

Studies in Generative Grammar 104

Editors

Harry van der Hulst

Jan Koster

Henk van Riemsdijk

De Gruyter Mouton

Recursion and Human Language

Edited by

Harry van der Hulst

De Gruyter Mouton

The series Studies in Generative Grammar was formerly published by
Foris Publications Holland.

ISBN 978-3-11-021924-1

e-ISBN 978-3-11-021925-8

ISSN 0167-4331

Library of Congress Cataloging-in-Publication Data

Recursion and human language / edited by Harry van der Hulst.
p. cm. – (Studies in generative grammar ; 104)

Based on presentations at a 2007 conference.

Includes bibliographical references and index.

ISBN 978-3-11-021924-1 (hardcover : alk. paper)

1. Grammar, Comparative and general – Syntax – Congresses.
2. Grammar, Comparative and general – Phonology – Congresses.

P291.R38 2010

415–dc22

2010003502

Bibliographic information published by the Deutsche Nationalbibliothek

The Deutsche Nationalbibliothek lists this publication in the Deutsche
Nationalbibliografie; detailed bibliographic data are available in the Internet
at <http://dnb.d-nb.de>.

© 2010 Walter de Gruyter GmbH & Co. KG, Berlin/New York

Typesetting: RoyalStandard, Hong Kong

Printing: Hubert & Co. GmbH & Co. KG, Göttingen

∞ Printed on acid-free paper

Printed in Germany

www.degruyter.com

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15. Kinds of recursion in Adyghe morphology

Yury A. Lander and Alexander B. Letuchiy

1. Introduction¹

Since the early years of generative grammar, the concept of recursion in linguistics has been primarily associated with syntax (see, e.g., Tomalin 2007). Yet, if by recursion we understand application of a derivation to material containing the result of the same derivation, any language level employing derivations can theoretically show recursion. Therefore a generalization stating that recursion is mainly a syntactic property should be pretty non-trivial.

One problem with such a generalization relates to polysynthetic languages, where morphology takes much work that is done by syntax in other languages. Perhaps because of this, polysynthetic morphology may manifest characteristics which are usually ascribed to syntax, at times including recursion. This is shown in the following example from Central Siberian Yupik, where we find two occurrences of the so-called post-base suffix ‘ask to’, which presumably constitute two different layers of derivation:²

-
1. Most data presented here were collected in 2003–2006 in the village of Hakurinoahl (Republic of Adyghe, Russian Federation) within a project supported by the RGNF grants No. 03–04–18010e, 04–04–18008e, 06–04–00194a. The material presented in Section 3 relies partly on the work of Natalia Korotkova and Anna Kursakova. We are grateful to our language consultants for their help, especially to Zarema Meretukova for her contribution at the last stage of the preparation of a manuscript. Thanks also to other participants of the project for discussions and to George Hewitt and two anonymous reviewers for useful comments. All errors are ours.
 2. Abbreviations used in glosses: A agent, ABS absolutive, AUX auxiliary morpheme, BEN benefactive, CAUS causative, COM comitative, COND conditional, DIR directive, DYN dynamic affix, EMP emphatic, FCL facilitive, FUT future, HBL habitive, INADV inadvertitive, INDIC indicative, INSTR instrumental, IO indirect object, LNK linker, LOC locative, NEG negation, OBL oblique case, OPV general oblique preverb, PL plural, POSS possessive, POT potential, PR possessor, PRED predicative, PST past, PTCL particle, RE reversive/refactive, REC reciprocal, SG singular, SML simulative, TMP temporal, TRM terminative. Numbers denote persons.

- (1) *iitghesqesaghiisqaa*
 itegh-sqe-yaghtugh-sqe-aa
 come.in-ask.to-go.to-ask.to-INDIC.3SG
 'He_i asked him_j to go ask him_k to come in.' (de Reuse 2006: 745)

In this paper we argue, however, that even in such languages recursion may be allowed to different extents in different parts of the word and be highly constrained exactly in contexts that are considered prototypical for recursion. Hence this property is indeed not as natural for morphology as for syntax.

Our arguments are based on the material of (Temirgoi) Adyghe, a highly polysynthetic language of the Northwest Caucasian family comprising, besides Adyghe, Kabardian, Abkhaz, Abaza and the now extinct Ubykh language. Figure 1 represents the general make-up of the Adyghe verb.³

Argument structure zone	Pre-stem elements	Causative marker(s)	Root (plus word-formation)	Propositional operators	Endings
		Stem			

Figure 1. Make-up of the Adyghe verb

The Adyghe verb consists of several zones, which are separated on the basis of functional and morphophonemic criteria which we cannot discuss in detail.⁴ The argument structure zone includes predominately cross-reference prefixes (as well as reflexive, reciprocal and relative prefixes, which have the same distribution) and markers providing information about the roles of participants of the situation. The pre-stem zone and the zone of endings mainly contain affixes that are responsible for the syntactic distribution of the form. The stem maximally consists of the prefixal causative marker(s), the root (sometimes together with undeniably word-formative affixes) and the zone of propositional operators which includes, in particular, suffixes referring to the tense, aspect and modality. Consider the following example:

-
3. For the sake of simplicity, we disregard complex multi-stem forms, which comprise reduplicatives and certain tense forms discussed in Korotkova and Lander (Forthcoming).
 4. For the relevant morphophonemic criteria see Smeets 1984; Arkadiev and Testelets (Forthcoming), and Korotkova and Lander (Forthcoming).

- (2) *a-r* *Ø-je-mə-š^wa-β-ew* *Ø-š'ə-tə-β-ep*
 that-ABS 3SG.IO-OPV-NEG-drink-PST-PRED 3SG.IO-LOC-stand-PST-NEG
 'He was not sober.' (Literally: 'He did not stand not being drunk.')

The dependent verb form *je-mə-š^wa-β-ew* 'not being drunk' in (2) can illustrate most zones postulated above. The argument structure zone of the form includes the 3rd singular indirect object prefix (cross-referencing the undergoer of the formally intransitive bivalent root 'drink') introduced by the so-called general oblique preverb. Pre-stem elements are represented by the narrow scope negative prefix *mə-*. The root *š^wa* 'drink' is followed by the zone of propositional operators, which manifests itself with the past suffix. The last morpheme *-ew*, which marks the form as dependent, belongs to the class of endings.

Pre-stem elements and endings do not display recursion, but the argument structure zone and the stem do. These are considered in sections 2–4: in Section 2 we discuss recursion in the argument structure zone, in Section 3 recursion in the suffixal zone is analyzed, and in Section 4 we consider multiple causatives. Section 5 discusses data given in previous sections. Section 6 presents conclusions.

2. Recursion in the argument structure zone: applicatives

The initial part of the Adyghe verb contains prefixes cross-referencing arguments, applicative markers and a directive prefix; cf. Figure 2.⁵

The first slot is designed for prefixes cross-referencing absolutive arguments, i.e. intransitive subjects and undergoers of transitive verbs (note

Absolutive argument	Directive	Temporal argument	Adjuncts: applicatives	Agent argument
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Figure 2. The argument structure zone

5. The arrangement shown in Figure 2 can be violated where the directive prefix is expected to precede the 3rd person plural applicative object prefix. In this case, the cross-reference prefix at surface may precede the directive marker rather than follow it (Smeets 1984: 182). We assume that this is a surface phenomenon which is not related to the overall structural organization of the zone.

that Adyghe also has multivalent intransitive verbs whose undergoers are marked as indirect objects). This slot remains empty when the absolutive phrase is of the 3rd person. The directive prefix occupying the second slot has the meaning ‘hither’ with verbs of motion but also appears as an inverse marker with non-motion verbs. The third slot (“temporal argument”) is only observed in some temporal clauses and is not relevant for us. Next come applicatives expressing such relations as location, comitative, benefactive etc. Each applicative consists of a preverb indicating the role added to the argument structure, preceded by a person prefix filling this role. The last slot within the argument zone is reserved for the agent prefix, which appears in transitive verbs. The following example (artificial but accepted by consultants) demonstrates most parts of this zone, except for the temporal argument:

- (3) *sə-qə-t-de-p-fə-Ø-r-a-ka-že-š' tə-β*
 1SG.ABS-DIR-1PL.IO-COM-2SG.IO-BEN-3SG.IO-OPV-3PL.A-CAUS-read-
 AUX-PST
 ‘They were making me read it to you together with us.’

Here we find the 1st person singular absolutive prefix, the directive prefix, three applicatives *t-de-* ‘with us’, *p-fə-* ‘for you’ and *Ø-r-* (the last introduces the undergoer of the caused situation treated in this case as indirect object), and the 3rd person plural prefix cross-referencing the agent/causer.

Most parts of this zone do not allow for recursion. However, applicatives constitute an exception to this. Note that Adyghe applicatives add indirect objects rather than direct objects (as is common for applicatives cross-linguistically; see Baker 1988; Peterson 2007) and hence do not affect the already established part of the argument structure. As (3) demonstrates, this makes it possible for a single verb to contain several applicatives, which form an applicative chain. The same is shown by the two alternative verb forms in (4):

- (4) *ježape-m rwəslan mefeč'ə-šx^we*
 school-OBL Ruslan festival-big
Ø-fə-Ø-š'-a-š'ə-β /
 3SG.IO-BEN-3SG.IO-LOC-3PL.A-make-PST
Ø-š'ə-Ø-f-a-š'ə-β
 3SG.IO-LOC-3SG.IO-BEN-3PL.A-make-PST
 ‘They made a big festival for Ruslan.’

The predicate in (4) contains two applicatives, namely the applicative introducing the beneficiary (Ruslan) and the applicative introducing the location (the school). As the example makes clear, the order of applicatives is not fixed (cf. Jakovlev and Ašxamaf 1941: 356–357).

The co-presence of several applicatives suggests recursion. In order to prove its presence, we should show that different applicatives represent the same kind of derivation and their chain is organized by layers.

At first glance, all applicatives look alike: they are constructed in the same way and have the same morphosyntactic impact, namely the introduction of a new argument (albeit some applicative – root combinations became fixed). Still, they do not form a formally homogenous class. Thus, applicatives formed by the general oblique preverb, whose basic form is *je-*, must be distinguished from other applicatives (concrete applicatives, henceforth) on the basis of the fact that general oblique applicatives never swap places with concrete applicatives, with a few well-defined exceptions, must occur at the very end of that part of the argument structure zone that is reserved for applicatives and in some morphophonemic contexts even can omit the applicative marker;⁶ cf. (5a) and (5b):

- (5) a. *qə-Ø-š'ə-s-a-tə-ɤ*
 DIR-3SG.IO-LOC-1SG.IO+OPV-3PL.A-give-PST
- b. **qə-s-e-Ø-š'-a-tə-ɤ*
 DIR-1SG.IO-OPV-3SG.IO-LOC-3PL.A-give-PST
 'They gave it to me there.'

In (5a) we find a general oblique applicative 'to me' that is placed immediately before the agent prefix and follows a concrete applicative. Note that in this example the oblique preverb (which is normally represented by a vowel after the 1st and 2nd person prefixes), is reduced. In (5b), on the other hand, the general oblique applicative precedes the concrete applicative, and this makes this form infelicitous.

Importantly, the contrast between general oblique and concrete applicatives also has a functional motivation. The general oblique preverb

6. In fact, there is no agreement in the literature on whether the general oblique morpheme should be regarded as applicative. Jakovlev and Ašxamaf (1941), Kumakhov (1964) and Smeets (1984) state that indirect objects proper are expressed by single morphemes. However, Rogava and Keraševa (1966) postulate the oblique preverb, and so do we. Some morphophonemic arguments for the latter view can be found in Arkadiev and Testelet's (Forthcoming).

introduces arguments that are closely related to the semantics of the stem.⁷ The roles of such arguments are often implied by the specific components within the semantics of the stem (as, for example, the recipient role is implied by the semantics of the verbs of giving), and this is probably the reason why the applicative prefix occasionally can be omitted in this case. Concrete applicatives, on the other hand, are functionally equivalent to adjunct postpositional phrases,⁸ they are formally optional and do not affect the core argument structure, nor are the arguments introduced with concrete applicatives implied by the specific semantics of the stem.

Despite these differences, if we look at general oblique applicative chains and concrete applicative chains in isolation, we find good evidence that both of them instantiate recursion, i.e. their chains have layered organization.⁹ We will assume below that this can be shown by demonstrating that some applicatives can be sensitive to others.

Thus, for multiple general oblique applicatives, it can be shown that their order is not accidental. This becomes most clear when we consider causative verbs formed from transitive stems: as we will see in more detail in Section 4, in this case, the causee is expressed by an indirect object introduced by a general oblique preverb. If a verb already contains a general oblique applicative, its causative derivative contains two general applicatives. As (6) demonstrates, the order of general oblique applicatives is relevant for interpretation, hence they are unlikely to have a flat structure:¹⁰

-
7. Following Lehmann and Verhoeven 2006, this kind of applicative can be characterized as extraversive, i.e., that type of applicative that introduces a semantically obligatory participant (or a participant closely related to the semantics of the stem), for instance, an undergoer or a recipient in situations like 'give'.
 8. In a detailed description of a similar system in Abaza, O'Herin (2001) suggested to treat such applicatives as incorporated postpositional phrases. For Kabardian, Colarusso (2006: 27) explicitly names applicatives adjuncts.
 9. An alternative to this could be a template organization of applicatives such as that proposed by Kumakhov (1964: 152–154), but it does not accord with the facts of rearrangement in (4). Below, we attempt to argue against any model of this zone that presumes the flat structure of applicative chains.
 10. To be sure, one can postulate that causative verbs derived from 3-place predicates with general oblique objects have a special template. In this case, however, a generalization will be missed that causatives add an indirect object causee after all indirect objects for any transitive stems, independently of their valence.

- (6) *Ø-je-š^w-e-z-ke-tə-š't*
 3SG.IO-OPV-2PL.IO-OPV-1SG.A-CAUS-give-FUT
 'I will make you (plural) give it to him';
 *'I will make him give it to you.'

We propose, then, that general oblique applicative chains represent recursion. Nonetheless, it is worth noting that this recursion is somewhat restricted by the fact that any new general oblique applicative must be in a sense "licensed" by the stem, and in fact even in theory no more than three general oblique applicatives can appear in a single form.

For concrete applicatives we have not found any well-established rule governing their order.¹¹ Still, there is a preferred order of applicatives (e.g., locative applicatives tend to precede comitative and benefactive applicatives). Since no template can be proposed for this part of the verb, this suggests that applicatives are sensitive to the presence of other applicatives, and so the structure of the applicative chain is not flat either.

Now, we find two curious constraints on multiple concrete applicatives in Adyghe. First, there is a constraint which prohibits two applicatives introducing the same role. Consider (7), with two identical preverbs:

- (7) *s-a-fə-Ø-f-e-txe*
 1SG.ABS-3PL.IO-BEN-3SG.IO-BEN-DYN-write
 'I write to him for their benefit.' / 'I write to them for his benefit.'

In (7), one of the preverbs conveys the benefactive meaning proper, whereas the other marks the addressee: despite the identity of complexes, they introduce different roles, so the readings like 'I write for him for their benefit' are excluded.¹² It is worth emphasizing that at least for some speakers the order of applicatives is not restricted by their semantics, which suggests that no fixed positions can be provided for one or another semantic role.

11. Significantly, we have not found any strict dependencies between the arrangement of applicatives and their semantic contribution. In particular, we are not aware of any correlation between the order of concrete applicatives and the distinction discussed in detail by Pykkänen 2008, whence applicatives are divided into high applicatives whose function is only to "add another participant to the event described by the verb" (p. 19) and low applicative, which bear a transfer of possession relation to the object.

12. See Letuchiy (Forthcoming a) for the discussion of various functions of the benefactive applicative.

Second, applicative chains are occasionally blocked when “new” arguments are coreferential. For example, agents are sometimes “demoted” and introduced via applicatives.¹³ This phenomenon is observed, for example, in the case of the inadvertitive meaning ‘accidentally’ (8) and, remarkably, in the case of some reciprocals which are constructed via demotion of the agent and its subsequent reciprocalization (9):¹⁴

(8) *s-ʔeč'e-wəʔa-ɤ*
 1SG.IO-INADV-wound-PST
 ‘I accidentally wounded him.’

(9) *tə-ze-re-wəʔa-ɤ*
 1PL.ABS-REC.IO-INSTR-wound-PST
 ‘We wounded each other.’

Importantly, a verb cannot contain several demoting applicatives. If such a reading is required, a single prefix referring to the argument can be introduced by a sequence of preverbs. Thus, in (10) the reciprocal prefix is followed by a sequence of the inadvertitive and instrumental preverbs:

(10) *tə-ze-ʔeč'e-re-wəʔa-ɤ-x*
 1PL.ABS-REC.IO-INADV-INSTR-wound-PST-PL
 ‘We wounded each other accidentally.’

In fact, it seems to us that both rules, namely the constraint prohibiting two applicatives and the constraint which can block several applicatives introducing coreferential arguments, can be stated without any reference to the structure. In particular, we hypothesize that the phenomena just discussed manifest the principle which prohibits multiple parallel expressions of the same semantic role.¹⁵ Thus, (7) cannot contain two applicatives

13. The treatment of these constructions as an instance of agent demotion is not widespread. Yet, for some parallel constructions in Abkhaz a similar treatment is presented in Hewitt 1979: 236.

14. Adyghe reciprocal constructions are described in Letuchiy 2007, but the present interpretation deviates from that presented in that paper in many respects. In particular, for the reasons that will become clear immediately below, we gave up the traditional analysis of the relevant reciprocal constructions, which postulates a single reciprocal prefix *zere-* (see Rogava and Keraševa 1966; Hewitt 1979: 229, 235 *inter alia*).

15. By *parallel expressions* we mean expressions that do not reflect any differences in either the semantic structure or the information structure.

introducing the role of beneficiary because their appearance would lead to multiple parallel beneficiaries. Similarly, the introduction of the demoted agent in different applicatives would violate this principle if these applicatives are meant to interpret a role rather than to establish it, as they apparently are in (8) and (9).

Notably, examples like (10) also pose the question of how such sequences of preverbs are organized. In fact, in Adyghe we find instances of complex applicatives that are definitely organized hierarchically. Thus, consider (11) where the instrumental preverb (here, with the meaning ‘through’) follows the locative preverb ‘inside’:

- (11) *məzə-m* *Ø-k^weçə-rə-č’ə-ke-x*
 forest-OBL 3SG.IO-LOC-INSTR-go-PST-PL
 ‘They went through the inner part of the forest.’
 (Rogava and Kerasheva 1966: 133)

Here the locative preverb together with the (null) cross-reference prefix refers to the reference point (‘inside it’) with respect to which the instrumental preverb is interpreted (‘through [inside it]’). This clearly points to a hierarchical structure (and effectively, another kind of recursion). We are not ready to claim that this kind of structure applies to all complex applicatives, however.¹⁶

To conclude this section, we have tried to argue that multiple applicatives represent recursion. Furthermore, we have demonstrated that for concrete applicatives this recursion does not display any restrictions with the exception of very general ones, which presumably are not related to the structure of the verb.

3. Recursion in the suffixal zone

To the right of the root, we observe various suffixes which modify the core proposition. Some suffixes are shown in the following example:

- (12) *a-š’* *Ø-jə-wəne* *ə-šə-ž’ə-š^wə-κ*
 that-OBL 3SG.PR-POSS-house 3SG.A-make-RE-HBL-PST
 ‘S/he was able to repair his/her house.’
 (Literally: ‘S/he was able to make his/her house back.’)

16. Spruit (1986: 22) notes that in the parallel complex locative applicatives in Abkhaz the second part can always function as a simple applicative marker. The same seems to hold for Adyghe.

The verb in (12) contains three suffixes, namely the reflexive/reversive marker $-ž'ə$ ('back'), the habitive marker $-š^wə$ ('is able to') and the past marker $-k(e)$.

While a few descriptions of the Adyghe morphology (e.g., Kumakhov 1964; Smeets 1984; Paris 1989) assumed that the arrangement of (classes of) suffixes is determined by a template, Korotkova and Lander (2007; Forthcoming) argue against this model. In particular, they suggest that suffixes function as semantic operators that take their base as an argument, hence the order of suffixes is determined by their scope. For example, the semantics of the verb form in (12) can be represented as in (13):

- (13) PST [HBL [RE [make]]] = 'There was a situation of [being capable of [back-[making]]].'

It is easy to see that the order of suffixes in (12) is the mirror-image of the order of the operators in (13).

The crucial argument of Korotkova and Lander is that the order of suffixes can vary together with their scope. This is demonstrated in (14), which contains the reflexive marker and the simulative suffix ('seem'):

- (14) a. $g^wəš^we-š^we-ž'ə-k$
 happy-SML-RE-PST
 'It seemed again that s/he was happy.'
- b. $g^wəš^we-ž'ə-š^wa-k$
 happy-RE-SML-PST
 'It seemed that s/he was again happy.'

In (14a) the simulative morpheme precedes the reflexive marker and hence appears to be within the scope of the latter: this form is felicitous, for example, for describing a situation where the subject feigned his/her happiness and this was not the first time. In the second example, with the opposite order of the same two morphemes, the reflexive operator is placed within the scope of the simulative operator: (14b) may apply, for example, to a situation where the subject feigned that s/he was happy again even if it was the first time s/he feigned it.

The dependence of the position of a suffix on its scope shows that this zone is organized by layers. There is no reason to claim that the simulative and reflexive operators function in different ways, as would be the case if they required formally different bases or constructed stems displaying different behaviour. Hence examples like (14) can be thought to instantiate recursion: an application of an operator to the base that is constructed by an operator of the same class.

An even clearer instance of recursion is observed for some suffixes that are presumed to express the tense category and have been claimed obligatorily to close the stem (see Smeets 1984; Paris 1989: 198). Consider (15) and (16):

- (15) *ade nebrər-jə-pš-me nah dekw-ew*
 PTCL person-LNK-ten-COND more good-PRED
š^wə-šxe-ka-ke-ba š^wə-š^we-ž'ə-ka-κ
 2PL.ABS-eat-PST-PST-EMP 2PL.ABS-drink-RE-PST-PST
 'If you were ten persons, you had eaten and drunk nicely,
 had you not?'
- (16) *tə-qə-ze-sə-m šəhafə-r*
 1PL.ABS-DIR-REL.TMP-reach-OBL subbotnik-ABS
Ø-fe-wəxə-ke-xa-κ
 3SG.IO-BEN-close-PST-TRM-PST
 'When we came, the subbotnik¹⁷ had already ended.'

The matrix verbs in these examples contain two past suffixes, a combination which is often treated as a complex pluperfect marker (see Rogava and Keraševa 1966; Smeets 1984: 280, Paris 1989: 189 among others). While such a representation might look adequate for (15), it does not hold for (16), where the two temporal suffixes are separated by a terminative suffix meaning 'already'. It can be argued, then, that multiple past suffixes represent different layers. Korotkova and Lander suggest that the real function of the so-called past suffix is to shift the temporal value of the situation described by its base back on the time axis. In (15) and (16) this shift occurs twice, in order to show the precedence of the event described by the verbal forms to some other event and/or yielding the effect of "discontinuous past" observed for such shifts in a number of languages (see Plungian and van der Auwera 2006). Consequently, this construction involves recursion both semantically (the shift applies to the temporal reference which resulted from another temporal shift) and morphologically (the successive appearance of two past markers).

The past suffix obviously can be considered an operator akin to the simulative and refractive markers. Hence we might expect that it could have narrow scope with respect to them just like they have narrow scope with respect to it in (14). This expectation is only partly borne out,

17. *Subbotnik* is a term for free weekend work occasionally organized since Soviet times.

though. As the following examples show, stems whose temporal reference is already established overtly (with tense affixes) cannot take the reflexive suffix directly (17a), although the latter can attach to the base containing temporal affixes if it also includes additional morphology like the simulative (17b):

- (17) a. **g^wəŝ^we-ke-ž'ə-k*
 happy-PST-RE-PST
 The intended meaning: 'S/he again turned out to have been happy.'
- b. *g^wəŝ^we-ke-ŝ^we-ž'ə-k*
 happy-PST-SML-RE-PST
 'S/he seemed again that s/he had been happy.'

Since the reflexive and simulative suffixes belong to the same formal class, it is unlikely that the infelicity of (17a) relates to the categorial characteristics of the base of the reflexive suffix. We hypothesize that limitations of this sort are based on selectional restrictions of suffixes.

To sum up, Adyghe multiple suffixation does indeed seem to instantiate recursion. Nonetheless, this kind of recursion is different from what we saw in Section 3 for applicatives, since it is limited by selectional restrictions among the operators.

4. Double causatives

The causative marker *ke-* is placed immediately before the verbal root and normally adds a new argument (causer). The following examples demonstrate how causativization of an intransitive base works:

- (18) a. *č'ale-r ma-k^we*
 boy-ABS DYN-go
 'The boy goes.'
- b. *pšəše-m č'ale-r j-e-ka-k^we*
 girl-OBL boy-ABS 3SG.A-DYN-CAUS-go
 'The girl makes the boy go.'

The sentence (18b) with a transitive predicate can be represented as derived from (18a) with a monovalent intransitive verb by causativization. As can be seen from these examples, such a causative construction marks the causer as the agent, whilst the causee remains absolutive.

The next pair of examples demonstrates causativization of a transitive predicate:

- (19) a. *č'ale-m g^wəčə-r j-e-wəfe*
 boy-OBL iron-ABS 3SG.A-DYN-bend
 'The boy bends iron.'
- b. *pšaše-m č'ale-m g^wəčə-r Ø-r-j-e-ke-wəfe*
 girl-OBL boy-OBL iron-ABS 3SG.IO-OPV-3SG.A-DYN-CAUS-bend
 'The girl makes the boy bend iron.'

These examples show that causativization of a transitive predicate makes its agent an indirect object, whilst the causer appears, again, as the agent.

Despite the fact that in many examples the causative prefix immediately follows the causer prefix added to the argument structure and therefore resembles applicative preverbs, it should be emphasized that the causative construction is formally very different from the applicative construction. Thus, the causer prefix belongs to a special agent series of cross-reference prefixes and the causer has all the formal properties of agents. Further, the causative marker can be separated from the argument structure zone by one of the pre-stem prefixes such as the dynamic prefix (see (18b) and (19b)) or the negative prefix:

- (20) *se qe-sə-mə-ke-wəzə-n*
 I DIR-1SG.A-NEG-CAUS-hurt-POT
 'I will not make it hurt!'

As (21) and (22) demonstrate, causativization can involve bases that already contain a causative prefix (see also Kumakhov 1964: 152;¹⁸ Smeets 1984: 273; Paris 1989: 182; Hewitt 2004: 138), such forms indicating causativization of an existing causative:¹⁹

18. Since Kumakhov operated with a rigorous template model, he had to postulate two homonymic prefixes with almost the same semantics for such examples.

19. Multiple causatives are certainly very common cross-linguistically, see Kulikov 1993 and Burgess 1995. It is important to note, however, that in Adyghe we do not find typologically widespread idiomaticization of causative repetition pointing to intensive and indirect causation, as, for instance, in Oromo: *raff-is* (sleep-CAUS) 'put somebody to sleep (directly, e.g., by rocking)' vs. *raff-is-iis-* (sleep-CAUS-CAUS) with the meaning of indirect causation 'make somebody sleep (e.g., by giving him/her a sleeping pill)' (the example is from Kulikov 1993: 128). In fact, Hewitt (2004: 138) notices that the compositionality of double causatives in Northwest Caucasian languages distinguishes them from many other languages of the Caucasus.

- (21) *Ø-je-s-e-ke-ka-k^we*
 3SG.IO-OPV-1SG.A-DYN-CAUS-CAUS-go
 ‘I make him/her make him/her go’.
- (22) *Ø-r-Ø-je-z-ke-ke-λeB^wə-ke-r*
 3SG.IO-OPV-3SG.IO-OPV-REL.A-CAUS-CAUS-see-PST-ABS
 ‘the one who made him/her show it to him/her’
 (literally: ‘the one who made him/her make him/her see it’)

In (21) we find two causative prefixes with an intransitive root, while the relativized verb form given in (22) presents an example of double causativization based on a transitive root. In both forms, one of the causers is cross-referenced by an agent prefix, whilst the other is cross-referenced by an indirect object prefix.

This is clearly an instance of recursion. Causative markers in (21) and (22) instantiate the same kind of derivation. Double causatives have a clear semantic structure and both causative prefixes add new arguments. These arguments, further, are expressed differently, the one being introduced as an indirect object, the other being cross-referenced as the agent, which proves that the two causative markers are applied in turn. Nonetheless, we will see that this recursion is by no means as pure as it looks at first glance.

First, no more than two causatives appear within a word: forms like (23) are considered infelicitous.

- (23) **Ø-r-Ø-je-s-e-ke-ke-ka-k^we*
 3SG.IO-OPV-3SG.IO-OPV-1SG.A-DYN-CAUS-CAUS-CAUS-go

The intended meaning: ‘I cause him_i to make him_j make him_k go.’

We have no explanation for this fact. In particular, we cannot account for this restriction by the processing complexity of the expression alone, because lexicalized causative – root combinations do not allow for the appearance of additional causatives either, despite the fact that the apparently word-formative causative should not affect complexity here. Thus, consider the verb *keləžə-* ‘to tickle somebody/something’ (transitive) illustrated in (24b). Formally, it consists of a causative prefix and the root *ləžə-* ‘to tickle’ (intransitive, of a body-part), whose use is shown in (24a). Since the causative verb can be used with animate causees and the bare root cannot be used with animate subjects, the meaning of the causative verb is non-compositional and lexicalized. Nonetheless, the stem *keləžə-* only takes one additional causative prefix, as (24c)–(24d) demonstrate:

- (24) a. *a-r ləʒə-ʁ*
that-ABS tickle-PST
'It tickled.' (Not: 'S/he felt tickling.')
- b. *z-ʁe.ləʒə-ʁ*
1SG.A-(CAUS.)tickle-PST
'I tickled him/her.'
- c. *∅-je-z-ʁe-ʁe.ləʒə-ʁ*
3SG.IO-OPV-1SG.A-CAUS-(CAUS.)tickle-PST
'I made him/her tickle him/her.'
- d. **∅-r-∅-je-z-ʁe-ʁe-ʁe.ləʒə-ʁ*
3SG.IO-OPV-3SG.IO-OPV-1SG.A-CAUS-CAUS-(CAUS.)tickle-PST
The intended meaning: 'I made him/her make him/her tickle him/her.'

Second, as was noted by Smeets (1984: 225, 273), double causation is occasionally expressed by a single causative marker. In this case, only the presence of an additional cross-referencing prefix indicates that the form indicates to causation of causation. Thus, compare the following two variants, with double causatives and with a single causative prefix:

- (25) *pχexə-r s-jə-ʁe-ʁe-č'anə-ʁ /*
saw-ABS 1SG.IO+OPV-3SG.A-CAUS-CAUS-sharp-PST
s-jə-ʁe-č'anə-ʁ
1SG.IO+OPV-3SG.A-CAUS-sharp-PST
'S/he made me sharpen the saw.' (Literally: 'She made me make the saw sharp.')

While the first form in (25) marks double causation explicitly by two causative prefixes, for the second form the double causation meaning can only be identified due to the presence of an "unexpected" indirect object prefix.

The factors conditioning the choice of the first or the second variant are analyzed in Letuchiy (Forthcoming b). Briefly, the omission of the second causative marker could be considered an instance of haplology, which is to say, the deletion of a morpheme motivated by a phonologically identical context (Stemberger 1981). However, (25) shows that, for causatives, this process is optional, and in fact we do not observe it elsewhere in Adyghe. Further, it turns out that it can also relate to non-phonological factors. Indeed, it seems that explicit double causatives are more normal where

some of the causers are treated as especially salient in the context (for example, where there is a 1st or 2nd person causer (as in (25)) or where one of the causers is relativized (22)). On the other hand, if all the causers are 3rd person, the presence of the second causative prefix is sometimes judged doubtful:

- (26) $\text{ʔ}^{w\acute{e}f\acute{s}ak^{w\acute{e}}-m}$ $\text{Ø-}j\partial\text{-}\acute{s}^{w\acute{e}}\partial z$ $\acute{s}^{w\acute{e}}\partial\text{ʔ}an\partial\text{-}r$
 employee-OBL 3SG.PR-POSS-wife hoe-ABS
 $\text{Ø-}r\text{-}j\partial\text{-}k\acute{e}\text{-}\acute{c}'an\partial\text{-}k$ /
 3SG.IO-OPV-3SG.A-CAUS-sharp-PST
 $^{?}\text{Ø-}r\text{-}j\partial\text{-}k\acute{e}\text{-}k\acute{e}\text{-}\acute{c}'an\partial\text{-}k$
 3SG.IO-OPV-3SG.A-CAUS-CAUS-sharp-PST
 'The employee made his wife sharpen the hoe.'

We conclude that the causative recursion is indeed somewhat restricted. In addition, it deviates from recursion proper in terms of both the possibility of non-compositional expression (whereby one causative marker is omitted) and dependence on pragmatic factors.

5. Discussion

The previous sections have shown that recursion is allowed in various parts of the Adyghe verb form. Below we shall focus on differences between the described phenomena and show that they are distinct in their *recursability* (i.e., their inclination to recursion).

We identify three criteria for measuring recursability:

- the QUALITY criterion considers the number of combinations that similar operators can contract;
- the QUANTITY criterion determines how many times a given operation applies theoretically;²⁰
- the EXPLICITNESS criterion concerns overt and compositional expression of semantic operations.

20. We are making an assumption that we can distinguish between whether repeating an operation is grammatically prohibited or whether it results from processing complexities.

Let us apply these criteria to the instances of recursion discussed above.

Starting from concrete applicatives, as concerns the quality criterion, the appearance of a new applicative does not depend on the material to which it attaches until it violates some general constraints; hence, in principle, there are no potential limitations on the number of combinations. Concrete applicative derivations have no quantity restrictions either, at least formally, although in reality the number of applicatives only rarely reaches three. Last but not least, these derivations are always explicit and compositional.

General oblique applicatives are very different. They do not interact with other similar derivations, and this restricts the number of their possible combinations to one. The number of general oblique applicatives crucially depends on the stem and does not seem able to exceed three. Finally, they allow for the omission of the applicative preverb in some contexts; hence this part of the word is not clearly compositional (although this fact is not related to recursion *per se*).

The recursion in the suffixal zone permits many different combinations, although it seems to be still more restricted in this respect than concrete applicatives due to the role of selectional restrictions. At the same time, this kind of recursion is not restricted formally as far as the number of operations is concerned. The role of the explicitness criterion is less obvious in this case: whilst the semantics of this zone for the most part can be described as compositional, there is at least one aspect where this is disputable. Consider the following two examples:

- (29) a. *ke-š'əne-β^weš^wə*
 CAUS-be.afraid-FCL
 'It is easy to frighten him.'
- b. *səmežə-β^weš^wə-β*
 ill-FCL-PST
 'S/he promptly got ill.'
 (Literally: 'It was easy for him/her to get ill.')

The comparison of these two examples, which both include the facilitive suffix 'easy', demonstrates that the absence of temporal affixes may receive a probably unexpected present tense interpretation (as in (29a)). This is in spite of the fact that, as we argued above, temporal suffixes (just like, say, the facilitive suffix shown in these examples) are part of a compositional structure; so the absence of tense morphology would not imply any

Recursability →

	Causatives	General oblique applicatives	Propositional operators	Concrete applicatives
Quality	Only one recursive combination is possible.		Combinations are limited by selectional restrictions.	Combinations are limited by independent principles.
Quantity	Recursion is confined to two derivations.	Recursion is restricted by stem.	No obvious restrictions on the number of derivations.	
Explicitness	Operators can be suppressed.		The absence of expression can be interpreted.	Overt expression is obligatory.

Figure 3. Kinds of recursion in Adyge morpho-logy

specific temporal meaning at all. Depending on the approach and relying on different arguments, the present tense interpretation here can be considered either a default value or the semantics of the bare stem that serves as a base for further temporal derivations.²¹ At least if the first interpretation is accepted, the suffixal zone becomes somewhat less compositional.

Finally, causative recursion shows the most idiosyncratic properties. It is only restricted to one combination and is limited to a sequence of two markers. In addition, one of the causative markers can be deleted, which leads to the violation of compositionality.

These data are summarized in Figure 3, which suggests that concrete applicatives are the most recursible; the suffixal zone is the next in order; then come general applicatives; and, finally, comes the causative.

The fact that different morphological operations admit recursion to different extents is crucial, because it allows us to relate recursability to the properties of these operations. We propose that the following principle affects recursability in Adyge morpho-logy.

21. Apparently, paradigms can hardly be constructed for suffixal morphology, so the existence of null suffixes is unjustified.

- (30) The more a derivation affects the meaning of a stem, the less recursible it is.²²

Consider causatives: while creating a situation of a new kind, the causative derivation affects the meaning of a stem. Not any situation needs to be characterized as to whether it involves causation, and hence such information is highly marked significantly contributing to the semantics of the verb. Moreover, causatives partly determine the distribution of the stem (in particular, its combinability with some cross-referencing prefixes).

Similarly, general oblique applicatives are closely related to the semantics of the stem, so that their appearance is in fact only possible where the semantics of the stem already implies that the corresponding participant is relevant. The appearance of an indirect object prefix in a sense should be licensed by some component within the semantics of the stem. It is, thus, not so surprising that sometimes such components can be “reconstructed” due solely to the presence of indirect objects, as we have seen in the case of double causation expressed with a single causative prefix.

The suffixal derivations too affect the stem and its distribution. In particular, the appearance of some suffixes can affect the argument structure. An example of this is (29a) above, where the appearance of the facilitative prefix makes it possible to omit the agent prefix because the corresponding participant becomes irrelevant. At the same time, in most cases suffixal operations only result in certain aspectual, temporal or modal interpretations (i.e., those interpretations that are not usually thought to touch upon the core lexical semantics).

Finally, concrete applicatives while being “morphological adjuncts”, prototypically bear only subsidiary information and hence affect the stem to a lesser degree than other kinds of derivations.

Given this picture, we find a neat correlation between the recursability of a derivation and the nature of its semantic contribution.

6. Conclusion

In this paper we have described recursive morphological processes in Adyghe and have argued that their inclination to recursion depends on their semantic impact in the construction of a polysynthetic word.

22. This principle can be related to the concept of the relevance of morphological elements, as used by Bybee (1985).

In Adyghe, as we have demonstrated, causative derivation is the least recursible, concrete applicative derivation is the most, and general oblique applicatives and propositional operators occupy an intermediate place. These results are remarkable because they contrast with our intuitions about syntactic recursion.

In syntax, derivations similar to Adyghe concrete applicatives are the least prototypical instances of recursion, for they are “morphological adjuncts” and in some models (e.g., in dependency grammar) multiple adjunction is not considered an instance of recursion at all. Note also that concrete applicatives in Adyghe are typologically exceptional in non-affecting argument structure. Finally, it is our impression that morphological adjuncts belong to atypical phenomena for morphology, as they may show properties rather deviant from other kinds of derivations (see, for example, Newell 2005). Thus, we find that the least restricted recursion in Adyghe morphology is found with non-canonical derivations, and, in fact, this recursion is itself non-canonical.

The most restricted recursion in Adyghe morphology is found in causative constructions, which in syntax easily allow for recursion. At the same time, morphological causatives seem to be far more widespread than, for example, applicatives and represent, in a sense, a more canonical morphological operation.

The picture displayed by Adyghe cannot be captured by standard assumptions on both morphology and recursion. On this basis, we propose that morphology is indeed deficient as concerns recursion. This provides good evidence for the strong distinction between syntax and morphology even in such languages as Adyghe, where their functions may overlap.

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