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On the Complexity of Standard Negation

Abstract

From an information-theoretic viewpoint, the complexity of a phenomenon can be defined in terms of the length of the description it requires. With this background, grammatical complexity may be approached using as criteria the number of grammaticalized distinctions in a functional domain and the extent to which the expression of these distinctions conforms to the one-meaning-one-form principle. The standard negation structures found in the world's languages may be divided into two basic types, symmetric and asymmetric negation, according to whether or not there are structural differences between affirmatives and negatives in addition to the presence of negative markers. According to the proposed criteria of complexity, asymmetric negation under its different manifestations is generally more complex than symmetric negation.

1.   Introduction

In this article I will examine the typology of standard negation from the point of view of language complexity.[1] Standard negation (henceforth SN) can be characterized as the basic ways languages have for negating declarative verbal main clauses. I will first address the notion of language complexity and introduce some criteria for cross-linguistic comparison (section 2). Then I will briefly present my typological classification of SN (Miestamo 2003, 2005) and discuss some of its aspects in terms of the proposed criteria of complexity (section 3). The aim of this paper is twofold: on the one hand, it will seek answers to the question what is simple and what is complex in the typology of negation, and on the other, it

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[1] I see the combination of the two themes as especially appropriate in the present volume, since Fred Karlsson was the supervisor of my dissertation on negation (Miestamo 2003) and he also got me interested in questions of language complexity. I am grateful to John McWhorter, Kaius Sinnemäki, and the two reviewers for their comments on the manuscript of the paper.

will discuss the notion of complexity taking examples from the typology of negation.

2.   On Complexity

Grammatical complexity has recently attracted the attention of a growing number of linguists, and as typologists have also become interested in the issue, the question of the comparability of languages in terms of complexity has become relevant. The most explicit criteria for cross-linguistic comparison are found in McWhorter (2001) and Kusters (2003), and I will discuss their approaches in this section. Complexity can be and has been approached from two different points of view: absolute and relative (Miestamo, in press). The absolute (or theory-oriented) point of view looks at complexity in terms of the number of parts in a system, or in information-theoretic terms (Shannon 1948) as the length of the description a phenomenon requires (cf. Dahl 2004). The relative (or user-oriented) point of view pays attention to the users of language and defines as complex what makes processing, acquisition or learning more difficult. Note that some linguistic property may be easy for a given group of language users, e.g. speakers, hearers, children acquiring their native langue, or 2nd language learners, while at the same time causing difficulties to another one of these groups.[2] When approaching complexity from the relative point of view, one must therefore address the question "complex to whom" (cf. Kusters 2003). The concrete criteria used in absolute and relative definitions of complexity may in many cases look very much alike, but as these definitions have different bases, the motivations to use a given criterion and the way it is to be interpreted are different.

McWhorter (2001) proposes a metric for measuring the overall grammatical complexity of languages, paying attention to overt signalling of distinctions on different levels of language:[3] a grammar is more complex

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[2] E.g. redundant agreement may cause difficulty to speakers and L2 learners, but can be more helpful for hearers and L1 learners, while fission (one meaning-many forms syntagmatically) is preferred by hearers but causes difficulties for the three other types of language users (see Kusters 2003: 51–52, 56–57).

[3] This is one of the few attempts (and perhaps the most explicit one) to challenge the so-called equi-complexity hypothesis, i.e. the received view that all languages are equal in their overall complexity, and complexity in one domain is always compensated by simplicity in another.

than another to the extent that 1. its phonemic inventory has more marked members, 2. its syntax requires the processing of more rules, 3. it gives overt and grammaticalized expression to more fine-grained semantic and/or pragmatic distinctions, and 4. to the extent it uses inflectional morphology. Note that although criterion 2 overtly refers to processing, McWhorter states (ibid. 134–135) that his metric is ultimately about the length of the descriptions that grammars require, and is thus intended to be based on an absolute definition of complexity. The purpose of the metric is to support the thesis that the world's simplest grammars are creole grammars. Many aspects in the metric are open to criticism (see e.g. the commentaries in the issue of *Linguistic Typology* where it originally appeared), and any similar attempt to measure overall grammatical complexity of languages faces the following general problems: the problem of representativity—it is not possible to exhaustively take into account all relevant aspects of the grammar of a language—and the problem of comparability—the contributions of different grammatical domains to overall complexity are incommensurable; although we may be able to compare e.g. (parts) of the morphological complexity of two languages, there is no way to decide what the contribution of morphological complexity is to overall complexity and how it differs from the contribution of e.g. syntactic complexity. I have addressed these problems in more detail in (Miestamo, in press). Because of these problems, it is very difficult to study overall complexity from a general typological perspective,[4] and when approaching grammatical complexity from a cross-linguistic point of view, one must concentrate on the complexity of specific grammatical domains. The criteria proposed by McWhorter can prove to be useful in these studies.

Kusters (2003) examines changes in the complexity of verbal inflection in a few genealogically defined language groups and relates them to sociolinguistic differences in the speech communities. He defines complexity in relative terms taking the difficulties experienced by adult learners of language as criterial. Central to his view are the following three principles, the violation of which is taken to increase complexity: 1. economy—restriction of the number of overtly signalled categories, 2. transparency—clarity of the relation between meaning and form (one-

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[4] McWhorter's metric may be able to reveal overall complexity differences when they are very clear and when the different criteria do not give conflicting results; it does not seem implausible to say that this is indeed the case with creoles and the metric seems to work for the purpose it was originally designed for.

meaning-one-form), and 3. isomorphy—identity of the order of elements in different domains. Kusters examines several aspects of verbal inflection susceptible of causing difficulty to different types of language users and that could thus be potentially seen as complexifying factors in verbal morphology. The principle of economy is relevant when addressing questions such as whether verbal inflection overtly signals agreement or categories like tense, aspect or mood. The principle of transparency is evoked when dealing with phenomena like allomorphy (one meaning–many forms paradigmatically), homonymy (many meanings–one form paradigmatically), fusion (many meanings–one form syntagmatically) and fission (one meaning–many forms syntagmatically). The principle of isomorphy is called for when the order of inflectional affixes expressing given verbal categories is compared to cross-linguistic preferences in the mutual ordering of affixes expressing these categories. As such, the principles proposed by Kusters allow for a detailed treatment of morphological complexity even beyond verbal inflection, and in fact, as they are quite general in nature, there is no reason why their applicability should be restricted to morphological complexity.[5]

I will now present my own view of how to proceed in comparing languages in terms of complexity. The above-mentioned fact that a given linguistic property may cause difficulties to one type of language users but be easy for another causes problems for a relative approach to complexity; Kusters' choice of L2 learners is suitable for the sociolinguistic orientation in his study, but choosing one group and not another as criterial for

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[5] As noted above, absolute and relative approaches to complexity may pay attention to similar things, and many connections can be found between McWhorter's criteria and Kusters' principles. As to criterion 4, McWhorter (2001: 137–138) points out that inflection does not necessarily increase complexity, but inflection often renders a grammar more complex in that it tends to be accompanied by complexifying factors such as morphophonemics, suppletion, and allomorphy, and may involve "useless" (redundant) agreement. The first three of these affect the clarity of the relationship between meaning and form, i.e. they violate Kusters' transparency, whereas redundant agreement can be defined as complex in that it violates the principle of economy. Criterion 3, the number of overtly signalled semantic/pragmatic distinctions, although not restricted to inflectionally signalled meaning distinctions, translates to Kusters' principle of economy. As to criterion 1, since the presence of marked phonemes implies the simultaneous presence of unmarked ones—small inventories tend to contain cross-linguistically unmarked phonemes only (see McWhorter 2001: 135–136), the number of marked members in phoneme inventories is really about the size of inventories, and this criterion can thus also be seen in terms of the principle of economy.

complexity would be arbitrary when talking about complexity in more general terms. I would therefore argue for an absolute approach to complexity, defining a complex phenomenon in information-theoretic terms as something requiring a longer description than a less complex phenomenon; the question how difficult each phenomenon defined as complex or less complex is to process or learn can be addressed separately. In typology, cross-linguistic comparability is usually achieved by basing comparison on function, not form. As suggested in Miestamo (in press), morphosyntactic complexity may be approached by dividing the field of study in terms of functional domains, e.g. aspect, tense, evidentiality, or definiteness, and one can then make cross-linguistic generalizations about the complexities of these domains and look for typological correlations between the complexity or simplicity of different domains. Within each functional domain, attention can be paid to grammatical meaning, i.e. the semantic/pragmatic functions languages express grammatically, and the formal encoding of grammatical meaning. In the study of grammatical meaning, attention can be paid to the number of functional distinctions made in each domain (cf. McWhorter's criterion 3 and Kusters' principle of economy), irrespective of the formal coding means by which the constructions expressing these functions are formed; abstracting away from other complications, we may say that a language where more grammaticalized distinctions are made in a given functional domain, requires a longer description for that functional domain than a language where less distinctions are made.[6] This may be simply called the principle of less distinctions. In studying the formal encoding of grammatical meaning, we pay attention to the relationship between the functional and formal aspects of the meanings grammaticalized in each domain. The one-meaning-one-form principle (cf. Kusters' principle of transparency) is central in examining the relationship, and it can be connected to complexity in the absolute sense as follows: if the morphosyntactic coding of a function strictly adheres to the one-meaning-one-form principle, it can in

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[6] The length of a description naturally depends on the theory in terms of which a phenomenon is described, but on the general level that we are speaking here, the principles are likely to translate into length of description in similar ways in any theory. If languages are described in their own terms and not in terms of categories imposed by other languages, a large number of aspectual distinctions, for example, will require a longer description than a small one. (The interaction of the aspectual system with other functional domains may of course require a longer description in the language with a smaller number of distinctions).

most cases be given a shorter description than one where the principle is violated. Keeping in mind these two principles and the general idea of seeing complexity in terms of length of description, we may now turn to complexities in the functional domain of polarity.

3.   On the Complexity of Standard Negation

On the basis of a sample of 297 languages, Miestamo (2003, 2005) proposes a classification of the SN structures found in the world's languages. The basic distinction in the classification is between symmetric and asymmetric negation. In symmetric negatives there are no structural differences in comparison to the corresponding affirmatives in addition to the presence of (a) negative marker(s), whereas in asymmetric negation additional structural differences can be found. The symmetry–asymmetry distinction can be seen from the point of view of constructions on the one hand and from the point of view of paradigms on the other. Consider the examples in (1)–(4).[7]

(1)   Swedish (Indo-European: Germanic; personal knowledge)
     a. *Fred fyll-er   60 år*   b. *Fred fyll-er   inte 59 år*
       Fred fill-PRES 60 year.PL   Fred fill-PRES NEG   59 year.PL
       'Fred is turning 60.'   'Fred is not turning 59.'

(2)   Finnish (Uralic: Finnic; personal knowledge)
     a. *Fred täyttä-ä*   *60 vuot-ta*   b. *Fred ei*   *täytä*   *59 vuotta*
       Fred fill-PRES.3SG   60 year-PART   Fred NEG.3SG fill.CNG 59 year-PART
       'Fred is turning 60.'   'Fred is not turning 59.'

(3)   Swedish (Indo-European: Germanic; personal knowledge)
     a. *sjunga* 'to sing'   AFFIRMATIVE   NEGATIVE

	AFFIRMATIVE	NEGATIVE
PRESENT	*Fred sjunger*	*Fred sjunger inte*
PAST	*Fred sjöng*	*Fred sjöng inte*
PERFECT	*Fred har sjungit*	*Fred har inte sjungit*
PLUPERFECT	*Fred hade sjungit*	*Fred hade inte sjungit*

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[7] The following abbreviations are used in the glosses: 3 = 3rd person, CNG = connegative, FUT = future, IRR = irrealis, NEG = negative/negation, NPST = nonpast, PART = partitive, PL = plural, PRES = present, RMPST = remote past, SG = singular, TDPST = today past, YDPST = yesterday past.

(4)   Maung (Australian: Iwaidjan; Capell & Hinch 1970: 67)
       a. *ŋi-udba*   b. *ni-udba-ji*   c. *marig   ni-udba-ji*
          1SG.3-put   1SG.3-put-IRR.NPST   NEG   1SG.3-put-IRR.NPST
          'I put.'   'I can put.'   'I do/shall not put.'

Symmetric constructions, as in the Swedish examples in (1), simply add a negative marker to the corresponding affirmative, whereas asymmetric negative constructions show further structural differences in comparison to the corresponding affirmatives—in Finnish (2) person marking appears on the negative marker instead of the lexical verb which then appears in the non-finite connegative form. In symmetric paradigms, see the Swedish examples in (3), there is one-to-one correspondence between the members of the (verbal etc.) paradigms used in affirmatives and in negatives, whereas in asymmetric paradigms such one-to-one correspondence does not obtain—in Maung a distinction between realis and irrealis is made in the affirmative (4a,b), but negatives obligatorily use the irrealis verb form (4c), neutralizing thus the distinction between these two categories; the correpondence between the members of paradigms used in affirmatives and negatives is not one-to-one and there is paradigmatic asymmetry in Maung. Asymmetric negation can be further divided into subtypes according to the nature of the asymmetry, but I will not go into these subtypes here. 40 % of the sample languages have no asymmetry (constructional or paradigmatic), 42 % have both symmetric and asymmetric SN, and in 17 % SN is always asymmetric.[8]

    I will now look at the main aspects of this typology in the light of the criteria of complexity discussed above. Symmetric negative constructions are less complex than asymmetric ones. In the Swedish examples in (1), where the negative construction consists of adding the negative marker *inte* to the clause to be negated, none of the principles discussed above is violated—for example, there is no fusion or allomorphy that would constitute violations of the one-meaning-one-form principle.[9] Asymmetric negative constructions involve different kinds of deviations from the simple pattern represented by symmetric constructions thus showing a higher

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[8] The numbers given in this paper are based on an areally and genealogically balanced subsample of 179 languages (see Miestamo 2005).

[9] Symmetric constructions may of course involve some complexities not due to asymmetry; for example, double (discontinuous) negative markers, e.g. *ne… pas* in Standard French, violate the principle of one-meaning-one-form since they involve fission. The negative construction in French is symmetric since the negative markers are simply added to the corresponding affirmative with no further structural differences.

degree of complexity. From the information-theoretic point of view, asymmetric constructions are more complex than symmetric ones since their descriptions are necessarily longer than the descriptions of symmetric constructions where only the presence of the negative marker needs to be specified, cf. the Finnish examples in (2) where the description must also take into account the change in the finiteness of the lexical verb. Violations of the one-meaning-one-form principle are easy to see in many asymmetric constructions. In Diola-Fogny (5) the marking of the future changes in the negative, being marked by a portmanteau negative-future marker; this negative construction is asymmetric.

(5)   Diola-Fogny (Niger-Congo: Northern Atlantic; Sapir 1965: 33)
       a. *pan-i-maŋ*   b. *lɛt-i-maŋ*
          FUT-1SG-want   FUT.NEG-1SG-want
          'I will want.'   'I won't want.'

The future negative construction violates the one-meaning-one-form principle in that it involves fusion, the two meanings—future and negation—being expressed in one form syntagmatically. Furthermore, as the affirmative and the negative have different forms for the future, one-meaning-one-form is also violated in the sense that one meaning—future—is expressed with two forms paradigmatically. As to the frequency of symmetric vs. asymmetric constructions, 46 % of the sample languages have at least some constructional asymmetry whereas symmetric constructions are found in 83 % of the sample languages.

Symmetric paradigms can also be regarded as less complex than asymmetric ones. In Amele (6), in the past, the three-way distinction between today, yesterday and remote past made in the affirmative is lost in the negative that has only one past tense form; there is thus paradigmatic asymmetry in Amele past negatives.

(6)   Amele (Trans-New Guinea: Madang; Roberts 1987: 224–225)

a. *f-ec* 'to see'	TDPST	YDPST	RMPST	NEG.PST
1SG	*fi-g-a*	*fi-g-an*	*fe-em*	*qee +fe-l-em*
2SG	*fa-g-a*	*fa-g-an*	*fe-em*	*fe-l-em*
3SG	*fe-i-a*	*fe-i-an*	*fe-n*	*fe-l*
1DU	*fo-w-a*	*fo-w-an*	*fo-h*	*fo-lo-h*
2/3DU	*fe-si-a*	*fe-si-an*	*fe-sin*	*fe-le-sin*
1PL	*fo-q-a*	*fo-q-an*	*fo-m*	*fo-lo-m*
2/3PL	*fe-ig-a*	*fe-ig-an*	*fe-in*	*fe-l-ein*

When a language restricts the number of overtly signalled categories under negation, one might be tempted to say that less grammatical distinctions are then made, and the amount of complexity is decreased; in this view, negation would have a simplifying effect on the domain of tense. But this is not the right analysis since the language does have all these distinctions in its grammar, and their number is restricted only in certain contexts. As the grammar then involves additional restrictions, these paradigmatic neutralizations must in fact be seen as bringing more complexity into a grammar. In describing a symmetric paradigm we may simply state that certain distinctions can be made in a functional domain, but when we have an asymmetric paradigm, we must further specify which categories do not occur in combination with negation and which categories used in the negative correspond to which ones used in the affirmative.[10] This approach is plausible when it is clear that we are dealing with distinctions made in unmarked contexts and restricted in marked ones as is the case with affirmatives vs. negatives. At least some paradigmatic asymmetry is found in 30 % of the sample languages.

Non-future negation in Diola-Fogny is expressed by the suffix *-ut* and thus uses a different construction from future negation (cf. 5 above). The simultaneous presence of more than one SN constructions in a language might be seen as violating the principle of less distinctions since there are then more constructions expressing different grammatical meanings in the language. But from a purely functional point of view, this does not increase the number of distinctions expressed grammatically—if both future and non-future were negated with one and the same construction, we would have the same number of distinctions, i.e. affirmative and negative future and non-future. In the case of Diola-Fogny, the multiplicity of SN constructions violates the principle of one-meaning-one-form, since one meaning—negation—is expressed with more than one form paradigmatically. In some other cases, the simultaneous presence of more than one constructions can be defined as complex on different grounds. In Lavukaleve (Terrill 2003: 419–420), there are three SN constructions the use of which is not in complementary distribution; they can be seen as stylistic variants. Such a situation clearly violates the principle of less

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[10] Paradigmatic neutralization, such as is found in Amele, does not involve a violation of the one-meaning-one-form principle; it is not the case that all the distinctions made in the affirmative are also present in the negative but without formal differentiation—this would be a paradigmatic many meanings-one form situation. Both functionally and formally, there is only one past tense category in the negative.

distinctions, although in the case of Lavukaleve the functional distinctions between the different constructions are not easy to pin down. More than one SN construction is found in 89 % of the sample languages.

The complexity of the most central aspects of the proposed typology of SN has now been discussed. There is no space here to go into more detail or to discuss the question how much complexity can be found in the system of negation of a language. I would nevertheless like to briefly address a rare type of asymmetry found in e.g. Basque. In this type, affirmatives and negatives differ as to word order, and the word order difference carries no meaning. Verbal clauses (usually) contain a lexical verb and an auxiliary (expressing grammatical meanings such as tense and person); in the affirmative the auxiliary follows the lexical verb, but in the negative the order is reversed (Saltarelli 1988: 66–67; José Hualde, p.c.); note that this is specific to negation and does not depend on a more general principle of Basque grammar. Such inconsistent word order clearly violates the one-meaning-one-form principle, since there are two different formal constructions (VERB+AUX and AUX+VERB) to express grammatical meaning on the verb; word order must be specified separately for affirmatives and negatives and the description of the negative system thus becomes longer.[11]

4.   Conclusion

I will now briefly summarize the discussion in this article. First, the notion of complexity was discussed, and an approach where complexity was seen in terms of the length of the description required by a phenomenon was proposed. This was accompanied by a few criteria for cross-linguistic comparison of the complexity in encoding different functional domains. The reader was then introduced to a typological classification of SN where the main division was into symmetric and asymmetric types according to whether or not there are structural differences between affirmatives and negatives in addition to the negative markers. The central aspects of this

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[11] In this context we may also note, adopting a relative definition of complexity, that postverbal placement of negative markers, as in Swedish (1), is an instance of marked order and thus violates Kusters' principle of isomorphy. Following Jespersen's Neg-First Principle (Jespersen 1917), we may consider preverbal placement of negative markers as representing a functionally unmarked choice vis-à-vis postverbal placement. (This is also reflected in the higher cross-linguistic frequency of preverbal negation.) When the order on the formal level deviates from the order preferred on the functional level, we are dealing with non-isomorphy of orders in different domains.

typology were then discussed in terms of the proposed criteria of complexity, which showed asymmetric negation as generally more complex than symmetric negation. Needless to say, an exhaustive treatment of the topic has not been possible on these few pages, and more explicit formulation of the criteria of complexity would be needed if these issues were to be addressed in more detail. Nevertheless, I hope the general points presented here serve further discussions on the topic.

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