative; DCL — declarative; DEB — debitive; DEF — definite; DIST — distal demonstrative; DPR — depreciative; DU — dual; DUP — duplicative; DYN — dynamic; EMP — emphatic; ERG — ergative; EXC — excessive; F — feminine; FACT — factive; FUT — future; GEN — genitive; H — human; INCL — inclusive; IND — indicative; INT — intensive; INTR — intransitive; IO — indirect object; IPF — imperfect; ITER — iterative; LAT — lative; LOC — locative preverb; M — masculine; MSD — masdar; N — non-human; NEG — negation; NFIN — nonfinite; NPST — nonpast; OBJ — object; OBL — oblique; PASS — passive; PFV —

(1) Mohawk (Iroquoian, Canada; Mithun 2017: 236)
ó:nenkati' *ken* *t-en-s-ite-wa-htenno-'ók-h-a-'?*
now then Q DUP-FUT-REP-1INCL.A-PL-ball-hit-AND-PURP-PFV
'How about we go there and play some golf?'

(2) Chukchi (Chukotkan, Russia; Skorik 1961: 103)
tə-tor-taŋ-pəlwəntə-pojgə-pela-rkən
1SG-new-good-metal-spear-leave-PRS.1SG
'I am leaving a good new metal spear.'

(3) Dalabon (Gunwinyguan, Australia; Evans 2017a: 769)
kah-marne-yerrûh-ye-rrudjm-inj
3SG>1SG-BEN-ITER-COM-return-PST.PFV
'He kept bringing them back for me.'

Notably, not only has "polysynthesis" been introduced as a holistic notion aimed to capture the overall "character" of a language, like many typological terms of the 19th century, but it has largely remained so up to now. Indeed, while modern linguists have largely given up the habit of speaking about e.g. "ergative" languages, obviously due to the recognition of the fact that most languages show a mixture of different alignment types in their morphosyntax (Bickel 2011), the phrase "polysynthetic language" still belongs to linguistic parlance. The reason for this must be the (often implicit) belief of linguists that "polysynthesis" is a typological trait with repercussions in many domains of linguistic structure (e.g. Mithun 1988, Baker 1996, Fortescue 2007).

How can "polysynthesis" be defined beyond the rather impressionistic, even if insightful, characterisation by Duponceau? The most straightforward way to lend precision to Duponceau's description was proposed by Greenberg (1960: 194), who introduced a quantitative "index of synthesis", the morpheme-to-words ratio in a 100-words long text, and defined as polysynthetic the languages with an index of synthesis of 3.0 or more. Simple as this definition might seem, it is unsatisfactory for two interrelated reasons (cf. Sadock 2017). First, the cut-off point of 3.0 morphemes per word is purely arbitrary; second, the high morpheme-to-words ratio in and of itself does not reveal anything about the morphological structures making it possible. It is therefore not surprising that since Greenberg, linguists working on polysynthetic languages have been focusing on qualitative rather than quantitative characteristics. For example, Mithun in her seminal article, starting with a simple statement that "[p]olysynthetic languages are by definition those that exhibit a high number of morphemes per word" (Mithun 1988: 442) ends with the insight that "[t]he propensity of polysynthetic languages to develop morphological complexity primarily within their verbs can have a subtle effect both on the semantic nature of the categories they grammaticize, and on the resulting structure of their morphological systems" (Mithun 1988: 451–452). It is clear that "[p]olysynthetic languages are more than just languages with very long words" (Fortescue 2016: 2) and must differ qualitatively, not just quantitatively, from non-polysynthetic ones.

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perfective; PL — plural; POSS — possessive; POT — potential; PR — possessor; PRED — predicative; PRF — perfect; PROX — proximal; PRS — present; PST — past; PTCL — particle; PURP — purposive; PVB — preverb; Q — interrogative; RE — refactive; REC — reciprocal; REL — relativizer; REP — repetitive; RFL — reflexive; RPST — remote past; RR — reflexive/reciprocal; RSTR — restrictive; S — single argument of canonical intransitive verb; SBD — subordinator; SBJ — subject; SEQ — sequential; SG — singular; SML — similative; TEMP — temporal; TRL — translocative; VERT – motion upwards.

That said, there is still no general and agreed-upon definition of polysynthesis, and the very notion and the class of languages it is supposed to characterise lack clear-cut boundaries. This becomes apparent if we consider some of the qualitative definitions proposed in the literature (setting aside Baker's (1996) definition or rather redefinition of polysynthesis within the generative framework). Thus, Evans & Sasse (2002: 3) speak about "a prototypical polysynthetic language" as 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 <…> to a level of specificity allowing this word to serve alone as a free-standing utterance without reliance on context". Likewise, Fortescue (2017: 122) requires of a "core polysynthetic" language to "display holophrasis (i.e. be able to represent a whole clause – including all bound core pronominals – by a single word)" as well to "allow more than one lexically 'heavy' morpheme within the holophrastic verb, whether it be lexical or affixal". Fortescue underscores that polysynthesis cannot be reduced to head-marking (Nichols 1986, 2017) alone and "contains an essential derivational component" (Fortescue 2016: 6), i.e. semantically loaded morphological processes altering and modifying the verb's meaning. Indeed, there are languages such as Basque or Kinyarwanda, which exhibit even more head-marking than such "core" polysynthetic languages as Yupik, but have never been considered polysynthetic precisely for their lack of this derivational component.

The latter notion is central in De Reuse (2009), who introduced the concept or "productive non-inflectional concatenation" (PNC), i.e. optional and formally transparent affixes expressing semantic content often bordering on lexical, and especially in Mattissen (2004, 2006, 2017), who defines polysynthetic languages as those which "have complex, polymorphemic verbal units which necessarily integrate productive<ly> non-root bound morphemes with 'lexical' and grammatical meanings […] and optionally allow concatenation of lexical roots within a verbal wordform" (Mattissen 2017: 72). By contrast, head-marking and holophrasis are not wrought into Mattissen's definition and are treated as parameters of variation.

What can be distilled from these characterisations of polysynthesis is a cluster of morphological properties such as head-marking and polypersonalism, productive and optional semantically loaded derivational morphology, incorporation and composition in general, as well as more concrete features such as use of applicatives in the verb to fulfill the function of nominal case (see Mithun 1988, Fortescue et al. 2017). Different languages traditionally conceived of as polysynthetic show different constellations of these properties, and some of the polysynthetic properties can be found, even if to a limited extent, in languages that linguists have never included into this class, e.g. in Lithuanian (4) (see e.g. Arkadiev 2021).

(4) Lithuanian (Indo-European, CCL)
ne-be-su-si-tik-inėj-o-me
NEG-CNT-together-RR-meet-ITER-PST-1PL
'we did not (repeatedly) meet each other any more'

The existing definitions of polysynthesis crucially rely upon on the notion of "word", whose validity and consistency as a cross-linguistic concept have been repeatedly put to doubt (e.g. Haspelmath 2011, Tallman 2020). "Wordhood" has been shown to raise considerable methodological and analytical problems at least in some polysynthetic languages as well (e.g. Bickel & Zúñiga 2017, Tallman 2021), in particular with respect to mutual correlations (or rather lack thereof) between phonological and morphosyntactic criteria defining the relevant syntagmatic domains. Unless the boundaries of the "word" or at least of the "verb" are robustly defined, speaking about its morphological complexity is hardly a meaningful endeavour.

Do these internal heterogeneity, fuzzy boundaries and problematic foundations lend the very notion of polysynthesis "at best an impressionistic label, and at worst an ill-defined buzzword, without much practical usefulness" (Zúñiga 2019: 15)? Perhaps they do, but one can still conceive of polysynthesis as not entirely hopeless by trying, on the one hand, to make the notion more restrictive (as suggested by Zúñiga 2019: 14–15), and, on the other, by looking more deeply into the individual characteristics associated with polysynthesis and exploring their cross-linguistic variation as well as their possible mutual correlations and their relations with other relevant properties of grammar and lexicon.

3. Typologising polysynthesis

Languages traditionally considered polysynthetic differ widely along many parameters, both quantitative and qualitative. These include average or maximal number of morphemes per word or slots in a morphological template as well as number of paradigmatically opposed affixes for each slot, number and type of semantic features grammaticalised, maximal number of participants expressed by pronominal affixes on verbs, types of arrangement of morphemes within the word, degree of morphological and morphophonological opacity manifested in such phenomena as fusion, cumulation, multiple exponence or suppletion, presence, productivity and types of incorporation, etc.

That said, it is remarkable that there are few comparative works based on representative samples of polysynthetic languages aiming at mapping their diversity and exploring the similarities and differences between them (e.g. Fortescue 1994, Drossard 1997). Indeed, most significant publications on polysynthesis deal with just one language or several selected languages. Perhaps the most famous exception to this trend is Baker (1996) approaching polysynthesis from a generative perspective. However, most typologists would disagree with Baker's rather restrictive definition of polysynthesis based on obligatory expression of arguments within the verb by means of either bound pronominals or productive noun incorporation, as well as counter his claims about the correlations between these definitional features and other grammatical properties such as absence of grammatical case marking, reflexive pronouns or non-finite verbal forms (e.g. many contributions to Evans & Sasse 2002 and Mahieu & Tersis 2009).

A genuine typological approach to polysynthesis on a basis of a 75-language sample has been advanced in a series of articles by Johanna Mattissen (2004, 2006, 2017). Her typology is based on the following three major parameters:

(i) Whether the verb stem can contain more than one lexical root: *compounding*[2] vs. *affixal* polysynthesis.
(ii) Internal organisation of the polysynthetic morphology: *scope-ordered* vs. *templatic*.
(iii) Number of arguments indexed in the verb by pronominal affixes: *polypersonal* (two or more), *monopersonal* (just one), *apersonal* (none).

The first parameter is probably the most important one and can be elaborated further. First, different types of compounding can be singled out: besides the best-known noun incorporation shown in example (2) above, Mattissen singles out adverb incorporation (5) and verb-root serialisation (6).

[2] Mattissen uses the term "compositional", which creates unwarranted associations with semantic compositionality and should preferably be avoided.

(5) Bininj Gun-wok (Gunwinyguan, Australia; Evans 2017b: 315)
*a-ban-**yawoyʔ-warga**ʔ-maŋe-gaɲ-giɲe-ŋ*
1SG.SBJ-3PL.OBJ-again-wrongly-BEN-meat-cook-PST
'I cooked the wrong meat for them again.'

(6) Yimas (Lower Sepik-Ramu, New Guinea; Foley 1991: 331)
num-n *na-**way**-mpi-**waraca**-mpi-**ya**-ntut*
village-OBL 3SG.S-turn-SEQ-return-SEQ-come-RPST
'He came back to the village.'

Since various types of incorporation are not limited to polysynthetic languages (e.g. one finds noun incorporation in Frisian and Soninke, see e.g. Olthof 2020, Vinyar 2021, while productive verbal compounds are found e.g. in Japanese, Kageyama 2016), Mattissen (2004: 203; 2017: 94) suggests that criterial for polysynthesis are "non-root bound morphemes with rather concrete ("lexical") meanings" (Mattissen 2004: 190), also known as "lexical affixes" (Mithun 1997) or "lexically heavy morphemes" (Fortescue 2017: 122). A detailed cross-linguistic analysis of such affixes is given in Mattissen (2006: 297–333), where the following ontological domains are singled out (the list below is non-exhaustive):

(i) direction and position
(ii) body parts
(iii) classifiers
(iv) artefacts and living creatures
(v) motion and manner
(vi) degree
(vii) chronology
(viii) phasal
(ix) quantification and focus

Some of these as well as additional domains are illustrated below; thus (7) from Purépecha shows lexical affixes with locational meanings, (8) from Bella Coola shows body-part affixes expressing patients or instruments, while (9) from Central Alaskan Yupik shows affixes with verb-like meanings.

(7) Purépecha (isolate, Mexico; Chamoreau 2017: 683)
a. *waxa-**nu**-x-ti* 'He sat *on the patio*.'
b. *waxa-**ru**-x-ti* 'He sat *in the street*.'
c. *waxa-**k'ara**-x-ti* 'He sat *inside the house*.'

(8) Bella Coola (Salishan, Canada; Mithun 1997: 361)
a. *cp-**ak**-m-c* 'I am wiping my *hands*.'
b. *ip'-**ak**-m-tic* 'I am grabbing them *with my hand*.'
c. *pusm-**ak**-c* 'My *hand* is swelling.'

(9) Central Alaskan Yupik (Eskimo-Aleut, USA; Woodbury 2017: 551)
a. *qaya-**ngqer**-tua* 'I *have* a kayak.'
b. *taryaqvag-**tur**-tua* 'I'm *eating* king salmon.'
c. *citegta-**lngu**-unga* 'I'm *tired* of tomcods.'

Of course, none of the languages in Mattissen's sample has lexical affixes from all of the ontological domains, while at least some of these domains are attested by productive affixation in the languages traditionally not considered polysynthetic. For example, the so-called preverbs of Slavic, Baltic, Germanic, Hungarian or Kartvelian languages express locational as well as some more abstract meanings, e.g. degree or repetition (10), and Lithuanian has a prefix with the focus-related meaning 'only' (11) (Arkadiev 2010).

(10) Bulgarian (Indo-European; Istratkova 2004: 313)
iz-raz-pre*-pro.da-m*
CMPL-EXC-REP-sell-PRS.1SG
'I completely sell (it) again in excess'

(11) Lithuanian (CCL)

Te*-mat-au*	*j-os*	*tams-us*	*plauk-us.*
RSTR-see-PRS.1SG	3-GEN.SG.F	dark-ACC.PL.M	hair-ACC.PL

'I *only* see her dark hair.'

The main problem with "lexical affixes" is again that of delimitation of this class in a meaningful way (cf. Zúñiga 2017, Haspelmath 2018). While cases shown in (7)–(9) above appear uncontroversial, because those affixes indeed refer to concrete locations, objects or actions, the Bulgarian and Lithuanian affixes in (4) and (10)–(11) have quite abstract meanings, even if translatable by lexical words into English. Excluding such affixes from the domain of "lexically heavy" morphemes would substantially reduce the ontology given above. Mattissen's (2017: 94) conjecture that the Slavic or German preverbs differ from non-root bound morphemes in polysynthetic languages such as Ket or Purepécha in that the former are "lexicalized on their roots" is factually incorrect as well as unhelpful, since, on the one hand, the Bulgarian and Lithuanian affixes shown in (10) and (11) are fully transparent and productive, while, on the other hand, root-affix combinations in polysynthetic languages are just as prone to lexicalisation (e.g. Dorais 2017, Mithun 1998). Thus "non-root bound morphemes with rather concrete meanings" is a fuzzy concept, possibly with a prototype-structure.

Turning to the second parameter of Mattissen's typology, that of morphological organisation, we find the familiar distinction between "layered" (or scope-based) and "templatic" types of ordering (Stump 2006, Bickel & Nichols 2007: 214–220; Mithun 2016: 149–152). Clear manifestations of both types of morphological structure are not hard to find, e.g. successive attachment of suffixes in Central Alaskan Yupik in (12) vs. interlacing of derivational and inflectional elements in Ket (13), a hallmark of templatic morphology.

(12) Central Alaskan Yupik (Eskimoan, USA; Mithun 2016: 15151)

a. *quya-****yuumi-it****-u-a*
thankful-yearn-NEG-INTR.IND-1SG
'I don't want to be thankful.'

b. *quya-****yuumi-ite-llru****-u-nga*
thankful-yearn-NEG-PST-INTR.IND-1SG
'I didn't want to be thankful.'

c. *quya-****yuumi-ite-llru-yugnarq****-u-a*
thankful-yearn-NEG-PST-probably-INTR.IND-1SG
'I guess I didn't want to be thankful.'

(13) Ket (Yeniseian, Siberia; Vaida 2017: 907)
da=in-ba-h-a-ted
3F.SBJ=needle-1SG.OBJ-area-PRS-hit.endwise
'She pokes me with a needle (once).'

However, both purely scope-ordered and purely templatic organisation are idealised types to which morphological structures of real languages adhere to different degrees, being shaped by diachronic processes of grammaticalisation, reanalysis and analogy (Mithun 2000, 2016), and Mattissen (2004: 208) acknowledges that "[t]wo types of mixed organization are observed". In the first one, some affixes show scope-driven ordering in an otherwise rigid template as in Southern Sierra Miwok (14); in the second one, "different parts of the verb form, e.g. the pre-root and post-root part, may differ in their organizational principles" (Mattissen 2004: 208), as in Nivkh, where, according to Mattissen, suffixes follow a strict template while the order of pre-root elements is scope-driven.

(14) Southern Sierra Miwok (Miwok-Costanoan, California; Broadbent 1964: 39–40)
a. *ʔetal-**nuk:u-lumhu-:***
return-CAUS-ready-PRS.IPF.3SG
'He is ready to make him go home.'
b. *ʔetla-**lamhy-nuk:u-:***
return-ready-CAUS-PRS.IPF.3SG
'He is making him ready to go home.'

The last parameter of Mattissen's typology pertains to head-marking. As said above, in contrast to other approaches, Mattissen considers polypersonalism to be a variable rather than a defining feature of polysynthesis. This is not unreasonable, since, on the one hand, polypersonalism is quite widespread (Siewierska 2005) and is in no way limited to polysynthesis, see Basque in (15), and, on the other, there exist languages exhibiting polysynthetic features while lacking argument indexing altogether, e.g. Awtuw (16).

(15) Basque (isolate, Spain, France; Saltarelli 1988: 238)
Ni-k *aita-ri* *diru-a* *eska-tu* ***d-i-o-t.***
1SG-ERG father-DAT money-DEF[ABS] ask-PRF 3.ABS.PRS-DAT-3SG.IO-1SG.ERG
'I have asked father for (some) money.'

(16) Awtuw (Sepik, Papua–New Guinea; Feldman 1986: 52)
ka-d-ma-taw-owra-t-akla-kow-kay-e
NEG-FACT-go-yet-again-DU-dig-BEN-PRF-PST
'(two) hadn't gone and dug again for (someone) yet'

The three parameters of Mattissen's typology are largely independent of one another and cross-classify languages in a number of subtypes, as shown in Table 1 based on Mattissen (2017: 82)[3].

[3] It has to be observed that some of Mattissen's classifications are inaccurate, e.g. the listing of Yimas among the languages with at most bipersonal indexing (cf. Foley 1991: 208–215) or of Tiwi as lacking incorporation (cf. Osborne 1974: 46–50).

Table 1: Classification of polysynthetic languages according to Mattissen

scope-ordered	templatic	noun incorporation	verb-root serialisation	no. of indexed participants	language
+	+	+	+	2	Lakhota
–	+	+	+	2	Wichita
+	–	+	+	2	Pano
–	+	+	–	2	Takelma
+	+	+	–	2	Blackfoot
–	+	–	+	2	Tonkawa
–	+	–	+	0	Awtuw
+	+	–	+	3	Yimas
+	+	–	+	0	Maidu
+	–	–	+	2	Capanawa
–	+	(+)	–	3	Creek
+	+	–	(+)	0	Klamath
+	+	(+)	–	2	Spokane
–	+	–	–	2	Navaho
+	+	–	–	1	Tariana
+	–	–	–	2	Greenlandic

The typological parameters discussed above (as well as other conceivable traits) are all synchronic in their nature. However, a highly important question concerns the diachronic origins of polysynthesis. Since most of the known polysynthetic languages either lack historical records altogether or have not changed much during their written history, only speculations based on internal and comparative reconstruction are possible. Thus Fortescue (2007) proposes to distinguish between "old" and "new" polysynthesis on the basis of synchronically observable traits summarised in Table 2.

Table 2: "Older" vs. "newer" polysynthesis according to Fortescue (2007: 21)

Older polysynthesis (e.g. Nuuchahnulth)	Newer polysynthesis (e.g. Chukchi)
(i) few if any lexical sources of derivational affixes to be found;	(i) lexical sources of derivational affixes transparent;
(ii) no independent stress on incorporated morphemes;	(ii) residual stress on incorporated stems;
(iii) entangled ordering of derivational and inflectional morphemes;	(iii) derivational morphemes closer to stem than inflectional morphemes;
(iv) evidence of successive layering of affixes, with fossilisation.	(iv) productivity of incorporation or verb-root serialisation.

In a more recent article, Fortescue (2016) postulates several diachronic pathways by which polysynthesis may arise, all presupposing as a prerequisite "embedding into a larger geographical region where head-marking is already dominant" (Fortescue 2016: 6). These idealised pathways differ in the major types of productive stem-derivational morphology and are therefore reminiscent of Mattissen's "compositional" and "affixal" types (Fortescue 2016: 6):

(i) productive verbalising affixes but little or no compounding → affixing type (e.g. Eskimoan, Wakashan);
(ii) compounding of various kinds but no productive verbalising affixes → compounding type (e.g. Iroquoian, Chukotkan, Gunwinyguan);
(iii) clause chaining or verb serialisation in fixed order → clause-combining type (e.g. Yimas, Athabaskan)

While the general consensus seems to be that the extreme morphological complexity of the polysynthetic kind takes extended periods of time to develop (Fortescue 2016, Dahl 2017) under such specific sociolinguistic conditions as isolation and no asymmetric language contact (Trudgill 2017), one may ask whether polysynthetic structures can also develop "abruptly" via univerbation of analytic constructions or clitic clusters. Indeed, it has been suggested that some of the analytically-looking European languages, when analyzed in their colloquial spoken form and without orthography-based preconceptions, may turn out to look rather polysynthetic, cf. Lambrecht (1981), Arkadiev (2005), Kibrik (2011: 253–259) on spoken French (17), Charitonidis (2008) on Modern Greek and Moreno Cabrera (2014) on spoken Spanish.

(17) Written vs. spoken French[4]
parce qu'il me les a toujours fait envoyer
paʁsk-i-mə-lez-a-tužuʁ-fɛ-ãvwaje
because-3SG.SBJ-1SG.OBJ-3PL.OBJ-PST.PFV-always-CAUS-send
'because he has always had them sent to me'

Such examples, even if debatable, clearly bear on the issues of "wordhood" and of delimitation of polysynthesis.

4. Polysynthesis in the Northwest Caucasian languages

The Northwest Caucasian (or Abkhaz-Adyghean; further NWC) is one of the three indigenous language families of the Caucasus alongside the Northeast Caucasian (Nakh-Daghestanian) and the South Caucasian (Kartvelian). It comprises three branches: Circassian consisting of West Circassian (a.k.a. Adyghe) and Kabardian, Abkhaz-Abaza and the now extinct Ubykh. The languages are spoken by about 1 million people in the Russian republics of Adygea, Karachay-Cherkessia and Kabardino-Balkaria and some districts of the Stavropol and Krasnodar regions, in the self-proclaimed Republic of Abkhazia (officially part of Georgia but *de facto* under Russian protectorate), as well as in the diaspora in Turkey and other countries of the Middle East. All NWC languages are head-marking and polysynthetic, and below I shall focus on the various manifestations of these traits trying to situate NWC in the typology of polysynthesis outlined above and to discuss the implications of their data for the understanding of the concept in general. Further information about these languages, including the sociolinguistic situation, state of research and most important traits of their phonology and morphosyntax, can be found in Hewitt (2005) and Arkadiev & Lander (2020). The foregoing discussion is based on the material collected by myself and my colleagues during fieldwork in Adygea on various dialects of West Circassian and Kabardian (2004–2016) and in Karachay-Cherkessia on Abaza (2017–2021), as well as on published grammars, special studies and text collections. Examples marked as "texts" and "elicited" come respectively from the oral narratives and elicited examples collected during our fieldtrips.

All NWC languages possess highly complex verbal morphology with many suffixal and prefixal positions:

(18) Abaza (texts)
awə́j *árɣan* *s-z-á-la-nəqʲʷa-wa-ʒə-j-š'a-ṭ*
DIST DEF+rope 1SG.ABS-POT-3SG.N.IO-LOC-walk-IPF-PVB-3SG.IO-seem-DCL
'He thought that I would be able to walk on that rope.'

[4] https://www.babelio.com/livres/Dupuis-Apaches/1286313, accessed October 10, 2022.

NWC nominals also show polysynthetic features, albeit of a different nature, i.e. productive and in many cases obligatory compounding of lexical stems corresponding to nouns, adjectives and numerals into so-called "nominal complexes" showing properties of coherent morphosyntactic words (Lander 2017):

(19) Standard West Circassian (published text)
jə-[*ʒ'ene–šχʷenṭe–daxe*]-*re* *jə*-[*cʷeqe–λedeqe–λage*]-*re*
POSS-dress–green–beautiful-COORD POSS-shoe–heel–high-COORD
'her beautiful green dress and her shoes on high heels'

Verbal and nominal polysynthesis in NWC arguably instantiate different morphosyntactic mechanisms (Ershova 2020). Below I shall focus on verbal complexity, although the borderline between verbs and nominals in NWC is rather fluid (cf. Testelets & Lander 2017: 951–952).

The polysynthetic properties of NWC languages include the following:

(i) exuberant polypersonalism coupled with limited (Circassian, Ubykh) or no (Abkhaz-Abaza) case marking of core grammatical relations;
(ii) many productive affixes with different degrees of "lexicality", most notably from the domain of spatial semantics, as well as vestiges of incorporation;
(iii) an intricate mixture of templatic and layered organisation;
(iv) a complex system of morphological expression of syntactic information.

4.1. Polypersonalism and "open head-marking"

Head-marking and polypersonalism can be illustrated by the following example showing as many as four person-number-gender prefixes indexing participants neither of which is expressed by an overt noun phrase:

(20) Abaza (texts)
š'ta ***j-ŝə-z-j-á-s-hʷ-p***˙
PTCL 3SG.N.ABS-2PL.IO-BEN-3SG.M.IO-DAT-1SG.ERG-say-NPST.DCL
'OK, I'll tell this to him (God) about you.'

Verbal forms indexing four participants like the one in (20) are infrequent but are attested in texts, being constructed by speakers when necessary. Tripersonal forms are fairly common, and in Circassian, verbal forms indexing five participants are reported in grammars (Kumakhov 2006: 200–202; Kumakhov & Vamling 2009: 38) and even attested in written texts (21).

(21) West Circassian (AdCorp)[5]
t-jə-wəram *asfal't*
1PL.PR-POSS-street asphalt
*∅-qə-**t**-fə-∅-tər-**a**-r-**jə**-ʁe-λha-ʁ*
3.ABS-CSL-1PL.IO-BEN-3.SG.IO-LOC:on-3PL.IO-DAT-3SG.ERG-CAUS-put-PST
'He made them put asphalt on our street for us.'

[5] The 3rd person absolutive and 3rd person singular indirect object prefixes in Circassian are zero. They won't be marked in the examples unless necessary.

Polypersonalism in NWC is facilitated by a rich system of valency-increasing derivations, in particular, by the numerous semantically specialized applicatives that introduce indirect objects expressing various peripheral participants (see Arkadiev et al. forthcoming and references therein), e.g. the benefactive *z-* in (20) and the benefactive *fə-* and the locative *tər-* in (21). This possibility to freely add peripheral participants to the verbal core by means of productive morphology was called "open head-marking" by Nichols (2017), and can be considered one of the hallmarks of "true" polysynthesis (Zúñiga 2019: 12). Applicatives in NWC are very numerous (from about twenty in Circassian to several dozens in Abaza and Abkhaz) and range semantically from underspecified, as e.g. the "dative" in (20) and (21), to highly specialised, as e.g. the comitative (22a) or the numerous locative applicatives (22b).

(22) Besleney Kabardian (texts)
a. *s-**a**-**də**-ɕe-ɕ'-a*
1SG.ABS-3PL.IO-COM-LOC:under-go_out-PST
'I went away with them.'

b. *š'abe* *q̇ə-**s**-**ɕ'**-jə-ʒ-t-jə*
soft CSL-1SG.IO-LOC:under-3SG.ERG-throw-IPF-ADD
'She would put something soft under me.'

NWC applicatives combine with intransitive and transitive verbs alike and introduce indirect objects. These are expressed by a special series of pronominal prefixes in dedicated slots in the prefixal chain and their presence normally does not affect the otherwise ergative expression of agents and patients, consider examples in (23).

(23) West Circassian (Letuchiy 2009: 331)
a. *txəλ-xe-r* *s-š'efə-ʁe-x*
book-PL-ABS 1SG.ERG-buy-PST-PL
'I bought books.'

b. ***ɕ'ale-xe-m*** *txəλ-xe-r* ***a-fe**-s-š'efə-ʁe-x*
boy-PL-OBL book-PL-ABS 3PL.IO-BEN-1SG.ERG-buy-PST-PL
'I bought books for the boys.'

Applicatives allow stacking, see (21) above and even limited recursion (24), testifying to a high degree of productivity and semantic transparency.

(24) West Circassian (Lander & Letuchiy 2010: 269)
*s-**a**-**fə**-∅-**f**-e-txe*
1SG.ABS-3PL.IO-BEN-3SG.IO-BEN-DYN-write
'I write to him for their benefit / to them for his benefit.'

On the other hand, many combinations of applicatives with verbal roots are lexicalised, as e.g. the comitative in (25), and some applicatives, particularly the "dative" one, express arguments required by the lexical root, as e.g. the addressee of 'say' in (20).

(25) Abaza (texts)
*ŝə-r-**c**-qraʕa-ra* *a-taqə-ṗ*
2PL.ABS-3PL.IO-COM-help-MSD 3SG.N.IO-need-NPST.DCL

'We have to help them.'

The extensive polypersonalism of NWC and the valency-increasing mechanisms of "open head-marking" behind it raise important questions about the cross-linguistic variation in argument structure and the argument-adjunct distinction.

4.2. Lexical affixes and traces of incorporation

NWC languages possess lexical affixes from most of the ontological domains described by Mattissen (2006), e.g. degree (26), situational modality (27), phasal (28), repetitive (29) and focus (30), as well as from domains not listed by Mattissen, e.g. subjective evaluation (31) and similitude (43) in section 4.3.

Abaza (texts)

(26) *j-s-gʷapχa-**ʒa**-wá-ta*
3SG.N.ABS-1SG.ERG-love-INT-IPF-ADV
'I liked it *very much*, and…'

(27) *j-g'-**zə́**-na-m-ʒa-ṭ*
3PL.ABS-NEG.EMP-POT-TRL-NEG-reach-DCL
'They *could* not reach it.'

(28) *j-gə́la-**rḳʷa**-ztən-g'əj …* *h-tʒə*
3SG.N.ABS-stand-CNT-COND-ADD 1PL.PR-house
'If our house *still* exists…'

(29) *awa-ʔa* *h-**ata**-də-r-ca-**χ**-wa-n*
DIST-LOC 1PL.ABS-REP-3PL.ERG-CAUS-go-RE-IPF-PST
'They used to make us go there *again*.'

(30) *awasa* *j-hʷa-**ʕʷaca*** *aẑa-zaʒə̂ḳ*
but 3SG.N.ABS-say-RSTR word-one
'But say *just* one word.' (published texts, Luke 7:7)

(31) West Circassian (Rogava & Kerasheva 1966: 306)
*ḳʷa-ʁe-**gʷəš'**-ep*
go-PST-DPR-NEG
'*Unfortunately*, he didn't go.'

In principle, chains of affixes are possible, as in (32), however, forms with more than one affix are only rarely attested in texts.

(32) Ubykh (Fenwick 2011: 127, transcription and glosses adapted)
*jə́-∅-s-tʷ-**aj-le-f**-ew-mə-t*
3SG.ABS-3SG.IO-1SG.ERG-give-RE-CMPL-POT-FUT-NEG-FUT
'I won't *be able* to give it *back* to him *completely*.'

The affixes just shown do not fit well into the traditional classification of morphological phenomena into derivation vs. inflection (Spencer 2013, Haspelmath to appear). On the one hand, they are derivation-like in being optional and expressing rather concrete semantic content; on the other, they resemble inflection by being (at least in principle) highly

productive, compositional and able to derive clearly ad-hoc forms. Their properties are thus close to De Reuse's (2009) PNC, even if their combinatorics is not as impressive as that found in Yupik.

The largest set of "lexical" affixes in NWC express spatial meanings. These include simplex and complex locative prefixes ("preverbs"), ranging in number from ca. 30 in Circassian to ca. 150 in Abkhaz and Abaza, as well as much less numerous directional suffixes. Importantly, all locative preverbs in Circassian and many in Ubykh, Abaza and Abkhaz are applicatives introducing the landmark as indirect object, as in (22b) in section 4.1 above; in many cases this is the only way to express the landmark. Locative preverbs are obligatory with some verbal roots denoting position and directed motion, the choice of the preverb depending on the spatial configuration and the type of the landmark (Paris 1995), cf. (33).

(33) Standard Kabardian (Kumakhov 1964: 165)
a. *tjepŝeč'ə-m* ***jə**-λə-n*
plate-OBL LOC:container-lie-MSD
'to be on a plate'

b. *škampə-m* ***de**-λə-n*
cupboard-OBL LOC:enclosure-lie-MSD
'to be in a cupboard'

c. *wəne-m* ***ŝe**-λə-n*
room-OBL LOC:under-lie-MSD
'to be in a room'

Directional suffixes express such meanings as 'inside', 'outside', 'around', 'up' and 'down'. They normally combine with locative preverbs introducing the landmark (34a); in some cases such combinations are fixed, the landmark being implicit (34b).

(34) Besleney Kabardian (texts)
a. *šə-m* ***tje**-d-ʁe-ṭəs-**ha**-ne*
horse-OBL LOC:on-1PL.ERG-CAUS-sit-LAT-FUT
'We shall make him sit on a horse.'

b. *pŝeχʷə-r* ***d**-a-hə-**je**-ž'-a*
chain-ABS LOC:enclosure-3PL.ERG-carry-VERT-RE-PST
'They carried the chain up.'

Some directional suffixes can occur as independent roots (taking the appropriate locative preverbs) with the same meaning, hence, their combinations with verbal roots can be considered verb-root serialisation (cf. the discussion of "incorporation" in Circassian by Kumakhov 1964: 139–146), see (35).

(35) Abaza
a. *ŝ-sə-d-**thawsəχ'a-l**-χ-əj-ṭ*
2PL.ABS-1SG.IO-LOC:close-complain-go_in -RE-PRS-DCL
'You come to me with complaints.' (Klychev 1972: 96)

b. *d-a-ḳʷə-z-**ga-ša**-ṭ*

3SG.H.ABS-3SG.N.IO-LOC-1SG.ERG-carry-go_around-DCL
'I carried it around.' (Klychev 1995: 138)

Diachronically, most locative preverbs in NWC stem from incorporated nouns, mainly denoting parts of the body or of other objects (Kumakhov 1964: 139–146, 164–182; Kumakhov 1989: 200–228; Klychev 1994; Avidzba 2017; Arkadiev & Maisak 2018: 121–127). In those cases when the preverb synchronically coexists with the noun, the former still shows some semantic link with the latter, even if the meaning of the preverb is more abstract (36).

(36) West Circassian (Kumakhov 1964: 177–179)
a. *ḳʷeçə* 'intestines': ***ḳʷeçə-****λhe-n* 'put *inside* sth'
ḳʷeçə-*rə-čə-n* 'run *through* sth'

b. *ʔʷə* 'mouth': ***ʔʷə-****cʷe-n* 'stand *near* sth'
ʔʷə-*š'ə-n* 'lead *away* from sth'

Some preverbs can even be viewed synchronically as incorporated nouns, given that they retain their lexical meaning and can host pronominal prefixes referring to the possessor. Such cases are marginal in Circassian, only involving a few body-part nouns (37), but are more widespread in Abaza and Abkhaz, where both body-part (38) and non-relational (39) nouns can incorporate. However, even in the latter languages this type of compounding is not productive, with only a limited number of nouns co-occurring with a limited number of verbs.

(37) Standard Kabardian (Kumakhov 1964: 181–182)
a. *ŝhe* 'head': ***ŝhe****-rə-xə-n* 'take from one's *head'*
b. *ʔe* 'hand': ***ʔe****-ṣe-xə-n* 'take from one's *hands'*

(38) Abaza (Klychev 1995: 154)
a-saba *ʕa-****rə-lakta****-ṗl-əw-n*
DEF-dust CSL-3PL.IO-face-pour.powder-IPF-PST
'Dust was pouring onto *their faces*.'

(39) Abkhaz (Avidzba 2017: 99)
a-raχʷ ***ʁə****-ça-h-ga-ra.wə-ṗ*
DEF-cattle winter-LOC:under-1PL.ERG-carry-DEB-NPST.DCL
'We have to keep the cattle during the winter.'

Thus, in terms of Mattissen's typology, NWC polysynthesis is transitional between "compounding" and "affixal", with both noun incorporation and verb-root serialisation being attested, but applying to closed classes of roots and tending to yield grammaticalised elements patterning with affixes. While many of the NWC "lexical" affixes have cognate roots and some of them even retain their original semantics, the majority of them are highly grammaticalised and fully integrated into the morphological system, pointing towards "older" polysynthesis in Fortescue's terms.

Simultaneously, NWC morphology shows clear signs of numerous layers of expansion and renewal of polysynthetic structures, including some clearly recent formations. The latter comprise, for instance, a number of TAM suffixes derived from former auxiliaries (see Arkadiev & Maisak 2018: 127–132 on Circassian), or a remarkable case of "dependent-head synthesis" (Mattissen 2003) in Abaza exemplified above in (18). These forms involve the verb *ʒə-š'a* 'seem, think' compounded with the head of its sentential complement, the two

verbal stems being furnished each with their own indexing prefixes and temporal/aspectual suffixes and admitting separate modification by temporal adverbials (40).

(40) Abaza (Panova 2020a: 98)
sara ***jacə*** [*wara* ***waχ'ĉa*** *χabez*
1SG yesterday 2SG.M today Khabez
*wə-c-**əw-š***]-*ʒə-s-š'-**əw-n***
2SG.M.ABS-go-IPF-FUT-LOC-1SG.IO-seem-IPF-PST
'Yesterday I thought you would go to Khabez today.'

At the same time, as shown by Panova (2020a,b), such forms behave as coherent words, as evidenced by their inseparability and unpermutability as well as by the bipartite negation marker, whose prefixal part occurs to the left of the dependent verbal stem even when the main verb is negated (41).

(41) Abaza (Panova 2020b: 291)
*d-**g'**-ʕa-j-ʒə-s-š'-əw-**m***
3SG.H.ABS-NEG.EMP-CSL-go-PVB-1SG.IO-seem-IPF-NEG
'I don't think he came.'

These patterns of "morphologically bound complementation" (Maisak 2016: 837) or "multiclausal polysynthesis" (Zúñiga 2019: 5–6) clearly go against Fortescue's (2017: 119–121) conjecture that the complexity of a polysynthetic predicate is always limited by the so-called "macro-event property" (Bohnemeyer et al. 2011). However, the formal and semantic transparency of these constructions as well as their absence in Abkhaz suggest their fairly recent origin; one might hypothesise that diachronic development of such verbal compounds should lead to tighter semantic integration.

4.3. Morphological organisation

NWC languages present an intricate and complex interplay of templatic and scope-ordered principles in their morphological make-up (Korotkova & Lander 2010, Arkadiev & Letuchiy 2011, Lander 2016 on West Circassian, Panova 2018 on Abaza). Table 3 schematically presents the general verbal structure distilled from much more detailed and expanded templates of each particular language.

Table 3: The general structure of the NWC verb (Arkadiev & Lander 2020: 404)

prefixes						root	suffixes			
argument structure zone				pre-stem elements	stem				endings	
absolutive	subordinators	applicatives and indirect objects	ergative	preradical negation	causative	root	aspectual, modal and evaluative operators	temporal operators	suffixal negation	illocutionary operators or subordinators
1	1	>1	1	1	1 or 2	may be complex	>1	>1	1	>1

The verbal complex is divided into several zones each of which includes a number of slots and follows its own organising principles. The distinction between the zones of "stem" and "endings" is most robust in Circassian, where it manifests itself in stress assignment and

application of certain morphophonological processes. The ordering of suffixes is largely scope-driven, so that actional and evaluative modifiers normally precede markers of TAM, which are followed by clause-typing markers (42). Reordering of suffixes is also attested, although it is fairly limited (43).

(42) West Circassian (Korotkova & Lander 2010: 307)
*w-je-bewə-**žʼə-ŝʷə-šʼt-a**?*
2SG.ABS-DAT-kiss-RE-POT-FUT-Q
‘Will you be able to kiss her again?’ (question > future > possibility > again)

(43) West Circassian (Lander 2016: 3523)
a. *gʷəŝʷe-**ŝʷe-žʼə-**ʁ*
be.happy-SML-RE-PST
‘s/he pretended again that s/he was happy’ (again > pretend)

b. *gʷəŝʷe-**žʼə-ŝʷa-**ʁ*
be.happy-RE-SML-PST
‘s/he pretended that s/he was happy again’ (pretend > again)

The ordering of prefixes is more intricate. On the one hand, some slots, e.g. those where the absolutive and ergative arguments are indexed, as well as the causative and the preradical negation, are fixed. On the other hand, the “intermediate” prefixes are at least partly scope-ordered (subordinators > prefixal potential > compositional applicatives > lexicalised applicatives) (44). Semantically-driven reordering of prefixes, however, is very rare.

(44) Abaza (elicited)
*d-**šə-z**-wə-**c-nə**-m-χ-əw-š* *l-hʷa-ṭ*
3SG.H.ABS-SBD-POT-2SG.M.IO-COM-PVB-NEG-work-IPF-FUT 3SG.F.ERG-say-DCL
‘She said that she won’t be able to work with you.’

At the same time, there are clear cases of counter-scopal ordering of prefixes, so that e.g. the preradical negation and the causative, which occur closest to the root, often take scope over the prefixes located farther from it (45); the Circassian cislocative prefix, despite being often lexicalised, always occurs in the position to the left of subordinators scoping above it (46).

(45) Abaza (texts)
*a-wandər h-a-**kʷ**-də-**r**-ĉa-ṭ*
DEF-cart 1PL.ABS-3SG.N.IO-LOC:top-3PL.ERG-CAUS-sit-DCL
‘They put us in the cart (lit. made us sit on it).’ (causative > locative)

(46) Besleney Kabardian (texts)
***q̇ə-šʼə-**ḳʷe-m*
CSL-TEMP-go-OBL
‘when he came to her’ (when > cislocative)

Dependencies between non-adjacent slots, characteristic of templatic morphology (Stump 2006), are also attested, see e.g. Arkadiev & Letuchiy (2011) on prefix-suffix interaction in West Circassian. Thus, in Abkhaz and Abaza the choice of the past tense suffix on the right edge of the word is sensitive to the choice of the personal vs. relative absolutive prefix in the leftmost position (47), while in Ubykh the number of the absolutive argument influences the

shape of affixes in several non-adjacent positions and governs suppletion of certain roots (48) (a case of multiple exponence), see Smeets (1997).

(47) Abkhaz (Chirikba 2003: 44)

a. ***də****-r-ga-wá-****n***
3SG.H.ABS-3PL.ERG-carry-IPF-PST.DCL
'they were taking him/her'

b. ***jə́****-r-ga-wa-****z***
REL.ABS-3PL.ERG-carry-IPF-PST.NFIN
'whom they were taking'

(48) Ubykh (Dumézil & Esenç 1975: 173, transcription adapted, glosses added)

a. ***sə****-w-****də****-q̇ʷe.****tʷ****-q̇e***
1SG.ABS-2SG.ERG-CAUS.SG-stop.SG-PST
'You (sg) made me stop.'

b. ***šʼə****-w-****ʁe****-q̇ʷe.****χe****-q̇e-****n***
1PL.ABS-2SG.ERG-CAUS.PL-stop.PL-PST-PL
'You (sg) made us stop.'

Finally, the position of some affixes is simply variable without any discernible difference in meaning, cf. the "floating" 3PL indirect object prefix in Circassian (49).

(49) Besleney Kabardian (elicited)

a. *sə-q̇-****a****-de-ḳʷ-a*
1SG.ABS-CSL-3PL.IO-COM-go-PST

b. *s-****a****-q̇ə-de-ḳʷ-a*
1SG.ABS-3PL.IO-CSL-COM-go-PST

a=b 'I came with them.'

Thus, the morphological organisation of NWC verbs is not uniform and defies any straightforward analysis aiming to reduce affix combinatorics and ordering either to semantic scope or to a rigid template. This complexity and heterogeneity obviously reflects a long and non-trivial historical development.

4.4. Morphology-syntax interface

One of the most remarkable aspects of the NWC polysynthetic morphology is the fact that a large part of it serves the purposes of syntax. Head-marking, applicatives and other valency-changing mechanisms are deployed for the expression of core and peripheral participants of the clause; the nominal complex briefly mentioned above is the main means of encoding head-modifier relations in the nominal domain. There are numerous other constructions where morphology plays a crucial role, e.g. reflexives and reciprocals. Not only are binding relations between co-arguments normally expressed within the verb in NWC, as in many languages of the world, but the way they are encoded is significant, see (50)–(51).

(50) West Circassian (Letuchiy 2012: 342)

a. ***wə****-sə-wəpsə-****ʁ***
2SG.ABS-1SG.ERG-shave-PST
'I shaved you.'

b. ***zə***-*sə*-*wəpsə*-*ʁ*
RFL.ABS-1SG.ERG-shave-PST
'I shaved (myself).'

(51) West Circassian
a. *sə*-***ŝʷə***-*š'*-*e*-*gʷəʁə*
1SG.ABS-2PL.IO-LOC-DYN-rely
'I rely on you (pl).' (adapted from AdCorp)

b. *tə*-***ze***-*š'*-*e*-*gʷəʁə*-*ž'ə*-*x*
1PL.ABS-REC.IO-LOC-DYN-rely-RE-PL
'We rely on each other.' (Letuchiy 2007: 788)

As is clear from these examples, in Circassian the reflexive and reciprocal markers occupy the same slots as the corresponding personal prefixes (Letuchiy 2007) and do not reduce the verbs' valency (Lander & Letuchiy 2017). They can be considered morphologically bound reflexive and reciprocal pronouns subject to syntactic binding (Ershova 2019), just like personal prefixes are morphologically bound referential pronominals (Kibrik 2011: 92–97).

Another domain where morphology is employed for the purposes of syntax in NWC is clause combining. These languages possess elaborated systems of morphological encoding of inter-clausal relations including nominalisations, converbs, and relativisation. The latter is the least trivial and has received considerable attention in the literature, see e.g. Hewitt (1979a, 1979b), O'Herin (2002), Caponigro & Polinsky (2011), Lander (2012), Ershova (2021). The morphological expression of relativisation is illustrated in (52).

(52) Abaza (elicited)
a. *a*-*phʷáspa* *ĉa* *lə́*-*s*-*t*-*ṭ*
DEF-girl apple [3SG.N.ABS]3SG.F.IO-1SG.ERG-give-DCL
'I gave an apple to the girl.'

b. [*a*-*phʷáspa* ***j***-*lə́*-*s*-*tə*-*z*] ***a*-*ĉá***
DEF-girl REL.ABS-3SG.F.IO-1SG.ERG-give-PST.NFIN DEF-apple
'the apple that I gave to the girl'

c. [*a*-*ĉá* ***zə́***-*s*-*tə*-*z*] ***a*-*phʷə́spa***
DEF-apple REL.IO-1SG.ERG-give-PST.NFIN DEF-girl
'the girl whom I gave the apple'

d. [*a*-*phʷáspa* *ĉa* *lə́*-***z***-*tə*-*z*] ***á*-*č'ḳʷən***
DEF-girl apple 3SG.F.IO-REL.ERG-give-PST.NFIN DEF-boy
'the boy who gave an apple to the girl'

Again, like reflexivity and reciprocity, relativisation is expressed by a special series of prefixes occupying the same positions as the corresponding personal markers. This suggests that NWC relative verbal forms are not "participles", as traditional grammars sometimes dub them (cf. Shagal 2019: 28), but rather involve morphologically bound resumptive pronouns (Lander & Daniel 2019).

Relativisation in NWC is employed not only for encoding clausal modifiers of nouns, but for other functions as well, see Caponigro & Polinsky (2011), Lander (2012). Headless relative clauses can be used for reference (53), in pseudo-clefts marking focus (Sumbatova 2009) (54), for adverbial subordination (55) and sentential complementation (56); in the latter two functions special relativisation markers are employed.

(53) West Circassian (published texts)
*zə-**z**-ʁe-bələ-ž'ə-ʁe-m* *λəχ^{w}ə-ʁ-ep*
RFL.ABS-REL.ERG-CAUS-hide-RE-PST-OBL search-PST-NEG
'He did not look for the one who hid.'

(54) Besleney Kabardian (texts)
[*jə-pe* *nahə-b-əw* *wə-**z**-ʁe-g^{w}əmeč'ə-r*] *bze-ra*
POSS-before more-much-ADV 2SG.ABS-REL.ERG-CAUS-worry-ABS language-PRED
'What worries you most of all is the language.'

(55) Abaza (texts)
[*ápχ'arta* *s-**an**-ʕá-lga*] *a-institút* *s-cá-ṭ*
DEF+school 1SG.ABS-REL.TEMP-CSL-finish DEF-college 1SG.ABS-go-DCL
'When I finished school I went to college.'

(56) Besleney Kabardian (texts)
[*mew-bə-m* *ʎəʁe* ***zerə**-xe-mə-λ-r-jə*] *qə-g^{w}ərəʔ^{w}-a*
DIST-OBL-OBL courage REL.FACT-LOC.mass-NEG-lie-ABS-ADD CSL-understand-PST
'She realised that he didn't have courage.'

The most peculiar development of relative verbal forms is attested in Abaza and Abkhaz, where they serve as bases for finite forms expressing matrix content questions (Arkadiev 2020, Arkadiev & Caponigro 2021). In these forms, the relative prefix indicates the role of the question variable while dedicated interrogative markers encode its ontological class (human vs. non-human argument vs. adjunct), see (57).

(57) Abaza
a. ***j**-wə́-c-k^{w}a-z-**da*** *l-h^{w}a-n*
REL.ABS-2SG.M.IO-be.with-PL-PST.NFIN-Q.H 3SG.F.ERG-say-PST.DCL
'Who were with you? she asked.' (texts)

b. *wə-**z**-pš-wá-**ja**?*
2SG.M.ABS-REL.IO-look-IPF-Q.N
'What are you looking at?' (elicited)

c. *arə́j* *áχč'a* ***n-bá**-ʕa-z-ʁəč'*
PROX DEF+money REL.TEMP-Q.ADV-CSL-1SG.ERG-steal
'When did I steal this money?' (texts)

Such forms, probably going back to univerbation of pseudocleft constructions (Arkadiev 2020: 245–247), testify to the intricate ways syntactic patterns can feed morphological structures in polysynthesis, leading to morphology "usurping" the functions most languages express syntactically.

5. Conclusions and prospects

As the exposition above has shown, the Northwest Caucasian languages adhere to the cross-linguistic "prototype" of polysynthesis, but show a number of specific features. These include extraordinary polypersonalism and "open head-marking" enhanced by a rich system of applicatives and highly developed syntactic functions of morphology, including a cross-linguistically rare pattern of relativisation forming one of the core mechanisms of NWC grammar. In terms of Mattissen's typology (and contrary to her own characterisation of Abkhaz, e.g. Mattissen 2004: 206), NWC languages belong to the "transitional" type showing vestiges of different types and diachronic layers of incorporation feeding the system of lexical affixes, as well as a complex mixture of scope-ordered and templatic organisation.

An important implication from the Northwest Caucasian material is that polysynthesis represents a specific way of drawing boundaries between morphology and syntax. As we have seen, in NWC verbal (as well as nominal) morphology is employed to express and manage syntactic relations both intra- and inter-clausally to a remarkable extent, with processes of affixation and compounding fulfilling such functions as adnominal modification, encoding of core and peripheral participants, coreference relations, relativisation, and, through the latter, marking of focus and questions. In turn, the productive subsystems of polysynthetic morphology can display syntax-like properties like additivity, compositionality and recursion, rendering the boundary between "inflection" and "derivation" blurred or even altogether irrelevant.

To conclude, polysynthesis is a composite notion not reducible to a single feature such as high syntagmatic complexity of morphology, head-marking or incorporation, and languages traditionally described as polysynthetic considerably vary on such parameters as availability and types of compounding, semantic types of affixation, morphological makeup and many others. Moreover, some polysynthetic traits are found in non-polysynthetic languages as well, suggesting that the boundaries of polysynthesis are fuzzy rather than sharp. Neither internal diversity nor permeability of the class of polysynthetic languages should, however, be considered as an embarrassment, rather, they are a logical necessity, since polysynthetic properties emerge from various sources and gradually accumulate over time. Whether the notion "polysynthesis" itself is useful for morphological typology remains a matter of perspective. It has certainly been helpful in allowing linguists to map the blank spots of linguistic diversity, discover typologically rare and exceptional structures and free themselves of the Eurocentric preconceptions about the divisions between lexicon and grammar and between morphology and syntax. However, to facilitate further progress, the notion surely has to be made more precise by carefully disentangling its various components and exploring their distribution and mutual correlations, also in languages that we are not used to treat as "polysynthetic".

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