Language variability in syntactic theory

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1. Categorical models for variable data?

The issue I consider in this paper is the following:

(1) Is a categorical theory of syntax compatible with apparently probabilistic distributions of variation in the syntactic data?

The standard response over the years to this question, following Labov (1972) et seq. is no: it is, rather, necessary to build probabilities into the grammar and moreover these probabilities are, at least in part, sensitive to properties of the individual which are fundamentally non-grammatical (e.g. which have to do with the social presuppositions of the speaker or the properties of the actual speech act). The consequences that this view has for questions of the modularity of the grammar are obvious. A particularly sharp formulation is given by Hudson (2007) (p. 693)

> syntactic patterns (among others) are learned inductively on the basis of experience, with a great deal of very specific information stored in memory about patterns such as subject-verb pairs (Goldberg 2006). ... Moreover, in this usage-based account, our memories of tokens may include their contextual specifics, such as who uttered them and when ...

Hudson's model of how syntactic patterns are learned is associationist at heart: it could learn any kind of pattern, and makes no predictions about impossible syntactic patterns in languages of the world. Absences in the record of languages are a side effect of historical and functional forces. Further, it is deeply non-modular. This approach, of course, is contrasted by the view in generative grammar, that, in fact, language learning is constrained by Univer-

sal Grammar, a distinct module of the mind. What, then, is the generative perspective on the issue raised in (1)?

This paper sketches out a reason as to why one might initially, from the perspective of generative grammar, also be tempted to answer the question in (1) with a no, and to try to deal with apparently probabalistic distributions of variation within a single speaker's grammar by reappraising the actual data. The issue turns on our understanding of what intra-personal variation is, and how the relationship between syntax and semantics is to be understood. However, I will reject this answer and propose that, actually, current generative syntactic theory is, in fact, well set up to model intra-personal variability, even though its technologies were developed for other purposes. I will briefly outline an approach to doing this that I have been developing with a number of sociolinguistic colleagues over the years (Adger and Smith 2005, Adger 2006, Adger 2007, Adger and Smith 2010, Cheshire, Adger, and Fox 2013, Adger 2014). This approach allows us to capture at least some of the frequency patterns in variability found in the literature while maintaining a modular view of grammar. The answer to the question in (1) is, then, actually a straightforward yes.

2. Variable phenomena in syntax

Good examples of variation of the sort that concerns us can be found in agreement systems. For example, Henry (1995) discusses the phenomenon of Singular Concord in Belfast English, where we find the subject can trigger agreement on the finite verb or auxiliary, or fail to:

(2) a. **The eggs** *are* cracked
b. **The eggs** *is* cracked

We find the same phenomenon in Buckie, the Scottish variety studied by Jennifer Smith (Smith 2000, Smith and Tagliamonte 1998, Smith, Durham, and Fortune 2007):

(3) a. Then lo and behold **the lockie and the souter** *comes* back thegither.
'Then lo and behold the locksmith and cobbler come back together'

b. No, it 's a shame cos **the bairns** *look* for a bitty encouragement.
'No, it's a shame because the children look for a little encouragement'

Here we see two main verbs (*comes* and *look*), both with plural subjects, which vary in whether they express agreement with the subject. The same effect is found with auxiliaries:

(4) a. Oh **my bairns** *has* put her off having bairns
'Oh, my children have put her off of having children.'
b. But since then, **the distilleries** *have* just went daft.
'But since then the distilleries have just gone crazy.'

(5) a. **A lot of our boys** *is* going.
b. **Most of them** *are* gan (=gone) to the oil industry now.

As well as variation in inflection, we also find variation in choice of functional elements. For example, the following types of relative clause are found in varieties of English spoken in London (from Cheshire, Adger, and Fox 2013):

(6) a. apparently a chav is like someone **that** wears like a big gold chain
b. have you seen that protein drink ∅ you can get like
c. I'm the only one **who** 's gone to college

Here we see the use of *that*, a zero (symbolized as ∅ here), and *who*, all available for creating relative clause structures.

Similarly, in Buckie, we find examples where the *do* that appears in do-support constructions is optionally absent:

(7) a. You **do** na ken fit tae dee wi' quines.
'You don't know what to do with girls.'
b. You ∅ na ken onything about me'
'You don't know anything about me.'

Buckie also allows *have* to be absent in the same kinds of context:

(8) a. I **have** na seen HC since she was a little quinie.
'I haven't seen HC since she was a little girl.'

b. I ∅ na heard any word fae Robbie.
'I haven't heard any word from Robbie.'

This pattern suggests a syntactic deletion operation, rather than a null lexical item, unless we decide to have both a null *do* and a null *have*.

As well as variation in agreement, in the morphological expression of lexical items, and in deletion, we also find variation in word order. For example, Harris (1984) gives the following examples from Northern Irish English, where the object of a perfect verb may occur postverbally:

(9) a. He has finished his course.
b. He has his course finished.

In my own (Scottish) variety we find a similar optional preposing of the predicate complement of certain verbs:

(10) a. She's awfy big gettin
'She's getting very big.'
b. She's getting awfy big.
'She's getting very big.'

Even within standard English, we have apparently optional variants for particle verb constructions:

(11) a. He took his coat off.
b. He took off his coat.

One might imagine that the word order variability in particle verbs is not truly optional, an issue that is addressed by Svenonius (1996). Svenonius notes that the optionality vanishes when the object is either a pronoun or is syntactically complex:

(12) a. Lock it up.
b. *Lock up it.

(13) a. *Lock all the doors on the second and third floors that lead into rooms with expensive equipment in them up.
b. Lock up all the doors on the second and third floors that lead into

rooms with expensive equipment in them.

However, Svenonius argues that the syntax generates both structures, but there are interacting discourse-level and prosodic factors that lead to unacceptability of one or the other. He considers the effect of context on the acceptability of the object particle order. Assume a context where somebody walks into the room where you are sitting, and you are inflating a number of balloons, and that person asks you what you're doing. One might think that the two following answers should be available, since both sentences are perfectly grammatical:

(14) a. I'm blowing balloons up.
b. I'm blowing up balloons.

However, Svenonius reports a preference for the (b) example in 8/12 speakers. He contrasts this with the following context (I quote, p.51):

> the person who walks into the room knows that there is going to be a party, that you are making preparations, and furthermore that there are balloons. He asks the same question, 'What are you doing?'

(15) a. I'm blowing the balloons up.
b. I'm blowing up the balloons.

In this case, there is no asymmetry in preference. Both are acceptable. Svenonius argues that the best explanation for this pattern is that the syntax generates both structures, but that there is an interaction between the position of sentence stress and a general preference that novel indefinites are preferentially stressed. Since sentence stress in English is at the right edge of the sentence, (14-b) is an outcome which is more in keeping with the extra grammatical constraints imposed by the interfaces with syntax. In the situation with the definites, the whole VP is in focus, and this can be marked by stressing the right edge. Svenonius backs this idea up by contrasting this case with epithetic definites, which prefer to be destressed (p.51 continued):

> For example, imagine a situation in which there are two girls, Turid and Ingrid, and you want to know about their transportation. You ask, 'How are Turid and Ingrid going to get here?' and I respond:

(16) a. I'll pick the girls up.
b. I'll pick up the girls.

Here the preferred response is (16-a), showing again that acceptability can be affected by discourse and pragmatic factors, an explanation which extends to the original cases. The lesson Svenonius draws from this kind of effect is that, even where the optionality of word order is sensitive to discourse or pragmatic factors, the grammar still needs to be able to generate the different forms.

In addition to syntactic constituents apparently optionally displacing as in the examples we've just seen, we also find variable placement of auxiliaries in certain dialects, as can be seen from the following Buckie examples:

(17) a. You **have** na a wrinkle.
'You don't have a (single) wrinkle'
b. Aye, you do na **have** the champagne in there.
'Yes, you don't have the champagne in here.'

Here *have* appears post negation in (b), with *do* support, but pre negation in (a), suggesting optionality of an auxiliary raising process. These different options can be available to the same speaker, even in the same utterance.

A final kind of example, highlighting the syntactic as opposed to morphological nature of the variability, is the optional establishment of longer distance syntactic dependencies. Another example comes from Smith's work on Buckie negative concord (examples from Adger and Smith 1999):

(18) a. I na ken nane of that, nor I na ken **nane** of that.
'I don't know any of those (people), nor do I know any of those.'
b. Now, ee dinna ken **ony** o that.
'Now, you don't know any of those (people).'

(19) a. It wisna really gan **naewye**.
'It wasn't really going anywhere.'
b. We didna get **onywye**.
'We didn't get anywhere.'

(20) a. I wisna sick or **nothin**, ye ken.
'I wasn't sick or anything, you know.'

b. Never heard of a woman director or **onythin**.
'I'd never heard of a woman director or anything.'

Here we see variability in whether an element c-commanded by negation is realised as a negative quantifier or as a negative polarity item.

What brings these different phenomena together is that they seem to be cases of variation in grammar: in the applicability of grammatical rules of agreement, movement, and deletion. In the remainder of this paper, I will concentrate on the agreement related phenomena (see Adger 2014 for some discussion of other types of variability).

3. What is variability?

What does it mean for something to be variable? One common-sense view of variability is that a single unit (at some level of abstraction) can come in a variety of forms; for example, pea-plant seeds could vary in whether they are smooth or wrinkled, or clover plants could vary in whether they have three leaves or four.

Within structural linguistics the notion of 'single unit' with a 'variety of forms' was usually conceived of as being connected to the notion of 'linguistic level'. From a classic structuralist perspective (e.g. Harris 1946), each level is an abstraction over some more concrete level. So a phoneme is an abstraction over various phones, a morpheme is an abstraction across morphs, syntactic categories are abstractions over distributional classes, etc. Keeping, for the moment, to this structuralist perspective, we can clarify what variation is by asking what characterizes *lack* of variation. Lack of variation would be a one-to-one mapping between various linguistic levels. So, for example, at the phonological level, a phoneme /t/ would always have the phonetic realization [t]. Lack of a one-to-one correspondence could then come about in two ways. Either /t/ could correspond to more than one phonetic realization (e.g. [t] and [t^h]) in which case we have allophony, which is a straightforward kind of variation, or more than one phoneme could have the same realization (e.g. /t/ and /k/ could both have a glottal stop realization as [ʔ]) in which case we have what in phonology is called neutralization, but which we can think of as a kind of

ambiguity: a single unit at one level corresponding to more than one at another. Variation and ambiguity are two sides of the same coin, in structuralist models, and are simply converse cases of a lack of a one to one mapping between levels. No linguist would dispute that variation and ambiguity (that is allophony and neutralization) of this sort exists within phonology: they are a crucial part of the empirical base of phonological theory. Note too, how important the notion of context is in allophony: allophones are thought of as variant realizations of an underlying form in a context.

Schematically, we can write descriptive statements about the kind of variation we find here using rewrite rules sensitive to context:

(21) $$\alpha \rightarrow \begin{cases} a\_\_C_1 \\ A\_\_C_2 \\ \aleph\_\_C_3 \end{cases}$$

Labov's early work (e.g. Labov 1969 et seq.) can be seen as removing the categorical assumption that context *determines* allophony, within this perspective of level-mapping. Of course early work allowed some allophonic variants to occur in what was called free distribution, but Labov's claim was that much allophonic distribution was actually probabalistically influenced by linguistic context, and by the social character of the speakers and the nature of the speech acts. Labov augmented context sensitive rules with probabilities to capture this claim, importing these non-phonological categories into phonological rules.

Keeping for the moment to the structuralist perspective, the notion of variation in form at the morphological level is similar, and we also have two kinds of phenomena that disrupt the one-to-one mapping: we can have more than one phonological exponent of a morpheme (again, a form of variation), or we could have the same surface class of phonological forms corresponding to more than one abstract morpheme (e.g. English plural *-s* and English possessive *-s*: syncretism, which is once again, a sort of ambiguity).

In fact, the classical treatment of (non-phonologically conditioned) suppletive allomorphy is precisely to view it as variation in the surface form of a morphosyntactic feature bundle, dependent on context. To take a well known example, past participle formation in English takes a number of forms depending on the morphological property of verb class:

(22) The pigs have eat+**en** the grass.

(23) The pigs have snort+**ed** the suspicious white powder.

(24) The pigs have **sung** the National Anthem.

We also find allomorphy dependent on syntactic rather than morphological properties. For example, in Scottish Gaelic, future tense marking on a verb depends on whether the verb is in an embedded structure:

(25) Cuir-**idh** mi an leabhar ann.
put-fut I the book there
"I'll put the book there."

(26) Can gun cuir-∅ mi an leabhar ann.
say that put I the book there
"Say I put the book there."

Here the future suffix is *-idh* in the main clause but it is realized as zero in the embedded clause.

What the structuralist perspective does, then, is treat variation (and indeed ambiguity) as fundamentally about exponence: a certain collection of linguistic features is realized in a certain way in a particular context. Adger (2006) calls this *Variation in Exponence*. This Variation in Exponence approach, modelled by probabalistic context-sensitive rules, lies at the heart of the variationist sociolinguistics enterprise.

At the syntactic and semantic levels, however, things become more complex (as is well recognized in the variationist literature, see especially Lavandera 1978, Romaine 1984, Cheshire 1987). The fundamental problem here is how to determine the equivalence between two syntactic forms and a single semantic interpretation, a problem that does not arise at the phonological or morphophonological levels. Even if we assume that semantic representations are individuated simply by truth conditions, the abstract nature of syntactic representations makes the issue somewhat vexed.

To see the issue more clearly, let us look first at the ambiguity case before turning to variation. Take, for example, a quantifier scope ambiguity:

(27) Every leopard chased an owl.

Some theories assume that the syntactic structure simply underdetermines the semantic interpretation, so there is a single syntax mapping to two meanings, much like the case of phonological neutralization (a single glottal stop mapping to two phonemes). For example, Cooper's (1983) approach was to enrich the semantic representations with a 'store' which could be used to disambiguate the sense, and there are also other approaches that take there to be a single syntactic/semantic representation mapping to a multiplicity of interpretations (e.g. Hendriks 1993). In any case, here we have a true one-to-many mapping.

However, a common alternative denies the one-to-many mapping for such cases and takes there to be no ambiguity in the mapping: rather, there is an ambiguity in the assignment of structure to a string or words, of similar sort to that seen in *I saw the boy with the telescope* (e.g. May 1977). If this is the case, then there is actually a one-to-one mapping, rather than a one-to-many mapping, between syntactic structure and semantic representation. For the wide scope reading of the indefinite object, we have a syntax where *an owl* is moved covertly to a higher position than *every leopard* (I represent traces of moved constituents as copies surrounded by angled brackets throughout), while in the narrow scope reading it is raised to a lower position:

(28) a. [an owl] [every leopard] chased ⟨an owl⟩
b. [every leopard] [an owl] chased ⟨an owl⟩]

Now we have two structures, and each one corresponds to a different semantic reading, so there is a one-to-one mapping between syntactic structures and meanings. This assumption, that the syntactic representations are to a great extent isomorphic on the semantic ones, essentially rules out true ambiguity.

This general viewpoint lends itself to also ruling out variation in exponence, when coupled with the fairly well established view that human languages disprefer synonymy.

To see this, imagine we have the following schematic syntactic structures:

(29) X [Y Z], X [W Z]

Here W, X, Y and Z are just lexical entries, which we can take to be collections of syntactic, semantic and phonological features, for the moment. If Y=W, then

the meaning of Y will of course then just be the meaning of W. This follows on the standard assumption that the interpretation function ⟦ ⟧ is indeed a function:

(30) If ⟦Y ⟧= **a** and Y = W, then ⟦W ⟧= ⟦Y ⟧= **a**.

So what about if Y ≠ W? If the two syntactic symbols are different, then what is entailed about their meaning? Nothing is entailed by the interpretation function, since of course, mathematically there is nothing to stop the following:

(31) ⟦Y ⟧= **a** and ⟦W ⟧= **a**, therefore ⟦Y ⟧= ⟦W ⟧.

Here Y and W are mapped via the semantic interpretation function to the same 'meaning', namely **a**. This would be a case of variation in exponent. One unit at the semantic level (**a**) corresponds to two (Y and W) at the syntactic level. So the issue boils down to the question of whether this is possible: that is, are there synonyms in human languages?

It's commonly assumed that synonymy is rather rare in natural languages (see for example discussion in semantics textbooks like Palmer 1981 or Saeed 2009 as well as arguments about the loss of synonyms historically, e.g. Kroch 1994). These linguistic arguments provide some evidence for Goodman's (1949)'s proposal that there are no true synonyms in human language. To the extent that one accepts this idea, then (31) will be ruled out, and there will be no variation, in the sense of two forms mapping to one interpretation. Indeed, Kroch in his work has argued that the drive to avoid synonymy is part and parcel of the drive to avoid variation of this sort and hence leads to diachronic instability. It seems then, that a pretty standard view of the syntax semantics interface, coupled with what appears to be a well-motivated constraint on synonymy, leads to the conclusion that there should be no true syntactic variability.

This has led researchers within generative grammar to treat syntactic variability as involving multiple grammars (Kroch 1989), where each grammar is invariable (see also Roeper 2000, Yang 2002), to build probabilities into the syntactic or morphological systems of the competence grammar, following the work of Labov (1972) and Cedergren and Sankoff (1974) (for more recent attempts to do this, see Bender 2001, Bresnan, Dingare, and Manning 2001 and, to a

certain extent, Nevins and Parrott 2008). An alternative is to deny that there is real intra-personal variability, and to take the parametric variation between the grammars of individuals in the same community to be of a very subtle form, so that apparent intra-personal variability is to be analysed as being actually inter-personal variation (Henry 2005).

4. Uninterpretable features

However, there is, within Minimalism, a very straightforward way in which the relevant kind of synonymy can appear. Recall that, within the Minimalist Program, syntactic dependencies between positions in structures are encoded by a relation between interpretable and uninterpretable features, usually called Agree. Once an uninterpretable feature is checked by its matching interpretable feature, it is removed from the representation as far as semantic interpretation is concerned. However, it is still present to the systems of spell-out, and so can still act to distinguish phonological forms. This means that our current theory, as it stands, makes a clear prediction: we should actually find variation within single grammar just when grammatical features enter into agreement or other syntactic dependencies that involve feature checking.

This is the Combinatorial Variability model that is proposed in Adger (2006). The core idea is the following: when two syntactic elements are in an Agree/Checking relationship, one of them will bear uninterpretable features. Since those features are uninterpretable, their presence will not impact on the semantic interpretation of the structure. Given this, a choice of lexical items A and B will be available to agree with C when either of A or B bear uninterpretable features that can match with C, but are distinct from each other. Schematically, we can take C to have three interpretable features f_1, f_2 and f_3:

(32) C[f_1, f_2, f_3]

Now if B, which has an interpretable feature g_1, also bears an uninterpretable f_1 feature (uf_1), B can combine with C as follows:

(33) C[f_1, f_2, f_3] B[g_1, uf_1]

B's uninterpretable feature will be checked, and unavailable to the semantics.

Let's now look at A. In this scenario, A bears the interpretable feature g_1, and an uninterpretable uf_2 feature:

(34) C[f_1, f_2, f_3] A[g_1, uf_2]

As far as the semantics is concerned, (34) and (33) are identical, as the uninterpretable features do not feed into the semantic interpretation. However, the phonology is sensitive to these features, so A and B can have different pronunciations. Further, I show in Adger (2006), that there are cases where we can have yet more lexical items bearing the same interpretable features, but different subsets of uninterpretable ones. Depending on how the phonological form of these features is specified, we can capture different probabilities of particular phonological surface forms. Again, to see this schematically, let us take a third lexical item, D, which also bears interpretable g_1, but in this case uninterpretable f_3:

(35) C[f_1, f_2, f_3] D[g_1, uf_3]

Once again, (35) (that is, CD) has the same semantic interpretation as CB and CA. Now if A, B and D have different phonologies, we will predict that each will have a 0.333 probability of occurrence. However, how do we determine whether we have A, B or D? We have to look at their phonological forms. Obviously, if A, B, and D have three different phonologies, then we will expect each phonological form to appear roughly one third of the time in a large enough corpus. However, imagine that A and D are syncretic: that is, they have the same phonology (call it P1), while B has a different phonology, P2. In that case we will see P1 roughly two thirds of the time, and P2, one third of the time, on the assumption that choice of the three lexical items is random.

This now gives us a system which allows variability within a single grammar (so no multiple grammars). The number of variants is upwards bounded by the number of uninterpretable features on the head (thanks to an anonymous reviewer for this point) though because of the possibility of syncretism, the number of variants may not match the number of uninterpretable features. In addition to this, however, it further provides a mechanism with which to model the frequencies we find in corpora. The mechanism is simply the distribution of syncretisms across the forms in the relevant agreement paradigm. To predict

(rather than just model) the frequencies, we further need to specify a formal learning algorithm that will build a lexicon of items which have the appropriate syncretic pattern. I proposed such a learner in Adger (2006), but other kinds of learner are possible (see, for example, Pertsova 2007), and the issue of what kinds of generalization actual learners come up with is, at present, open.

In the Combinatorial Variability model, the grammar (**G**) produces a *Pool of Variants*, PoV, where each variant is a distinct feature complex, with the same semantic interpretation, and with potentially different phonological forms.

(36) $\mathbf{G} \rightarrow \{ \text{v}_1, \ldots \text{v}_i \ldots \text{v}_n\}$ (=PoV)

I assume a distinction between knowledge of language and use of language (Chomsky 1965), so that **G** is embedded in a performance model. One can conceive of the systems of use **U** as a choice function on the pool of variants, given a context of utterance **C**:

(37) $\mathbf{U}(\text{PoV}, \text{C}) = \text{v}_i \in \text{PoV}$

The function **U** is extremely complex, and is sensitive to all sorts of properties of the elements of PoV: their phonology, their sociolinguistic connotations, whether they have been encountered recently, their frequency of occurrence in the life of the language user who is speaking, whether the language user likes that particular word, etc. It is also sensitive to many aspects of the context of utterance: the information structure of the discourse, pragmatic expectations about the interlocutor's knowledge, social expectations about appropriateness etc. Crucially, though, none of these are in the grammar. The probability of any particular v_i being chosen in any speech event is a function of the factors which enter into the specification of **U** and **C**. The fact that some phonological form might be more common in a corpus than some other phonological form depends on both the factors specifying **U** and **C** and the structure of PoV itself. So we must distinguish between the probability of any variant, and the frequency of the particular phonological forms (note how this is subtly different from the classical Labovian notion of linguistic variable).

In this model **G** does not contain sociolinguistic information, unlike the non-modular usage-based model outlined by Hudson in the quote that appears in

section 1 of this paper. There is never any rule of grammar that makes reference to frequency of a variant, or to social status of a variant. Grammar is sensitive only to syntactic features and structures built up from them. **U**, on the other hand, is part of the performance systems that impacts on the choice of a particular variant in ways that do depend on the speech situation, and the speaker's sociolinguistic capacity; however, **U** does not construct syntactic representations or constrain dependency relations between constituents. Moreover, this general model sees **U** as a dynamically changing function, responsive to the particularities of the utterance situation, and taking into account all of the multifarious factors that influence the particular choice of variant and that are the subject matter of much sociolinguistic research (hence the point about subjective probabilities immediately above).

5. Conclusion

In this brief paper I have answered the question of whether categorical models of syntax are compatible with apparently probabilistic distributions of variation in data with a clear positive. I suggested that the various approaches within generative grammar that have sought to deal with this issue have been influenced by particular architectural constraints to do with the way that syntax and semantics line up, together with a well-founded generalization about synonymy. These models have sought to treat the data by either incorporating probabilistic statements (sometimes in a non modular way) into the competence system, or by taking the data to involve more than one grammar, or not to be truly intra-personal. However, I have also shown that current minimalist theorizing is actually quite compatible with at least some kinds of grammatical intra-personal variability if we take the variability to arise because of the way that interpretable and uninterpretable features combine syntactically. Particular empirical case studies of this framework can be found in the various papers cited.

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Abstract

Morphosyntactic and syntactic variability is often ignored in syntactic theory. One reason has to do with assumptions about what variability is, and how the interfaces between syntax, the morphology, and the semantics are configured. I sketch out this argument, and show that the technology that Minimalist syntax currently employs to capture syntactic dependencies actually gives us, for free, not only a technique for capturing intra-personal variability, but also a means to model frequency effects in this domain.

Keywords

syntactic variability, uninterpretable features, syntax-semantics interface, frequency effects.