

# Toward a typology of verbal lexical systems: A case study in Northern Athabaskan<sup>1</sup>

ANDREJ A. KIBRIK

## *Abstract*

*Traditionally, lexical typology has mostly confined itself to local domains, such as color terms. In this paper I propose an integral typology of verbal lexical systems. As a first step, I compare the verbal lexicon of Northern Athabaskan languages (primarily Koyukon) with that of English, as well as Russian. The research question is how the construction of verbal lexical meaning operates in various languages. As an independent benchmark, I use a list of 122 verbs that were described as a child's earliest acquisitions in a developmental study by Michael Tomasello. Translational counterparts of English verbs have been identified for Koyukon. English and Koyukon basic verbs demonstrate very different degrees of morphological and conceptual complexity. Whereas English verbs have very few derivational morphemes, an average Koyukon verb has 1.5 derivational morphemes. Koyukon verb roots are significantly more abstract and a lot of derivational material is required to reach the level of semantic concreteness that is found in English verb roots. The measurement "index of verb complexity" is introduced that captures such differences between languages numerically. Various semantic classes of verbs display different degrees of complexity. In particular, Koyukon manipulation verbs are mostly derived, whereas motion verbs have a larger proportion of simple verbs. The derivational complexity of the Koyukon verbal lexicon may be related to the overall morphological complexity of the language.*

## **1. Grammatical and lexical typology**

During the last few decades, the typology of grammatical categories has seen significant progress, including both the formal and semantic facets of grammar. Haspelmath et al. (2001) provides a good summary of the achievements of grammatical typology, and at the same time witnesses to the weakness and scarcity of lexical typology. Typologists have developed a huge conceptual

apparatus to deal with grammatical devices, but know relatively little about the substance that all these devices modify, namely lexical items and lexical meaning. This situation has been gradually changing since 2001, but lexical typology is still in its infancy. Koptjevskaja-Tamm (2007) provides an excellent overview of the current developments in lexical typology (in different senses of the term), particularly during the 2000s.

One important respect that shows a qualitative difference between grammatical and lexical typology is the relative degree of generality, or size of domain, in question. For example, grammatical typology from the outset has tended to embrace rather general parameters of variation; a relatively recently formulated typological parameter of this kind is the distinction between head- and dependent-marking languages, proposed by Nichols (1986). This parameter characterizes languages in their entirety. In contrast, lexical typology usually focuses on rather restricted and specialized domains such as color terms (see MacLaury 2001), kinship terms (Greenberg 1980), body part terms (Brown 2008), or motion-in-water verbs (Maisak and Rakhilina 2007).

It appears that lexical typology must begin posing more general questions. If lexical typologists want to target a degree of generalization comparable to that found in modern grammatical typology, we need a way to compare entire lexical systems of languages. In this paper I propose an approach to profiling the verbal lexical system of a language in its entirety. The reasons for looking specifically at the verbal lexicon are the following. As is generally believed, the verb is the core of the clause and is in the core of the grammar and lexicon. Therefore verb lexical structure, including both formal organization and semantics, must be among the central forces shaping the typological parameters of a language. One needs to be able to characterize the verbal lexical system of a language in an integral way.<sup>2</sup> Once a format for describing individual languages in such a way is available, an *integral typology of verbal lexical systems* may become possible. Such typology would have merit of its own, but it would also provide hints about connections between grammatical and lexical parameters of crosslinguistic variation.

In the paper, I propose one approach to an integral characterization of verbal lexica. In Section 2 I provide an illustration of the fact that comparable lexical meanings can be expressed in different languages in very different ways — specifically, in English and in Alaskan Athabaskan languages. In Section 3 I discuss the relationship between morphological and conceptual complexity. Section 4 outlines the basic design for an integral lexical typology. Section 5 provides a general account of the Koyukon (Athabaskan) basic verbal lexicon against the background of its English counterpart. In Section 6 I look into individual semantic verb classes and discuss their differing arrangement in the two languages. One particular class of the Koyukon verbs, the classificatory verbs, are characterized in Section 7. The functions of the Koyukon derivational pre-

fixes are treated in Section 8. Section 9 contains conclusions about the typological profile of the Koyukon verbal lexicon. Finally, Section 10 offers some considerations regarding possible connections between lexical and grammatical typology.

## 2. First illustration: different degrees of morphological complexity in seeing and hunting

As an illustration of the kinds of lexical differences between languages that call for typological analysis, consider the following two examples from Upper Kuskokwim, an Athabaskan language of interior Alaska.

### (1) Upper Kuskokwim<sup>3</sup>

#### a. *ni-(s)-l-'anh*

CL.roundish-1SG.NOM-TRANS-ACT:IMPF

'I see him/her/it', lit. 'I act with roundish things upon him/her/it'

#### b. *srito-di-hw-(s)-l-'anh*

in.concealment-CL.phytogenous-AREAL-1SG.NOM-TRANS-ACT:IMPF

'I am hunting', lit. 'I act on an area (= animals) with a wooden object (= weapons) in concealment (= in the woods)'

In English, the verbal meanings 'see' and 'hunt' are conveyed by simple, underived verbs, consisting of indivisible roots alone; below I term these *prime verbs*. In Upper Kuskokwim, however, seeing and hunting are both *derived verbs* — they are based on a more abstract verb root, roughly meaning 'act'. In the case of 'see' (1a), the derivational prefix *ni-* is added to this root; it is (probably) a classificatory marker referring to roundish objects, that is, eyes.<sup>4</sup> There is also the transitivity indicator *l-*, also belonging to derivational morphology (see a brief discussion in Section 5). Where one morpheme suffices in English to convey the meaning 'see', three lexical morphemes are required in Upper Kuskokwim. Note that this is crosslinguistically unusual: according to Viberg (2001: 1307), "*see* is lexicalized as a simple verb in most languages", especially when compared to other verbs of perception.

As for 'hunt' (1b), the difference between the number of lexical morphemes in English and Upper Kuskokwim is greater still, at 1:5. In addition to the same root 'act', four derivational prefixes are needed in Upper Kuskokwim, each of which has a synchronically identifiable function. First, the verb contains the classificatory marker *di-*, referring to the objects of phytogenous origin (e.g., of a plant-based origin). Most often this prefix indicates wooden objects, and in this particular case refers to weapons (prototypically a bow and arrows or a spear). The verb also contains the derivational prefix *srito-* 'in concealment',

conventionally referring to the activities performed in the woods. Furthermore, the verb contains the prefix *hw-*, which is the areal Patientive prefix, used to refer to places and spaces. By extension, this prefix is also used to refer to less than fully delineated referents, in this case unspecified animals. In the verb ‘hunt’ this prefix, originally inflectional, is frozen into a rather derivational element. Finally, the verb contains the transitivity indicator *t-*.

Judging by such examples, the lexical structures of English and Upper Kuskokwim verbs have differing morphological complexity, and the difference is rather striking. Where single lexical morphemes (roots) suffice in one language, complex configurations of lexical morphemes (roots and derivational affixes) are required by the other to convey comparable lexical meanings. As we will see below, the specific differences in complexity between the English and Upper Kuskokwim *see* and *hunt* are not accidental, they are manifestations of a global contrast between these languages in the degree of morphological complexity of the verb. Thus morphological complexity is an essential typological parameter.

Similar distinctions in the domain of grammatical categories have often served as the bases for typological parameters. As an example, consider the typology of transitivity. Nichols (1982) proposed to distinguish between primarily transitivity-increasing and primarily transitivity-decreasing languages. (Nichols et al. 2004 is a more advanced incarnation of the same set of ideas.) In the transitivity-increasing languages, in particular Nakh-Daghestanian, in the pairs such as ‘melt (tr.)’ / ‘melt (intr.)’ the transitive verb is typically a causative formed from the intransitive; that is, the intransitive is a simple verb while the transitive is a derived and morphologically more complex verb that bears extra morphological material. In contrast, in transitivity-decreasing languages, including many European languages, the intransitive verb is an anticausative derived from the transitive, also with extra morphology.

Another example of a domain in which morphological simplicity/complexity matters is the most developed domain of lexical typology: color term studies (MacLaury 2001). When identifying basic color terms in language L, one of the criteria normally used is morphological simplicity. If in one language the term *brown* is nonderived, as in English, and in another its counterpart is derived from e.g., the word for ‘cinnamon’, as in Russian (*koričnevyyj* from *korica*), this is relevant for characterizing these languages’ basic color terms systems.

In a typologically oriented study of lexical domain D in language L, one must identify the proportion and the specific repertoire of items rendered in a morphologically simple way. This will characterize L with respect to D. The larger D is, the more significant characterization of L it provides. In particular, the first step in characterizing the verbal lexical system of a language is to look at which and how many verbal meanings are expressed in a simple, prime,

underived way, and which are expressed with the help of additional derivational devices.

The difference between English *see* and *hunt* and their Upper Kuskokwim counterparts in the degree of complexity can be assessed narrowly, in purely formal terms. Much of what is said below can be interpreted in such a narrow way. However, here I make a stronger assumption, that apart from the formal difference, there is also a semantic difference: the two languages have different *conceptualizations* of seeing and hunting.

The meanings of derivational affixes are identifiable through linguistic analysis. Seeing is conceptualized as acting with roundish objects, i.e., eyes, and hunting as acting upon animals with weapons in the woods. That is to say, Upper Kuskokwim ‘hunt’ is not just formally more complex than the parallel English verb, it is also conceptually more complex. With respect to hunting, this may seem surprising, since this was the main activity that the Upper Kuskokwim speakers’ ancestors pursued for centuries, and that modern Upper Kuskokwim people still pursue now. The complex conceptualization of hunting may result from a taboo, but that still does not deny the main observation: in Upper Kuskokwim, there is no way to simply say ‘hunt’. One has to employ several semantic elements in conjunction to give rise to the lexical meaning equivalent to that of English *hunt*. I further develop this point in Section 3.

### 3. Morphological and conceptual complexity

In functionalist linguistics, there is a widespread belief that linguistic form is not entirely arbitrary and is strongly *motivated* by meaning, pragmatics, cognition, language use, etc. Among the best known principles of such motivation there are principles of markedness and diagrammatic iconicity (see e.g., Givón 2001: 34–38), according to which the structure of form parallels the structure of meaning. The literature making this claim is too vast to review here, but see Jakobson (1965); Haiman (1980); Lakoff and Johnson (1980: 127); A. E. Kibrik (1983); Givón (1985); Croft (1990); Langacker (2000), among others; see Ariel (2008: 151–153) for a recent survey.

Applied to the derivational structure of verbs, the iconicity principle amounts to the statement that a simpler, unanalyzable form correlates with a solid, prime meaning in a given language, and a complex, derived form with a complex, derived meaning. There are multiple empirical studies demonstrating that formal and semantic representations of concepts are strongly connected. For example, Gil (2005), in an experimental crosslinguistic study, shows that morphological complexity correlates with semantic complexity. Particularly relevant to the topic of this study are numerous psycholinguistic works by Slobin (see e.g., Slobin 2005, 2006), which argue that linguistic representation of

events (particularly motion events) is closely connected to semantic structures in the cognition of the speakers of individual languages. See also Bergelson (2007) for a large set of studies aimed at demonstrating the motivated character of linguistic form.

Haspelmath (2008) is a recent attempt to question the validity of the iconicity principle from within functionalist linguistics. (Also see Fenk-Oczlon 2001 for an earlier version of the same claim.) Haspelmath suggests that the phenomena typically attributed to iconicity are better explained by differences in frequency. His method for disproving the iconic form-function correlations is to look for counterexamples. For instance, causative verbs are semantically more complex than the corresponding intransitive verbs, so in accordance with the iconicity principle causative verbs may be supposed to be universally morphologically more complex, which is not the case in e.g., the German pair of verbs *öffnen* ‘open (tr.)’/*sich öffnen* ‘open (intr.)’. I believe, however, that the version of iconicity Haspelmath is disproving with such examples is overgeneralized, and my suggestions on a proper understanding of iconicity are specified below.

No claim is made in this paper regarding the universal differences in conceptual complexity. To the contrary, I allow that different languages conceptualize reality differently. Languages are free to choose certain concepts as more basic and others as more complex or derived. Morphological coding is accordingly either simpler or more complex. We can judge the (invisible) conceptual complexity by the apparent morphological complexity. What the proper formulation of the iconicity principle says about German *öffnen/sich öffnen* is that the transitive verb is the basic form, and the decausative is the derived, and that the formal relationship mirrors the semantic relationship *in this particular language*.

A very persuasive illustration of how conceptualization of quite similar phenomena may differ across languages and within one language is provided by Wierzbicka (1988: Ch. 10). In this study Wierzbicka has demonstrated that even textbook examples of linguistic arbitrariness such as the plural *oats* and the singular *wheat* clearly trace back to functional motivation. Conceptualization is partly grounded in objective factors but is primarily language and item specific. Form is a window into content, and this should be taken as a default assumption. If one believes that form is blind and arbitrary, the burden of proof is with him or her. A linguist should trust form, as there is hardly anything else to trust.

Sometimes the question is raised of whether derivational structure is accessible to the conscious awareness of speakers. My answer to this question is twofold. A weaker version of the answer is that conceptualization should not be confused with conscious awareness. In a weak understanding, conceptualization is something that becomes apparent through linguistic analysis. Anal-

yses such as the one provided for (1a) and (1b) above demonstrate the underlying meanings of constructional elements leading to formal complexity, as well as the semantic machinery responsible for the formation of the whole meaning from meaningful parts.

However, one can make a stronger claim: language speakers often do have access to the conceptual structure of derivational formations. There are various ways to argue for this claim. First, morphologically complex verbs could only have developed under the condition of speakers' command of the semantics of the derivational devices. Second, even modern speakers may have access to the meanings of the parts, and the degree of such access may vary from conscious to intuitive and from full to partial; lay speakers may "feel" the semantic effects of derivation while not being able to rationally analyze it. This latter point deserves a brief discussion.

In connection with the degree of access to the functions of derivational elements, Langacker reasons as follows: "Should we ⟨. . .⟩ say that words like *propeller*, *ruler*, and *stretcher* are polymorphemic? Either a positive or a negative answer would, I think, be simplistic. ⟨. . .⟩ It is both reasonable and coherent to say instead that their analyzability into component morphemes is a matter of degree. ⟨. . .⟩ Intuitively, I would judge that *-er* is more clearly apparent in *propeller*, *ruler*, and *stretcher* than are *propel*, *rule*, and *stretch*" (Langacker 2000: 133). Furthermore, the connection between *propeller* and *propel* may be transparent to some language users and opaque to others. It is difficult or impossible to verify whether many, few, or none of the speakers of a language have access to the meaning of every given derivational element. This is particularly difficult in the case of a minority language. But there is evidence that at least some speakers have access to the meanings of some derivational elements.

I have asked one of my major Upper Kuskokwim consultants, Willie Petruska, about the literal meaning of the verb 'hunt' (see (1b) above). His answer was 'act in the woods', that is, the abstract root semantics and the function of one of the derivational affixes were readily accessible to him. Willie apparently could not access the meaning of the element *di-* 'phytogenous, wooden', but this same prefix was clear to him in another verb form, *doltsit* 'it landed on a tree' (about a bird). In another example, Willie could not come up with a clear explanation for the Upper Kuskokwim derivational perambulative prefix *k'o-* 'around' (as in *k'o'edinesh* 's/he is working', lit. 's/he is moving his/her hands around', the direct equivalent of the Koyukon verb form cited in (5) below), but he did acknowledge that this element, shared by many verbs, must have its own meaning.

Dauenhauer (1976) is a study of Koyukon riddles recorded in early 20th century by the scholar Jules Jetté. These riddles are largely based on the conflict between literal and idiomatic interpretations of derivational verb structures:

Younger speakers (30–60 age group) find much of the grammar bewildering. For example, a verbal prefix indicating a tree-like object would logically never occur with a first person subject pronoun — unless, as in the riddle style, the speaker is a tree, and the grammatical manipulation is a clue. Such grammatical combinations seem to have delighted the old time riddle composers, but strike the younger speakers as totally nonsensical and incorrect. (Dauenhauer 1976: 56–57).

Such facts, though scant, indicate that Northern Athabaskan derivational morphology is not completely impenetrable and obscure to proficient language users. This allows one to continue assuming that derivational iconicity is at work not only in the refined linguistic analysis, but also at least partly in the minds of lay speakers. Note that this does not necessarily imply that the speakers of different languages think about hunting differently on each use of the verb *hunt* (of their respective languages) in mundane communication. The question of conceptualization is about the offline semantic structure rather than about each online occasion of language use. (A set of related issues is discussed by Bohnermeyer et al. 2011.)

To conclude, morphological complexity is not a purely formal phenomenon but can also be understood in terms of conceptualization. In view of the iconic principles and the interactions between formal and functional complexity (Fenk-Oczlon and Fenk 2008), the issue of differing verb complexity is not just about morphology, it is also about semantics. In application to the evidence of this study, instead of “conceptualization” I will be using a more specific notion *construction of verbal lexical meaning*. As I demonstrate below, the construction of verbal lexical meanings varies a great deal across languages.

#### 4. A design for an integral typology of verbal lexical systems

So far I have made only anecdotal observations about individual verbs in individual languages. The possibility that different languages may have strikingly different verbal lexical semantics is pointed out in the literature on a number of occasions, with one of the most forceful illustrations being that of Kalam, a language of Papua New Guinea, as described by Pawley (1987) in contrast to English. (See also Bohnermeyer et al. 2011.) Can one capture the specifics of the verbal lexical system of a language in terms of morphological and conceptual complexity? Is such integral characterization, or *profiling*, of the verbal system of a language possible? If so, is it possible to compare the whole verbal lexica of languages and further proceed towards a genuine typology of lexical systems?

Such profiling and subsequent comparison is indeed possible, and below I demonstrate my proposed methodology. The first step in profiling the verbal lexical system of a language is to identify the proportion of basic verb mean-

ings expressed by prime verbs, that is, roots with no derivational affixes. This allows one to study the fundamental system of conceptualization reified in the verb roots of the language. The next questions are how many derivational affixes are used, and how often. Such characterization leads to an assessment of the relative abstractness vs. specificity of root semantics and of the processes of verbal lexical meaning construction in the language, including a quantitative assessment of the degree of complexity of the verbs' morphological and semantic structures. Furthermore, a discriminate semantic characterization of verb roots and derivational affixes is in order because different semantic types of roots and affixes can pattern differently.

The main methodological difficulty in implementing this program is that there is no readily available inventory of language-independent units, such as the color chips used in color term studies, or the 'plus or minus agent' semantic feature used in the typology of transitivity. Possible solutions for this problem include using some kinds of presumably universal semantic elements, such as Schank's (1975) elementary actions (so-called ACTs), Wierzbicka's (1996) semantic atoms, or Talmy's (1985) elements of schematic representation for motion events, including motion, figure, path, manner, and ground. However, I prefer a simpler and less theoretically committed solution: compiling a list of basic and universally applicable verbal meanings that would allow the profiling of the verbal system of a language.

But where can one get such a list? Probably the most "basic" verbal meanings are those that are important enough to be acquired at an early stage of language acquisition. Whereas entire lexica may vary strongly across languages depending on social and cultural structures, it is likely that young children first access the concepts that are most fundamental to human nature and most common across languages. A list of these early basic verbal concepts are found in the appendix to Tomasello's (1992) book *First Verbs*, which lists the verbs that the author's daughter uttered between the ages of 1 and 2. *In toto*, there are 122 verbs on the list.<sup>5</sup> There are good reasons to believe that this list of verbs must be a fair approximation to a language-independent inventory of basic verbal meanings.

Using Tomasello's verb list also addresses a second methodological problem that is immediately obvious when one attempts to profile the entire verbal lexicon of a language, i.e., the problem of the vastness of the lexicon. The basic verbs make up only a small but highly informative fraction of the entire lexicon. Of course, the more verbs the better, but Tomasello's list is a good start for a manageable research program potentially involving many languages.

One possible objection against using Tomasello's list is that these verbs, though basic, are of a specific human language, not from anything like a *lingua mentalis*. Of course, English is not a typological average; on the contrary, there are reasons to believe that it is a rather exotic language on many counts.

However, it can still be used as a point of departure. As long as we remember that Tomasello's list is a list of lexical items from one human language, and treat it as a relative, rather than absolute, benchmark, it is methodologically sound to compare other languages to this independent standard.

Once profiles of verbal lexical systems are available for a number of languages, we can progress towards the next goal: a genuine lexical typology of verbal systems.

## 5. Relative verb complexity in English and Northern Athabaskan

Here I offer one case study comparing the verbal lexical system of one Athabaskan language to English. This case study is of course not a lexical typology as such, but it is a step in that direction.

The nearly 40 Athabaskan languages, together with more distantly related Eyak and Tlingit, constitute the Na-Dene family, one of the large language families in North America (see Krauss [1979]; Thompson [1987]; Cook [1992]; Rice [2000]; inter alia, for general characterizations of Athabaskan). The Athabaskan languages are (or were) spoken across a vast territory and are conventionally divided into three areal groupings: Northern, Pacific, and Southern (or Apachean). The Northern languages are spoken in interior Alaska and much of western Canada.

In Section 2 we have seen a couple of examples from Upper Kuskokwim, an Athabaskan language of interior Alaska that I am particularly interested in.<sup>6</sup> However, in the subsequent discussion I switch to a closely related language, Koyukon, spoken immediately to the north of Upper Kuskokwim. The *Koyukon Athabaskan Dictionary* (henceforth KAD; Jetté and Jones's [2000]) is a far more comprehensive lexicographic resource than what is available for Upper Kuskokwim. Much of what is said below about Koyukon would apply equally to Upper Kuskokwim and many other Northern Athabaskan languages.

The particular morphology of the Athabaskan verb is often described as a stem-final template (Kari 1989; Kibrik 2005), that is, a sequence of linearly organized morphological positions, each of which can be occupied by prefixes from a limited set (see Rice [2000] on an alternative theory of Athabaskan verbal morphology). Athabaskan languages are almost exclusively prefixing, with an allomorph of the verb root at the right edge of the verb preceded by what is sometimes a very lengthy string of prefixes. Derivational prefixes are not necessarily adjacent, and inflectional prefixes are often interspersed among them. The examples in (1) above and further examples in this paper serve as illustrations of this structure, although here I focus only on roots and derivational prefixes, and do not consider Athabaskan verb inflection (but see Section 10).

122 English verbs from Tomasello's list were matched against the KAD, with the following results. 19 verbs do not have a direct verb equivalent in

Koyukon. Among these, five verbs — for example, *get-down* or *pat* — had no equivalent in KAD, although there are all reasons to believe that their meanings must be expressible by an individual Koyukon verb; the most likely reason for the lack of an equivalent is the occasional omission by the dictionary's authors.<sup>7</sup> In two instances, *feel* and *mean*, there is no specific Koyukon verb corresponding to the level of abstraction found in the English verb. For example, for different meanings of English *feel*, very different Koyukon verbs would be used (KAD: 905). Furthermore, three English verbs (*turn-off*, *turn-on* and *button*) had no correspondences in KAD for cultural reasons.<sup>8</sup> In one instance (*brush [hair]*) an equivalent was judged absent because a much more general verb 'handle plural objects' is used to convey this meaning (KAD: 745). Finally, in eight instances, including verbs such as *want*, *give*, *finish*, the Koyukon counterpart is not a verb but a different part of speech, e.g., a predicative noun or a postposition, or is a verbal affix.<sup>9</sup> There are thus 103 verbs from the English list (103 = 122 – 19) with a Koyukon equivalent.

Among the 122 English verbs in the full list, ten (roughly 10%) have some derivational elements, e.g., *sit-down*. The remaining 112 verbs are prime verbs, in which there are no lexical morphemes apart from the root. Among the ten verbs with derivational elements, nine verbs have one such element each, and one verb has two derivational elements, bringing the total number of derivational morphemes per 122 English verbs to eleven. Therefore, 133 (= 122 + 11) lexical morphemes are used in the set of English verbs.

I propose a formula for quantifying the average number of lexical morphemes used in a language to convey a verbal lexical meaning. This formula, dubbed the *index of verb complexity* (IVC), is calculated as the ratio of the overall number of lexical morphemes to the number of verbs in the data set. In the case of the English data set, the value of IVC is 1.09, or 133 : 122.

Before we can proceed with identifying the IVC for Koyukon, the Koyukon data set must be adjusted for two reasons. First, many English verbs have two or more counterparts in Koyukon. In some of these instances there are clear reasons for preferring one candidate over the other(s), such as a more direct correspondence to the English verb, as well as to the contexts of use cited in Tomasello's list.<sup>10</sup> However, sometimes there are no grounds for selecting one of such counterparts as the main equivalent and discarding the other. For example, English *paint* corresponds to two Koyukon verbs (*de-Ø-ben* and *G-Ø-tseek*, see KAD: 97, 625). Each of these verbs can be counted as a legitimate equivalent of *paint*, they are semantically very similar, and it would be highly artificial to exclude one of them from the data set.<sup>11</sup> Another example is provided by the counterparts of the English verb *swim*: one Koyukon verb, *Ø-baa*, actually means 'singular or dual human/animal/bird swims', while another, *(k'e-)Ø-laah*, means 'unidentified creatures, normally fish, swim underwater' (see KAD: 74, 380). Here again the solution was to include both, and both will contribute

something to the resultant assessment of the whole data set. There are seventeen instances such as this, plus two cases in which three Koyukon verbs correspond to one English verb (*find*, *hammer*). Therefore, at this stage of adjustment the size of the Koyukon data set is  $103 + 17 + 4 = 124$ .

There are also adjustments leading to the reduction of the Koyukon data set. In some cases, a single Koyukon verb corresponds to two or three English verbs from the list; there are eight instances of the former and two instances of the latter. For example, both English *see* and *look* correspond to one Koyukon verb, represented in its vocabulary form as *ne-t-'aan* (KAD: 21), directly cognate to the Upper Kuskokwim verb shown in (1a). Three English verbs (*go*, *come*, and *walk*) are reflected in one Koyukon verb, represented in KAD: 700 as *Ø-yo*.<sup>12</sup> The solution adopted in such instances was to list a Koyukon verb only once. It would be highly unnatural to count a single verb twice or three times, simply because its meaning is conveyed by more than one English verb. Accordingly, the Koyukon data set is adjusted as follows:  $124 - 8 - 4 = 112$ .

There are thus 112 verbs in the Koyukon data set, as compared to 122 verbs in the English data set. Among these 112 Koyukon verbs, 28 (that is, 25%) are prime verbs: the only lexical morpheme they contain is the root, and there are no derivational affixes.<sup>13</sup> There are 84 verbs (75%) that contain one or more derivational prefixes. These 84 verbs break down in terms of the number of derivational prefixes as follows:

- (2) Verbs with 1 derivational morpheme: 30 (26.8%)
- Verbs with 2 derivational morphemes: 30 (26.8%)
- Verbs with 3 derivational morphemes: 17 (15.2%)
- Verbs with 4 derivational morphemes: 6 (5.4%)
- Verbs with 5 derivational morphemes: 1 (0.9%)

Consider examples of the verbs of various degrees of complexity — from a prime verb with zero derivational morphemes to a derived verb with five derivational morphemes. Note that Koyukon is morphologically complex, and verb forms contain a plethora of not only derivational but also inflectional morphemes. (On some intricacies associated with the inflection vs. derivation distinction in Athabaskan see Kibrik 2005.) Inflectional morphemes are not discussed here, but for the sake of clarity, lexical morphemes — both roots and derivational prefixes — are underlined in the examples below.<sup>14</sup>

- (3) Koyukon  
 Prime verb: root, no derivational prefixes  
ye-ghee-t'otl  
 3.ACC-DUR.PF:3.NOM-CUT:PF  
 's/he cut it'  
 (KAD: 553)

- (4) Koyukon  
 Derived verb: root + 1 derivational prefix  
*n-ee-taayh*  
 repose-2SG.NOM-lie:IMPF  
 ‘lie down!’  
 (KAD: 496)
- (5) Koyukon  
 Derived verb: root + 2 derivational prefixes  
*kk'o-'ee-de-neeYh*  
 around-PEG-DETRANS-move.flat&flexible:IMPF  
 ‘s/he is working’, lit. ‘s/he is moving his/her flat and flexible objects  
 (= hands) around’  
 (KAD: 444)
- (6) Koyukon  
 Derived verb: root + 2 derivational prefixes  
*no-yee-tl-zoo'*  
 backwards-3.ACC-RES.PF:TRANS-be.nice:PF  
 ‘s/he cleaned it’, lit. ‘s/he made it nice again’, ‘s/he re-tidied it’  
 (KAD: 743)
- (7) Koyukon  
 Derived verb: root + 3 derivational prefixes  
*s-e-d-ee-ghee-neeK*  
 1SG.OBL-to-CL.phytogenous-once-DUR.PF:3.NOM-move.flat&flexible:PF  
 ‘s/he hurt me’, lit. ‘s/he moved a flat and flexible object (= hand) with  
 smth. wooden (= weapons) one time towards me’  
 (KAD: 452)
- (8) Koyukon  
 Derived verb: root + 5 derivational prefixes  
*y-e-do-hu-de-l'eeh*  
 3.OBL-to-mouth-AREAL-verbal-DETRANS.TRANS-act:IMPF  
 ‘s/he is reading it’, lit. ‘s/he is acting upon an area verbally toward it’  
 (KAD: 27)

Particularly tricky from the point of view of the distinction between inflection and derivation are the immediately pre-root transitivity indicators. These morphemes have the underlying shape *Ø-*, *de-*, *l-* and *le-* (see examples (4), (5), (6), and (8), respectively) and fundamentally indicate the degree of semantic transitivity of a given verb form, as compared to the original valence of the given verb root (see Kibrik [1993, 1996]; also cf. other related studies Krauss [1968]; Thompson [1996]; Rice [2000]). As has been shown in Kibrik (2005), transi-

tivity indicators sometimes are derivational, and at other times inflectional. Derivational indicators may be more or less semantically motivated, and sometimes are completely idiosyncratic. Derivational transitivity indicators count as derivational morphemes in this study, whether they are motivated or idiosyncratic, as they are clearly identifiable affixes, distinct from the verb roots.

From the figures given in (2) it follows that the Koyukon data set contains  $30 + 30 \times 2 + 17 \times 3 + 6 \times 4 + 5 = 170$  derivational morphemes. Therefore, the overall amount of lexical morphemes is  $170 + 112 = 282$ , and the calculation of IVC is  $282 : 112 = 2.52$ . In other words, the complexity of Koyukon verbs is about 2.5 times as high as in English. The large difference in IVC — 1.09 for English, 2.52 for Koyukon — defines the quantitative typological range that would likely encompass most languages.

I have performed analogous counts for Russian, using the same technique as was described for Koyukon. The set of Russian equivalents to Tomasello's list contains 116 verbs, 67 of which (57.8%) contain no derivational affixes. The remaining 49 Russian verbs (42.2%) break down according to the number of derivational affixes as follows:

- (9) Verbs with 1 derivational morpheme: 43 (37.1%)  
 Verbs with 2 derivational morphemes: 5 (4.3%)  
 Verbs with 3 derivational morphemes: 1 (0.9%)

There are thus  $43 + 5 \times 2 + 3 = 56$  derivational morphemes in the whole set, and  $116 + 56 = 172$  lexical morphemes. The IVC for Russian is  $172 : 116 = 1.48$ , which falls between the IVCs for English and Koyukon but is closer to that of English.

The Appendix to this paper contains the full data sets for English, Koyukon, and Russian. An interested reader may go back to the original sources (Tomasello 1992 and KAD for English and Koyukon, respectively). As Russian is my native tongue, I composed the Russian list myself. Conventions employed in the construction of the three lists are given in the Appendix.

In terms of semantics, the obtained IVC figures suggest that the Koyukon verb root is generally much less specified semantically than that of English. On the average, it takes 1.5 extra lexical morpheme to produce a verbal lexeme that is comparable in its semantic scope to an English verb. In other words, only about 40% of semantic content typically conveyed by an English verb root is found in a Koyukon verb root; the remaining 60% is rendered by derivational prefixes.

Further questions arise from this result: What kinds of meanings are reified in Koyukon roots? What kinds of meanings are expressed in Koyukon by derivational prefixes? In order to answer these questions, let us consider verb complexity separately for different semantic verb classes.

## 6. The structure of verbal lexeme and lexico-semantic classes

A classification of verbal meanings has been applied to the Koyukon data set. This classification builds upon a number of previous classifications, e.g., Levin (1993). Table 1 shows the 112 Koyukon verbs divided into fifteen semantically

Table 1. *Distribution of verbs in the Koyukon data set according to semantic class. Interesting results (commented upon below) are shaded*

	MISSING FROM KOYUKON; absolute number and percentage of column (f)		PRESENT IN KOYUKON				TOTAL; sum of absolute numbers in columns (b) and (c)
			All	Prime verbs (no derivational affixes); absolute number and percentage of column (c)		Derived verbs (1 or more derivational affixes); absolute number and percentage of column (c)	
(a)	(b)	(c)	(d)	(e)	(f)		
Phasal	2 67%	1	0 0%	1 100%	3		
Existence	2 29%	5	1 20%	4 80%	7		
Location	0 0%	3	2 67%	1 33%	3		
Possession	3 50%	3	0 0%	3 100%	6		
Physical condition	1 100%	0	0	0	1		
Physical impact	0 0%	21	6 29%	15 71%	21		
Manipulation	4 14%	24	4 17%	20 83%	28		
Motion	2 11%	17	7 41%	10 59%	19		
Physiology	0 0%	6	2 33%	4 67%	6		
Perception	1 17%	5	0 0%	5 100%	6		
Emotion	2 29%	5	1 20%	4 80%	7		
Speech/sound	0 0%	7	3 43%	4 57%	7		
Intellectual activity	1 17%	5	0 0%	5 100%	6		
Labor	1 11%	8	1 13%	7 87%	9		
Other	0 0%	2	1 50%	1 50%	2		
TOTAL	19 15%	112	28 25%	84 75%	131		

based classes. The table also includes information on the 19 verbs of the English data set with no counterpart in the Koyukon data. Both the attested and the absent verbs are relevant for the profile of the Koyukon verbal system.

The following observations can be made on the basis of Table 1.

- (i) The most numerous group in Tomasello's list are the verbs of manipulation (such as *hold, open, spill* . . .). Most of these (24) are represented in Koyukon, making up 21% of the Koyukon data set (24 out of 112). The distribution of this largest class into missing (column b) and attested (column c) verbs is very close to the average distribution in the data set as a whole.
- (ii) The second largest group is the verbs of physical impact (*break, rub, kill* . . .). All of these are represented in Koyukon, making up 19% of the Koyukon data set (21 of 112). This suggests that Koyukon attributes the same level of significance to this kind of verbal meaning as English. Like manipulation verbs, Koyukon verbs of physical impact are mostly derived.
- (iii) The third largest group is the verbs of motion (*move, sit down, climb* . . .). 17, or 15%, are found in the Koyukon data set. Motion verbs have a relatively large share of prime (underived) verbs: 41%. See Berez (2007) for a focused study of meaning construction in the Northern Athabaskan verbs of motion.
- (iv) Only the verbs of speech/sound (*talk, sing, call* . . .) and location (*stay, stand*) have a still higher share of prime verbs: 43% and 67%, respectively. It seems Koyukon nuclear vocabulary (root semantics) tends toward motion, location, and speech/sound events.
- (v) In contrast, the verbs of existence (*find, make* . . .), manipulation (*hold, open, spill* . . .), emotion (*like, kiss, cry* . . .) and labor (*work, wash, cook* . . .) have a very high share (between 80% and 90%) of derived formations. These events are conceptualized in Koyukon as complex rather than elementary ones; they require extra derivational morphology in addition to the root.
- (vi) Even more so, the verbs of possession (*have, keep, buy*), perception (*see, listen, smell* . . .) and intellectual activity (*read, play, remember* . . .) are exclusively derived. There are no prime verbs in the Koyukon data set conveying these kinds of meanings.
- (vii) Only one half or less of possession verbs (*have, keep, buy*) and phasal verbs (*stop*) is represented in Koyukon; others (*share, use, wait* . . .) are not. Evidently, these semantic groups of verbs are not typical of Koyukon verbal vocabulary, and Koyukon is different from English in this respect.
- (viii) In contrast, location (*stay, stand*), physiology (*eat, swallow, sleep* . . .), and speech/sound (*talk, sing, call* . . .) verbs, as well as physical impact

verbs mentioned above, are found in Koyukon without exception. With respect to these semantic classes, Koyukon patterns similarly to English.

This analysis shows that a full profile of the verbal lexicon of a language must take into account not only all verbs together, but must also consider individual semantic classes, as different classes may display quite different properties. First, some types of verbal meanings may be dispreferred by a language, in particular because these meanings are conveyed by other linguistic devices, nonlexical or even nonverbal. Second, the basic verbal vocabulary (roots) of a given language may be oriented to particular types of verbal meanings and not oriented to others. Whereas English prefers prime verbs in all classes, in Koyukon some classes are much more preferred than others by verb root semantics.

## 7. Classificatory verb roots

As was pointed out above, Koyukon verb root semantics is generally less specific as compared to English. This general picture averaged across all verbs, albeit accurately stated, obscures some other tendencies typical of Koyukon verbal vocabulary. In some respects Koyukon verb roots are more specific than those of English. This particularly concerns the *classificatory* verb roots. (See Hoijer [1945] for a classic treatment and Aikhenvald [2000: 153–158] for a typological discussion of this phenomenon.)

Koyukon and the other Athabaskan languages have about a dozen verb roots for each of the following meanings<sup>15</sup>:

- ‘be in a position’
- ‘move’ (intr.)
- ‘move’ (tr.).

Classificatory roots are distinguished on the basis of the class membership of the Absolutive argument.<sup>16</sup> Classification is based on features such as animacy, shape, consistency, quantity, size, etc. To appreciate the breadth of the Athabaskan classificatory verb roots, consider a series of clauses depicting various flour/dough products being at rest or in a position. In English, the difference between various flour/dough products is conveyed by the lexical designation of the referent (*the dough lies* vs. *the flour lies* vs. *the bread crumbs lie* vs. *the loaf of bread lies*, etc.), with the same verbal predicate in all instances. In contrast, in Athabaskan languages the difference is conveyed by the lexical differences between verbs, while the nominal lexical item is the same in all cases. In Upper Kuskokwim, the term for flour/dough products is *mega* (borrowed from Russian *muka* ‘flour’, probably through mediation of a neighboring Athabaskan language). All of the Upper Kuskokwim

clauses in (10) translate as ‘*mega* lies, is in a position’, but they have different verbal predicates. In (10), class membership of the Absolutive is indicated for each clause, as well as an approximate translation of the nominal component.

## (10) Upper Kuskokwim

		<i>class of Absolutive</i>	<i>approximate meaning</i>	
a.	mega	<u>’iŋchut</u>	food	a slice of bread lies
b.	mega	<u>’isditak’</u>	wet stuff	dough lies
c.	mega	<u>’isdinil</u>	tiny objects	flour or bread crumbs lie
d.	mega	<u>zidlo</u>	set of objects	several slices of bread lie
e.	mega	<u>’iŋtonh</u>	object in an enclosed container	flour or dough in a sack lies
f.	mega	<u>zikonh</u>	object in an open container	bread on a plate lies
g.	mega	<u>zi’onh</u>	roundish object	a loaf of bread lies

Note that all verbs cited in (10) are morphologically fairly simple. Idiosyncratic transitivity indicators (*ŋ-*, *di-*) are the only derivational affixes appearing in some of these verb forms. Of course, classificatory verb roots can give rise to many derived verbs, just as any other verb root.

Classificatory verbs abound in the Koyukon data set. There are two situations in which classificatory verbs occur. In the first, a series of Koyukon classificatory verbs corresponds to a single English verb. This is the case for the English verb *lift*. It is impossible to translate *lift* in a general sense into Koyukon. One must specify the class of thing that is being lifted: round or flat, single or multiple, etc. As is shown in the Appendix, Koyukon classificatory verbs are not represented in the data set as specific verbs, but rather as schematic structures with a variable classificatory root. For example, *lift* corresponds to the Koyukon structure *nee-k’o#ŋI-CL.POS*. Depending on the semantic class of the Absolutive referent, ‘lift’ is conveyed in Koyukon by a gamut of verbs, all sharing the derivational prefixes *nee-k’o#*, but with different roots and partly idiosyncratic transitivity indicators. Since all verbs in a classificatory series are parallel in structure, they are represented in the data set only once; including all of them would skew the data considerably.<sup>17</sup>

In the second situation, a single Koyukon verb, based on a classificatory root, corresponds to an English verb. This happens when an English verb already specifies the Absolutive argument concretely. For example, *drive* is represented in Koyukon with the structure *G-Ø-ton*, based on the classificatory root ‘elongated object is in a position’. The selectional properties of the English verb *drive* presuppose that the Absolutive is a vehicle. In Koyukon, a vehicle, prototypically a sled, is classified as an elongated object, hence the use of the corresponding classificatory root.

Consider another example, based on the classificatory root meaning ‘plural objects are in a position’:

- (11) Koyukon  
*h-e-k'e-de-laah*  
 AREAL.OBL-to-INDF.ACC-CL.phytogenous-TRANS:PLURAL.be:IMPF  
 ‘s/he is sweeping it’, lit. ‘s/he is holding a bunch of indefinite  
 phytogenous/sprouting objects (= twigs or feathers) towards the area’  
 (KAD: 412)

The activity of sweeping is done with a bundle of objects, e.g., twigs and so the classificatory root (‘plural objects are in a position’) is used, in a historically transitivized form. The verb’s Absolutive argument is thus plural objects, while the area being swept assumes the Recipient role. So the Koyukon equivalent of *sweep*, although a classificatory verb, has a fixed Absolutive argument (plural twigs or feathers).

The most productive root among the concrete classificatory verbs in the data set is *-neek* ‘flat and flexible object moves’. More specifically, these verbs denote an action done with the hand, which is conceptualized as a flat and flexible object; cf. examples (5) and (7) above. The root *-neek* is found in 11 verbs in the data set.

Among the 112 Koyukon items, 35 (that is, 31%) are various verbs (or schematic structures) based on the ‘be in a position’ or ‘move’ classificatory roots. The great majority of these items, 30 of 35, are derived verbs, while the remaining five are prime verbs. This means that 30 of 84 derived verbs (36%) in the data set are based on classificatory roots.

Apart from the classification of Absolutives, there is a range of other semantic elements sometimes included in the meaning of a Koyukon verb root that are absent from English. For example, the root of one of the verbs corresponding to *swim* (the verb (*k'e-*) $\emptyset$ -*laah*, KAD: 380) literally means ‘swim underwater’. The semantic element ‘underwater’ is absent from the lexical meaning of the English verb *swim*. Still, the main tendency of Koyukon roots is that they are semantically more general and abstract as compared to English roots.

## 8. Functions of derivational prefixes

Clearly, the semantics of verb roots is an important part of a language’s lexical-typological profile. Also important are the kinds of meanings that are conveyed by derivational morphemes. Table 2 provides information on the derivational affixes in the Koyukon data set, with the exception of the immediately pre-root transitivity indicators. These are excluded because they constitute a specialized, idiosyncratic class, see discussion above.

Table 2. *Semantic types of derivational affixes in the Koyukon data set*

Semantic type	Examples	Number of affixes attested in data set
Characteristics of participants	'hand', 'phytogenous/sprouting', 'roundish'	33
Aspectual	inceptive, semelfactive, iterative, terminative	12
Direction/location	'away', 'ascending', 'in mouth'	20
Manner	'intensely', 'nicely', 'in sleep', 'verbally'	14
Obscure		34
TOTAL		113

Unfortunately, the function of derivational prefixes is not sufficiently understood. Insufficient knowledge of the complex derivational morphology of Koyukon forced me to include an "obscure" category. Still the major concerns of the language regarding the kinds of derivational elements, added to roots to form verbal lexemes, are clear from Table 2. The most frequent semantic type of Koyukon derivational prefixes is related to participants' characteristics, followed by the direction/location, manner, and aspectual prefix types. Most of these semantic types have been illustrated above, see Examples (3)–(8), (11); also Note 4.

## 9. Conclusions on the typological profile of Northern Athabaskan verbal lexicon

The discussion above allows us to draw several conclusions regarding the typological profile of the Koyukon (and, more generally, Northern Athabaskan) verbal lexical system.

First, Koyukon has a high index of verb complexity, equaling 2.52. This means that on the average, a basic verb has one and a half derivational morphemes. There are numerous basic verbs with two derivational affixes, and three affixes is not infrequent. For comparison, English has an IVC of 1.09, and Russian of 1.48.

Second, in connection with the fact that the lion's share of lexical meaning is conveyed by derivational morphemes, Koyukon verb roots are significantly more abstract or semantically simple as compared to English verb roots. Overall they contain fewer semantic elements<sup>18</sup>.

Third, the morphological and semantic composition of Koyukon verbs differs depending on the verb's semantic class. Koyukon emphasizes in its inventory of verb roots those related to motion and physical impact: roots of these categories give rise to large groups of prime, nonderived verbs, which indicates that these events are often conceptualized as elementary in Koyukon. The numerous verbs of manipulation, however, are mostly derived, as are verbs of existence, labor, and emotion. Verbs of possession, perception, and intellectual activity are all derived; these last categories are generally conceptualized as complex, derived events. Possession and phasal verbs are strongly suppressed.

Fourth, despite the general tendency for semantic abstraction in the verb roots, there are certain highly specific semantic elements often found in the roots, in particular the class membership of the Absolutive argument. Classificatory verbs are salient in Koyukon verbal vocabulary. If we deduct them from the list of Athabaskan verbs compared to the English verbs, the degree of Athabaskan root abstractness, already high according to my calculations, grows significantly.

Fifth, many semantic elements typically contained in the verb root in other languages, are represented by derivational affixes in Athabaskan. The most frequent semantic type of derivational affixes are those that characterize participants of the event in a certain way, and the second most frequent — the direction/location of the event.

Profiling languages along these lines should lead to an integral typology of verbal lexical systems.

## **10. Postscript: prospects for connecting the verbal lexical profile with grammatical characteristics**

This paper is an exploratory case study in the typology of verbal lexical systems and also a first venture into the typological characterization of Athabaskan lexical structures. As we have seen above, Athabaskan appears quite unusual in its verbal lexical system. Although we do not know the indices of verb complexity in most other languages, the fact that the Koyukon IVC is 2.5 times that of English makes it likely that Athabaskan languages are close to a typological maximum, whereas most other languages would fit into a more moderate range. The following question arises: Is this peculiarity of Athabaskan isolated, or is it somehow related to other properties of this language family?

In terms of grammatical properties, Athabaskan languages are quite unusual in several respects, both on the American scene and more generally. The most

obvious peculiarity is that they are almost exclusively prefixing. There are very few languages of comparable morphological complexity, if any, that would be so strongly prefixing (see Kibrik 2002). In order to evaluate how rare the Athabaskan type is in this respect, one can compose two studies from the *World atlas of language structures*, namely “Inflectional synthesis of the verb” (Bickel and Nichols 2008) and “Prefixing vs. suffixing in inflectional morphology” (Dryer 2008). The language sample shared by these two studies includes 135 languages. Among them, only two simultaneously have more than five inflectional categories per word and are strongly prefixing. One of these two languages is Slave, the only Athabaskan language in sample. (The other language is Luvale, a Benue-Congo language of Angola.)

Furthermore, the consistently prefixing pattern is unusually combined with some properties of syntactic ordering (use of postpositions, verb-final order). Athabaskan languages are among the most polysynthetic, verb-centered languages. They display violations of the scope principle (Rice 2000): much of inflection is marked closer to the root than derivation, and the order of inflectional morphemes with respect to the root is typologically exceptional. Finally, Athabaskan has morphophonemics of an unusual degree of complexity and entanglement.

In order to appreciate the overall (not just derivational) morphological complexity of Athabaskan, consider the following form of the same verb ‘see’ as cited in (1a) above.

(12) Upper Kuskokwim

*nontinghiji'el*

no- ni- ti- ni- ghi- s- l- 'el  
again- 2SG.ACC- INC- CL.foundish PROG- 1SG.NOM- DETRANS.TRANS- act:PROG

‘bye’, ‘I will see you next time’

This verb form, also forming a whole utterance, contains at least eight morphemes, compared to the monomorphemic English equivalent *bye*. In this verb form, the word-final root, the pre-root indicator involving the meaning of high transitivity, and the discontinuous derivational prefix *ni-* constitute the lexical frame of the verb form. A number of inflectional morphemes are added on top of that frame. The iterative prefix *no-* conveys the meaning ‘again, next time’. The presence of this prefix entails semantic detransitivization,<sup>19</sup> which is registered in the transitivity indicator *l-* marking both original transitivization and subsequent detransitivization. The idea of future is rendered by a conjunction of three related, but linearly separated devices: the inceptive prefix *ti-*, the progressive prefix *ghi-*, and the root-final element *-l* that used to be a progressive suffix but synchronically is rather interpreted as a feature of the root allomorph.

The second person singular Patientive is expressed by the prefix *ni-*, and the first person singular Principal (roughly, subject) by means of the underlying prefix *s-*. This prefix, in conjunction with the ensuing transitivity indicator *l-*, via an enigmatic morphophonemic process, gives rise to the element *ji-*. Note especially the bizarre order of elements, in which inflectional morphemes are intermingled with derivational ones, and inflectional elements of similar force are found in very different parts of the verb form.

In sum, the Athabaskan languages seem to have a high condensation of what is called “rara and rarissima” in terms of Wohlgemuth and Cysouw (2010). Are these rare properties related to each other, perhaps through some kind of “cross-categorical harmony” (Nichols 1992), or did they simply find their way into Athabaskan by mere coincidence? In particular, and with respect to the immediate topic of this paper, is the typologically unusual lexical profile of Athabaskan related to its typologically unusual grammatical properties?

A conclusive answer to this question is beyond the scope of this paper. But it appears that at least one connection presents itself. The verb-centered, polysynthetic nature of Athabaskan grammar harmonizes with the high index of verb complexity identified above. Both aspects of the verb — grammatical and lexical — point to the abundance of affixes, typical of Athabaskan verb forms. Bickel and Nichols (2008), looking at inflectional synthesis in a sample of 145 languages, consider English belonging to the category “2–3 categories per word”, Russian to “4–5 categories per word”, and the Northern Athabaskan language Slave, quite similar to Koyukon morphologically, to “8–9 categories per word”. One can hypothesize that the cline of inflectional complexity harmonizes with the cline of derivational complexity. Note that English has deviated from the more conservative Indo-European type, as represented for example by Russian, with respect to both derivational and inflectional structure. Perhaps this is more than a mere accident.

Of course, this is only a preliminary hypothesis, one that must be tested systematically with a much greater range of languages. This must involve computing the IVC for a wide selection of languages, which is a laborious task. Even if the general trend is supported it is very likely we may find counter-examples, e.g., of inflectionally simple languages that are simultaneously derivationally complex.

As for other unusual or exceptional grammatical properties of Athabaskan languages, e.g., the violation of the scope principle, they still need to be proven (or disproven) as being connected to the peculiarities of the verbal lexical system and the construction of lexical meaning.

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*Institute of Linguistics,*  
*Russian Academy of Sciences,*  
*and Moscow State University*

**Appendix A. Abbreviations in glosses**

TRANS — indicator of transitivity

DETRANS — indicator of detransitivization

IMPF — imperfective

PF — perfective

PROG — progressive

DUR — durative

RES — resultative

INC — inceptive

NOM — nominative

ACC — accusative

OBL — oblique

INDF — indefinite

SG — singular

CL — classificatory derivational prefix

PEG — morphophonemic peg element

**Appendix B. Verbs on Tomasello's list and their Koyukon and Russian counterparts**

This appendix contains a table summarizing all English, Koyukon, and Russian data used in this study. Some comments are due here regarding the organization of the table and the preparation of the data as they appear in the table.

Column (a) of the table contains the sequential numbering of a verbal meaning, following the order in Tomasello (1992), see below.

Column (b) indicates the verbs' semantic classes. First I indicate the classification employed in Tomasello (1992). In that publication all items are broken into two gross classes: change of state and activities. Each of these classes is further divided by Tomasello into subclasses: change of state verbs into six subclasses and activities into two subclasses. The names of subclasses and their numbers according to Tomasello are all indicated in column (b).

Furthermore, column (b) also indicates affiliation of each verb in one of fifteen classes, in accordance with a more conventional linguistic classification of verbs, see Section 6. This is a semantic classification that addresses verbal meaning rather than lexical items. As a consequence, class membership is not always obvious and is sometimes fluid. For example, in Koyukon a single verb conveys the three different English meanings 'hold', 'squeeze', and 'hug', all belonging to different semantic classes (manipulation, physical impact and emotion, respectively).

**English** (columns c–e)

The order of verbs in the list (column c) is taken from Tomasello (1992: 286–370). The following conventions have been applied in choosing the citation form of English verbs:

- I keep Tomasello’s policy of connecting multi-word verbal expressions with a hyphen: *fall-down*.
- I convert occasional past tense verbs to the normal citation form: *finished* > *finish*, *left* > *leave*.
- I merge different tense forms, such as *give* and *gave*, into one entry (*give*).
- Where there is an *ing*-form in Tomasello’s list, I convert it into a verb: *working* > *work*.
- Where there is both a verb and a participle on Tomasello’s list, I included only the former: *break*, *broken* > *break*.
- I remove object pronouns and other similar elements: *get-it* > *get*, *here-go* > *go*.
- I indicate Absolutive and/or other arguments, where it is necessary to delineate a verb meaning more specifically — for example, *wave (hand)* or *come (about a person)*, as only these specific kinds of Absolutives are found in Tomasello’s examples of verb use.
- Sometimes English verbs are polysemous; where I found it difficult to find in Koyukon even an approximate equivalent of the semantic extent of an English verb, I indicate, usually in parentheses, a submeaning that has a direct counterpart in Koyukon, for example: *swing (on a rope)*.
- For labile verbs, I indicate transitivity: *move* TR, *move* INTR; when only one kind of usage is found in Tomasello’s list, I follow this in my list as well — for example, there is *taste* INTR, but no *taste* TR.

Column (d) shows the number of derivational morphemes in English verbs, and column (e) shows the page in Tomasello (1992) on which the given verb is introduced and exemplified.

**Koyukon** (columns f–h)

Koyukon verbs appear in column (f), number of derivational morphemes in column (g), and reference to a page in KAD in column (h). Explanations are due here regarding the choice of particular Koyukon counterparts of English verbs, regarding the citation form of Koyukon verbs, and regarding the counts of derivational morphemes

Choice of a Koyukon counterpart

- As was explained in Section 7, some verbal meanings are conveyed in Koyukon not by an individual verb, but rather by a series of classificatory verbs with a shared configuration of derivational affixes. See below on schematic representations used in such instances.
- When two different Koyukon verbs, differing semantically only in the number of the Absolutive participant are present, only one verb (the singular one) is included; for example, the verb *le-ggok* ‘run’, listed under #94, indicates movement of singular or dual actors, while there is a different verb for plural actors.

- When two or more Koyukon verbs are found that are derived from the same root and correspond to a single English verb, the simpler one is included.
- When two or more Koyukon verbs from different roots correspond to a single English verb, and one of them seems to be a closer equivalent than the other (e.g., *G-l-tl'aa*h 'lick', as opposed to *Ø-tl'ootl'* 'lick, suck', see KAD: 616), then only the first one is included; when there is a doubt, the meaning of the original English verb is specified through the consideration of examples provided by Tomasello.
- But when there is no reason to prefer one verb over the other, both are included; for example, the equivalents of *swim* are *Ø-baa* 'singular or dual human/animal/bird swims' and *(k'e-)Ø-laah* 'unidentified creatures, normally fish, swim underwater'.
- When no exact semantic equivalent of an English verb is found in KAD, the nearest is chosen.
- When a Koyukon verb corresponds to two or more English verbs, the Koyukon verb is listed only once. In the lines corresponding to other English verb(s) a reference to the first listing is given, and the cell in question is shaded.
- When no Koyukon verb is found, comparable in semantic extent to an English verb, the cell is not filled and the dash (—) is used.

#### Citation form of Koyukon verbs

- Generally I follow the representation of verbal lexemes as they appear in KAD. In this representation, each verbal lexeme consists of two or more morphemes. The rightmost morpheme is the root, and it is immediately preceded by one of the four transitivity indicators (*Ø-*, *de-*, *l-*, and *le-*). Further to the left there may be one or more derivational prefixes.
- Series of classificatory verb roots are indicated by abbreviations CL.POS and CL.MOT, designating positional and motion-related classificatory roots, respectively.
- In the series of classificatory verbs transitivity indicators may vary from one verb to the other, so a generic indicator is shown, marked as TI.
- After KAD, the following transcriptional conventions are employed:
  - (i) Symbol # indicates a morphological boundary within an Athabaskan verb: prefixes appearing to the right of # (so-called conjunct prefixes) are more closely connected to the root, while disjunct prefixes to the left of # constitute morphological periphery (see Kari 1989).
  - (ii) Symbol ## indicates the boundary of a phonological word; elements of lexical representation appearing to the left of ## are supposed to be outside of the verbal phonological word.
  - (iii) Symbol P designates the slot for an inflectional pronominal morpheme, functioning as an object of a postposition. P is always followed by a postpositional morpheme per se, e.g., *P-kk'a*.
  - (iv) Symbol G refers to a set of so-called gender affixes, providing a classificatory characterization of certain verb arguments (as being roundish, or wooden, etc.).
  - (v) Symbol INC refers to nominal roots that can be incorporated into a verb form.

- In distinction from KAD:
  - (i) I replace the plus sign connecting morphemes in KAD by the hyphen;
  - (ii) I remove the symbol O, indicating the presence of a direct object in the verb.

Counts of derivational morphemes

- The number of derivational morphemes cited in column (g) indicates the count of non-zero prefixes in the lexical representation.
- Measures have been taken to not artificially increase the complexity of Koyukon verbs. In accordance with that, the following prefixes were not included in the counts:
  - (i) morphemes that do not appear 100% regularly, e.g., (*de-*) in parentheses;
  - (ii) morphemes that vary with zero morphemes, e.g., zero/non-zero transitivity indicator;
  - (iii) generic transitivity indicators (TI) in series of classificatory verbs;
  - (iv) those derivational morphemes that appear only in some forms of the given verb, particularly gender prefixes (G);
  - (v) those derivational morphemes that appear only in some of the classificatory verbs of a series, such as non-zero transitivity indicators opposed to zero indicators in other verbs;
  - (vi) postpositions that are separate phonological words (separated from the verb by the ## symbol).

**Russian** (columns i–j)

Russian verbs are listed in column (i), and the counts of derivational morphemes in column (j). The following conventions have been applied:

- When more than one Russian verb corresponds to a single English verb, the more vernacular is listed (e.g., *propadat'*, as opposed to *isčezat'* 'go-away', *perestat'*, as opposed to *prekratit'* 'stop').
- Other conventions regarding the choice of a Russian counterpart are similar to those employed for Koyukon, see above.
- Russian verbs are cited in the infinitive form.
- Measures have been taken to not artificially increase the derivational complexity of Russian verbs. In particular:
  - (i) in the pairs "perfective — imperfective", characteristic of the Russian verbal lexicon, those are listed that have fewer derivational affixes; when both aspectual forms have the equal number of derivational affixes, the perfective verb is included;
  - (ii) bases of denominal verbs are not analyzed into morphemes, e.g., in *delat'* 'make' from *del-o* 'action, affair, business', originally containing the *-l* suffix;
  - (iii) thematic submorphs are not included in the counts of derivational morphemes, as they do not have a clear semantic value.
- Obvious derivational suffixes, such as *-(o)va-* (e.g., in *pol'zovat'sja* 'use'), are counted.

	Semantic class	English			Koyukon			Russian	
		English verb (c)	Number of derivational morphemes (d)	Page # in "First verbs" (e)	Koyukon verb (f)	Number of derivational morphemes (g)	Page # in KAD (h)	Russian verb (i)	Number of derivational morphemes (j)
(a)	(b)								
	Change of state								
	1. <i>Presence, absence, and recurrence of objects</i>								
1.	Existence	find	0	287	G-ee-O-ion P-e#hu-de-l-'o gh-G-I-neek	1 4 2	522 56 448	najti	1
2.	Existence	turn-on	1	295	—			vykjučit'	1
3.	Existence	turn-off	1	296	—			vykjučit'	1
4.	Existence	go-away (=disappear)	2	296	(de-ldokk	0	146	propast'	1
5.	Existence	make	0	296	G-I-see	1	620	delat'	0
	2. <i>Presence, absence, and recurrence of activities</i>								
6.	Other	do	0	298	de#l-'aan	2	17–18	SAME AS make, #5	
7.	Other	help	0	299	P-tis e##O-nee <sup>o</sup>	0	441	pomoč'	1
8.	Phasal	stop	0	301	P-e#de-O-tset	2	633	perestat'	1
9.	Phasal	wait	0	303	—			Zdat'	0
10.	Phasal	finish	0	303	—			končit'	0
	3. <i>Exchange and possession of objects</i>								
11.	Manipulation	get	0	304	oo-G-O-neeek	1	454	dostat'	1
12.	Manipulation	hold	0	308	oo-G-O-tun P-aal#ne-l-neeek	1 3	534 447	deržat'	0
13.	Possession	have	0	309	SAME AS <i>keep</i> , #18 d-'aan	1	25	imet'	0
14.	Manipulation	give	0	310	—			dat'	0
15.	Possession	share	0	310	—			delit' sja	1
16.	Possession	use	0	311	—			pol'zovat' sja	2
17.	Possession	buy	0	311	oo-G-O-kkaat	1	325	kupit'	0

	Semantic class	English			Koyukon			Russian		
		English verb	Number of derivational morphemes	Page # in "First verbs"	Koyukon verb	Number of derivational morphemes	Page # in KAD	Russian verb	Number of derivational morphemes	
			(d)	(e)	(f)	(g)	(h)	(i)	(j)	
18.	(b) Possession	keep	0	311	G-I-CL.POS	1	e.g., 41, 407	—		
19.	Possession	leave	0	311	—			ostavit'	1	
	4. Location of objects									
	5. Movement of objects									
20.	Motion	move INTR	0	327	(de-)G-TI-CL.MOT	0	766	dvigat' sja	1	
21.	Motion	move TR	0	327	(de-)G-TI-CL.MOT	0	e.g., 470	dvigat'	0	
22.	Location	stay	0	327	(INC)#TI-CL.POS	0	e.g., 408	ostat' sja	2	
23.	Motion	go (about a person)	0	328	Ø-yo°	0	700	idti	0	
24.	Motion	come (about a person)	0	328	SAME AS go, #23			ujti	1	
25.	Manipulation	bring	0	329	P-e#ghe-le-no	3	484	prijiti	1	
26.	Manipulation	take	0	330	SAME AS get, #11			prinesti	1	
27.	Motion	get-out	1	331	daa#Ø-yo°	1	106	brat'	0	
28.	Motion	get-down	1	331	—			vylezti	1	
29.	Motion	get-off	1	331	—			slezt'	1	
30.	Manipulation	put	0	332	nee#Ø-°o	1	50	SAME AS get-down, #28		
	6. State of objects							klast'	0	
31.	Manipulation	open TR	0	333	yaas'e#tte-I-CL.POS	2	e.g., 522	otkryt'	1	
32.	Manipulation	close TR	0	334	do#oo-ghe-de-TI-CL.POS	4	e.g., 575	zakryt'	1	
33.	Motion	fall-down	1	335	SAME AS move INTR, #20			padat'	0	
34.	Motion	drop	0	336	SAME AS move TR, #21			ronjat'	0	
35.	Manipulation	spill	0	336	G-Ø-nel	0	466	prolit'	1	
36.	Physical impact	fix	0	337	de#Ø-loh	1	710	čmit'	0	
37.	Physical impact	break	0	337	P-e-l'ee#ha-l-°o	4	56	lomat'	0	
					G-Ø-yets	0	695	lomat'	0	
38.	Physical impact	tear	0	338	G-Ø-ssoo	0	647	razbit'	1	
39.	Physical impact	crack	0	338	G-Ø-ggool	0	213	rvat'	0	
					SAME AS break, #37		695	kolot'	0	

(a)	(b)	English			Koyukon			Russian	
		English verb	Number of derivational morphemes	Page # in "First verbs"	Koyukon verb	Number of derivational morphemes	Page # in KAD	Russian verb	Number of derivational morphemes
		(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
	<b>Activities</b>								
	<i>I. Activities involving objects</i>								
40.	Labor	sweep	0	338	P-e#de-Ø-lo°	2	412	podmesti	1
41.	Labor	brush	0	338	—			—	
42.	Labor	wash	0	338	P-e-to#G-Ø-lo°	2	412	myt'	0
43.	Labor	clean	0	339	no#G-l-zoo	2	743	č'iat'	0
					P-e#(k'e-)de-l-tlet	3	576		
44.	Labor	paint	0	339	de-Ø-ben	1	97	krasit'	0
					G-Ø-tseek	0	625		
45.	Physical impact	hammer	0	339	G-Ø-tlet	0	577	bit'	0
					ne-l-g'heh	2	244		
					de-G-l-nen	2	473		
46.	Manipulation	lock	0	339	—			zaperet'	1
47.	Intellectual activity	draw (picture)	0	340	de-ne-Ø-l-et	2	400	risovat'	1
48.	Intellectual activity	read	0	341	P-e-do#hæ-de-le'-aan	5	27	č'isit'	0
49.	Labor	work	0	341	kk'o#id-neek	2	444	rabotat'	0
50.	Intellectual activity	write	0	341	de-ne-l-dek	3	128	pisat'	0
51.	Physical impact	cut	0	341	G-Ø-t'oil	0	553	rezat'	0
52.	Labor	cook	0	342	P-e-kk'o#no#-neek	3	446	gotovit'	0
53.	Manipulation	cover	0	342	P-ne#de-l-kool	3	302	ukryt'	1
54.	Manipulation	button	0	342	—			zastegnut'	2
55.	Motion	ride	0	342	G-l-e-baalt	1	82	exat'	0
					(k'e-)de-l-g'heh	2	273		
56.	Motion	drive	0	342	G-Ø-ton	0	522	vesti	0
					SAME AS roll/TR (I), #60				
57.	Manipulation	bump	0	343	P-e#h-kk'eyh	2	346	stuknut'	1
58.	Manipulation	catch (object)	0	343	oo-G-Ø-neek	1	454	lovit'	0
59.	Motion	throw	0	343	(de-)G-Tl-CL.MOT	0	766	brostit'	0
60.	Manipulation	roll TR	0	343	G-l-baalt	1	82	kaait'	0
					G-l-toi <sup>30</sup>	1	529		

	Semantic class	English		Koyukon		Russian			
		English verb	Number of derivational morphemes	Page # in "First verbs"	Koyukon verb	Number of derivational morphemes	Page # in KAD	Russian verb	Number of derivational morphemes
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
61.	Manipulation	kick	0	343	Ø-toil	0	530	pinat'	0
62.	Physical impact	hit	0	344	G-l-dzets	1	174	udarit'	1
63.	Manipulation	touch	0	344	P-e#ŋhe-de-Ø-no	3	484	trogat'	0
64.	Manipulation	pat	0	344	—	—	—	slépat'	0
65.	Manipulation	stick (a body part)	0	344	G-Ø-yel	0	690	sovat'	0
66.	Physical impact	squeeze	0	344	P-e#(k'e-)G-l-kkəyħ	3	346	sžat'	1
67.	Physical impact	rub (liquid into smth)	0	344	SAME AS hold (2), #12	1	444	vīrat'	1
68.	Physiology	eat	0	344	P-e#Ø-neck	0	285	est'	0
69.	Physiology	drink	0	345	G-Ø-(h)on	1	492	pit'	0
70.	Physiology	swallow	0	346	de-noon	2	222	glotat'	0
71.	Physical impact	bite	0	346	te-G-le-ŋguts	2	465	kusat'	0
72.	Physical impact	chew	0	346	P-aat#de-le-gutis	2	635	ževat'	0
73.	Physical impact	lick	0	346	de-le-tset	0	66	lizat'	0
74.	Physical impact	blow	0	347	G-Ø- 'oil	1	589	lizat'	0
75.	Intellectual activity	play	0	347	G-l-l' aah	2	720	duť	0
76.	Emotion	kiss	0	347	de-t-yutl	3	66	igrat'	0
77.	Emotion	hug	0	347	soo#de-le- 'oíl	2	673	celovat'	1
78.	Physical impact	kill	0	348	ne-t's' oo'	2	579	obnjat'	1
79.	Motion	step-in	1	348	P-aa-dbozoos#Ø-tlelyħ	2	—	ubit'	1
80.	Manipulation	pick	0	348	SAME AS hold (2), #12, and sjeze, #66	2	227	nastupit'	1
81.	Physical impact	wipe	0	348	G-l-l'-ghaa	2	29-30	sobrat'	1
82.	Physical impact	burn TR	0	349	de-le- 'aatl	2	279	vīretet'	1
83.	Manipulation	push	0	349	oo-ne-Ø-(h)aa	3	114	zažec'	1
84.	Manipulation	pull (vehicle)	0	349	P-e#(k'e-)de-t-tlet	2	363	tolkat'	0
85.	Manipulation	lift	0	349	P-e#de-t-neck	3	447	tjanut'	1
86.	Manipulation	pour	0	349	G-Ø-egges	0	207	podnjat'	1
					nee-k' oo#l-Cl. POS	2	e.g., 316	lit'	0
					SAME AS spill, #35	2	466		

(a)	Semantic class	English			Koyukon			Russian		
		English verb (c)	Number of derivational morphemes (d)	Page # in "First verbs" (e)	Koyukon verb (f)	Number of derivational morphemes (g)	Page # in KAD (h)	Russian verb (i)	Number of derivational morphemes (j)	
	<b>(b)</b>									
	2. Activities not involving objects									
87.	Motion	sit-down	1	350	ne-Ø-dø	1	143	sest'	0	
88.	Motion	lie-down	1	350	ne-Ø-taa	1	496	leč'	0	
89.	Motion	climb	0	350	P-ghaa#ghie-de-ee-yo°	4	229	zalezit'	1	
90.	Location	stand	0	350	Ø-(h)jaa	0	279	stojat'	0	
					ghie-le-ø°	2	62			
91.	Motion	jump	0	350	le-tluh	1	588	prygat'	0	
92.	Motion	walk	0	351	SAME AS <i>gr.</i> , #23, and <i>come</i> , #24			SAME AS <i>gr.</i> , #23		
93.	Motion	swim	0	351	Ø-baa	0	74	plyt'	0	
					(k'e)-Ø-jaah	0	380			
94.	Motion	run	0	351	le-ggok	1	211	bežat'	0	
95.	Emotion	cry	0	351	Ø-tsaah	0	617	plakat'	0	
96.	Speech/sound	sing	0	351	P-#de-Ø-lee°	2	386	pet'	0	
97.	Physiology	sleep	0	351	be#ne-le-ten	3	511-512	spat'	0	
98.	Speech/sound	scream	0	352	Ø-ts'okk	0	674	kričat'	0	
					Ø-kk'ok	0	362			
99.	Physiology	pee	0	352	Ø-lets	0	401	pisat'	0	
100.	Manipulation	wave (hand)	0	352	ne-lo#de-Ø-ø	2	55	maxat'	0	
101.	Manipulation	clap	0	352	ne-lo#de-le-t'usk	4	559	xlopat'	0	
102.	Motion	swing (on a rope)	0	352	G-le-tis'ok	1	672	kačat'sja	1	
103.	Perception	see	0	353	ne-l' aan	2	21	videt'	0	
104.	Perception	look	0	354	SAME AS <i>see</i> , #103			smoret'	0	
105.	Perception	watch	0	354	oo/de-l' aan	2	22-23	SAME AS <i>look</i> , #104		
106.	Perception	taste INTR	0	355	le-neyh	1	453	—		
107.	Perception	smell TR	0	355	G-lason	1	643	njuxat'	0	
108.	Perception	listen	0	355	oo-le-t-l' on	3	609-610	šušač'	0	
109.	Perception	feel	0	355	—			čuvstvovat'	2	
110.	Physical impact	hurt TR	0	355	P-#de-ee-Ø-neck	3	452	—		
111.	Physical condition	hurt INTR	0	355	—			bolet'	0	
112.	Manipulation	try (clothes)	0	356	P-#foo-te-le-yoooh	4	719	merjat'	0	
113.	Intellectual activity	mean (to do smth)	0	356	—			namerevat'sja	3	
114.	Emotion	like	0	356	oo-ne-Ø-neck	2	454	nnavit'sja	1	

	Semantic class	English		Koyukon		Russian			
		English verb	Number of derivational morphemes	Page # in "First verbs"	Koyukon verb	Number of derivational morphemes	Page # in KAD	Russian verb	Number of derivational morphemes
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
115.	Emotion	love (food)	0	357	P-kk a##de-Ø/de-lo	1	405	ljubit'	1
116.	Emotion	want	0	357	—	—	350	xoet'	0
117.	Emotion	need	0	357	—	—	—	nuzdat'sja	1
118.	Speech/sound	tell	0	358	P-e#(de-)/Ø-nee°	1	438	govorit'	0
119.	Speech/sound	call	0	358	Ø-zecf	0	729	zvat'	0
120.	Speech/sound	talk	0	358	P-yef##he-(nc)-Ø-yo°	1	704	razgovarivat'	2
121.	Speech/sound	say	0	358	de-Ø-nee°	1	436	skazat'	1
122.	Intellectual activity	remember	0	358	P-e-no#le-neck	3	451-453	pomnit'	1

## Notes

1. This article is a revised version of a paper given at the conference of the Association of Linguistic Typology held in September 2003 in Cagliari, Italy. Additional research underlying this study has been supported by the Russian Foundation for the Humanities grant #11-04-00153, as well as by the OIFN RAN project "Discourse structure, grammar, and their interaction: typological aspects". I am very grateful to the guest editors of this issue, Andrea Berez, and the two anonymous reviewers for their highly valuable comments on various drafts of this paper. I also thank Olga Fedorova and Gertraud Fenk-Oczlon for the help they provided during the preparation of the final version. Correspondence address: Institute of Linguistics, Russian Academy of Sciences, B. Kislovskij per. 1/12, Moscow 125009, Russia. E-mail: aakibrik@gmail.com.
2. In the final stages of preparation of this paper I became familiar with Viberg (2006). This study bears some resemblance with the present study in that it also sets the goal of an integral characterization of the verb system of a language, even though the methodology applied is very different.
3. I underline lexical morphemes in the examples. "Lexical", in my understanding, includes those morphemes that participate in the formation of lexemes, that is, roots and derivational affixes. Lexical morphemes are opposed to the morphemes responsible for the formation of inflectional word forms.
4. Northern Athabaskan languages have a small set of classificatory derivational prefixes called "noun class markers" (Rice 2000) or "gender" (Kari 1989), in accordance with their semantic potential: they break situation participants (implied instrument, in this particular case) into several classes, among which are "roundish", as well as "phytogenous" (see example (1b)). Note that classificatory derivational prefixes are entirely independent from the classificatory verb roots discussed in Section 7.
5. The list contains other items that I disregard in this study, such as combinations of verbs with other content words (e.g., *let-go*, *leave-alone*), participles that cannot be easily replaced by a semantically equivalent verb (*gone*, *stuck*, *scared*), nonverbal predicative words (*over*), adjectives (*sorry*, *hungry*), nouns (*morning*, *turn*), pronominal words (*self*, *other*), demonstratives (*here*, *there*), question words (*where*), adverbs (*more*, *again*, *too*, *back*), prepositions and prepositional phrases (*with*, *with-me*, *on*, *out*, *under*), forms of address (*hi*, *bye*, *hush*, *thanks*), and interjections (*woops*).
6. Using specifically Upper Kuskokwim in those examples is essential, as Upper Kuskokwim is the language on which I do first-hand research and for which I possess exhaustive information on its morphological structures, including inflection.
7. Or perhaps my inability to think of an English synonym that would be found in the KAD index.
8. As was pointed out by an anonymous reviewer, there may be periphrastic ways to convey these meanings in Koyukon.
9. More specifically, the meanings 'hurt (intr.)' and 'want' are primarily conveyed by predicative nominals *eba* and *-kk'aat*, respectively, see KAD: 77, 350. The meaning 'finish' is rendered by various aspectual affixes, such as the quasi-inflectional prefix *kk'aa-*, see KAD: 350. The meanings 'lock', 'share', and 'use' are expressed by postpositions *-ts'uḡhtu* 'obstructing', *-gho* 'for, sharing' and *-t'o* 'by means of, using', respectively, see KAD: 676, 247, 551. The meaning 'wait' can be expressed either by the postposition *-nodebaa* 'awaiting' or by interjection *tlaa* 'wait!' (see KAD: 76, 561). Finally, the meaning 'give' can be rendered by the postposition *-ts'en* 'to, toward' or by the particle *nedaa* 'give it to me!' (see KAD: 664, 106).

10. For example, among the candidate equivalents of *lick* are the Koyukon verbs *G-l-tl'aah* 'lick' and *Ø-tl'ool* 'suck, lick'. Only the first one is included as it provides a more direct correspondence to the original English verb. See Appendix for further conventions used in choosing a Koyukon counterpart for an English verb.
11. Note that randomly choosing one of the Koyukon equivalents might significantly affect subsequent results, in the instances where different Koyukon equivalents have a different number of lexical morphemes.
12. The situation with this verb is in fact still more complex: it is a classificatory verb (see Section 7) implying a singular, normally animate, participant, as opposed to two parallel verbs with a dual and a plural participant. As with other classificatory verbs, only one representative of this group is included in the data set.
13. It goes without saying that Koyukon contains many prime verbs that are not included into the data set, for the simple reason that the original Tomasello's list did not contain equivalent English verbs. Information about such prime verbs is not captured in this study, which is sample oriented rather than aiming at an exhaustive description of a language's lexicon.
14. Exact identification of lexical morphemes is somewhat confusing in the case of verb roots. Athabaskan languages demonstrate an extremely high variation of verb roots in different tense-aspect-modality forms. Particularly variable is the end of the verb root, coinciding with the end of the verb form. (Cf., for example, the allomorphs *-neeyh* and *-neek* of one and the same root in examples (5) and (7).) Historically, verb roots used to be followed by aspectual suffixes. These suffixes fused with the root morphemes so tightly and irregularly that it is nearly impossible to single them out as segmental units in modern languages (Leer 1979, Eddington and Lachler 2010). In the descriptions of individual Athabaskan languages this phenomenon is usually understood as root variation rather than suffixation. In this sense, underlining the whole of the root allomorph as a lexical morpheme is controversial, as a part of the material of this allomorph and all the more so a part of its meaning is inflectional rather than lexical.
15. The abundance of these roots does not contradict the total numbers of location and movement verbs in Table 1. As is explained below, a series of classificatory verbs with different roots was represented in the data set by a single item.
16. Athabaskan languages are consistently accusative in their alignment, as far as the encoding of clause participants' roles is concerned. For example, in (4) one can see a second person singular pronoun appearing in the Nominative morphological position, whereas in (3) there is a third person pronoun in the Accusative position. (Head-marked positions serve as equivalents of nominal cases, including Nominative, Accusative, Dative, and Oblique; see Kibrik 2012 for a detailed argument in favor of this treatment of Athabaskan morphology.) However, verb semantics, as is often the case in the world's languages, operates on the ergative basis: it is the Absolutive argument's class affiliation that is relevant for it. This is particularly evident in classificatory verbs: in intransitive verbs what is classified is the Sole participant of the situation, while in transitive verbs it is the Patientive participant. The conjunction of Sole and Patientive is what is understood here as the semantic hyperrole Absolutive, following the terminology proposed in A. E. Kibrik (1997).
17. In some instances, however, the information in KAD was insufficient, and even though the full series of classificatory roots is likely to correspond to a single English verb, only one specific representative, found in KAD, was listed in the data set. For example, the meaning 'put' figures in the data set not as a schematic representation, but as the specific verb *nee#Ø-'o*, implying a compact roundish Absolutive participant. From the point of view of the calculative analysis offered in this paper, having a representative of a series or a schematic representation does not make any difference.

18. An interesting research question would be to check on Athabaskan evidence the generalization by Fenk-Oczlon and Fenk (2008: 58) that the structures of high morphological complexity are less polysemous compared to the morphologically simple structures.
19. Michael Krauss (personal communication) suggests that detransitivization in this case may be rather due to the implicit reciprocity of the clause.
20. This root is homophonous to the root of the immediately following verb, due to a merger of two consonant series in Koyukon.

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