# Grammatical variation in English: A question of 'structure vs. function'?

Stefan Th. Gries

## Abstract

The purpose of this paper is twofold. First, it argues in favour of multifactorial statistical analyses of grammatical variation by demonstrating that variation phenomena are too multifaceted to be treated adequately by means of minimal-pair tests and the researcher's own acceptability judgements. It is shown in some detail that multifactorial analyses of Particle Placement in English are superior to more traditional accounts; one of their most important advantages is the possibility to predict native speakers' utterances and thereby rigorously assess the accuracy of the analysis. Second, the paper argues against overly simplified perspectives on how grammatical variation can or should be explained. More precisely, it is demonstrated that models encompassing both formal and functional aspects considerably increase the explanatory power compared to those which are confined to one type of determinant.

## 1. Introduction

Most analyses of grammatical variation, in particular those involving word-order alternations, fall into two categories. The first type is mainly based on syntactic parameters such as length and complexity, while the second one is based on discourse-functional or information-structural parameters such as givenness and/or importance of referents.[1] As is frequently acknowledged the explanations and predictions based on these two kinds of parameters coincide in many cases. However, many linguists have argued that a particular instance of grammatical variation illustrates that one of the two approaches is somehow superior to the other. In this paper, I will argue that the question of which kind of variables is superior (or even the single underlying cause of grammatical variation) is, in fact, fundamentally mistaken for several reasons. Moreover, I will propose an alternative line of reasoning, trying to integrate findings from both approaches.

This paper is organized as follows: Section 2 is a non-exhaustive discussion of several studies of word order alternations and their basic conclusions as to the superiority of the approach that was pursued. In section 3, I will discuss a particular instance of grammatical variation, namely Particle

Movement in English. On the basis of an analysis of corpus data from the British National Corpus (BNC), I will first provide empirical results showing to what extent discourse-functional and syntactic variables influence the choice of construction (when analyzed in isolation). The main focus, however, will then be on discussing how the interactions of these two kinds of variables can be described and explained most adequately. Finally, section 4 provides a brief summary of the major findings.

## 2. Syntax vs. function: previous analyses

In a recent study, Siewierska (1988) investigates among other things the effect of linearization hierarchies on constituent ordering. She distinguishes three different kinds of hierarchies. First, formal hierarchies are concerned with the length and internal complexity of constituents and, accordingly, range from simple constituents such as one-word noun phrases to complex constituents such as noun phrases containing embedded sentences. The general idea is that short and structurally simpler constituents precede longer and structurally more complex constituents, as can be observed in (1), a standard example of Heavy NP Shift in English.

(1) a. *I introduced* [$_{NP}$ *some friends that John had brought to the party*] [$_{PP}$ *to Mary*].
b. *I introduced* [$_{PP}$ *to Mary*] [$_{NP}$ *some friends that John had brought to the party*].
(1b) is the preferred version because the shorter PP precedes the heavy NP.

Second, dominance hierarchies deal with variables concerned with "perceptions of natural salience as reflected in the way humans experience the world" (Siewierska 1988: 29). Several kinds of interrelated dominance hierarchies are discussed:

- personal hierarchies (also known as egocentricity or animacy hierarchies): 1st person > 2nd person > 3rd person > higher animals > other organisms > inorganic matter > abstracts (Siewierska 1988: 49);
- semantic role hierarchies for subjects: agent > patient > recipient > benefactive > instrumental > spatial > temporal (Siewierska 1988: 47);
- semantic role hierarchies for objects: patient > recipient > benefactive > instrumental > spatial > temporal (Siewierska 1988: 47).



Finally, familiarity hierarchies relate to speakers' interests as manifested in parameters such as topicality, givenness, definiteness, etc.; more familiar and/or given information precedes less familiar and/or new information. This observation is intimately related to research on topic continuity as carried out by Givón (1983) and his associates.

These three hierarchies are obviously interrelated since, for instance, it has long been observed that discourse-given referents tend to be picked up by short expressions, whereas discourse-new referents are more likely to be referred to by longer expressions. Even so, Siewierska draws the conclusion that "[t]he data presented in this chapter clearly support the superordinate nature of the familiarity hierarchies over the dominance and formal hierarchies on a cross-linguistic basis" (Siewierska 1988: 83).

Another major research paradigm is presented by Hawkins (1991, 1994). Hawkins argues that constituents are ordered in such a way as to make the on-line recognition of syntactic structures as easy as possible. More precisely, his processing principle of Early Immediate Constituents (EIC) claims that those constituent orderings within a phrase P are preferred that minimize the number of constituents that need to be processed until all immediate constituents of P have been recognized. For English as a head-first language, Early Immediate Constituents amounts to a predicted preference of short > long, and this prediction is strongly supported by Hawkins's data (written corpora). A considerable part of Hawkins's work is dedicated to a comparison of the predictive power of his Early Immediate Constituents as opposed to two different discourse-functional criteria, namely Givón's (1993) Task Urgency and the principle of given > new as formulated by the Prague School. He finds (i) that Early Immediate Constituents exhibits a stronger correlation with constituent orderings than givenness and (ii) that cross-linguistically the discourse-functional variables fail to adequately deal with head-last languages such as Japanese. Although Hawkins acknowledges the interrelation of length and discourse-functional variables such as givenness, the conclusion he arrives at is a rather radical one, namely that "pragmatics appears to play no role whatsoever. The [pragmatic] theories proposed add nothing to the syntactically based predictions of EIC" (Hawkins 1994: 240–241).

While Hawkins provides a large amount of evidence supporting his conclusion, his analysis shows a number of weaknesses. First, the notion of processing effort underlying Hawkins's analysis is defined very narrowly: Early Immediate Constituents is a purely syntactic variable, so the amount of processing effort that Hawkins postulates for each word order does not include determinants of processing cost other than syntax. In view of the

fact that lexical retrieval plays a role in considerably affecting the processing load (cf. Bock 1982), this approach is too imprecise: Hawkins's notion of processing cost may simply not be rich enough to deal with every relevant aspect of processing. Second, most of the analyses are of limited statistical sophistication. Consider, e.g., Table 1 taken from Hawkins (1994: 181) and slightly adapted for expository reasons.

*Table 1.* Results of Hawkins (1994: 181) concerning Particle Placement in English

| | NP=1 word | NP=2 words | NP=3 words | NP=4 words | NP=5+ words |
|---|---|---|---|---|---|
| Verb-particle-object ordering | 51 (94.4%) | 21 (31.8%) | 3 (18.8%) | 1 (7.1%) | 0 (0%) |
| Verb-object-particle ordering | 3 (5.6%) | 45 (68.2%) | 13 (81.2%) | 13 (92.9%) | 29 (100%) |
| Column totals | 54 (100%) | 66 (100%) | 16 (100%) | 14 (100%) | 29 (100%) |

On the one hand, not a single test of significance is computed; given the overall tendency, however, this is probably not too severe a drawback. Still though, there is another aspect bearing on this issue: Hawkins concludes that 154 (54+45+13+13+29) out of 179 orderings (86%) are most optimal, which supports the predictions made by the Early Immediate Constituents Analysis. This shows that Hawkins includes in the category of successful predictions even those cases where Early Immediate Constituents does not make any prediction at all as to which construction the speaker will choose. This is because in the case of direct object noun phrases which are one word long, either ordering is optimal as far as Early Immediate Constituents is concerned. Put differently, the 54 cases where the NP is just one word long were counted as supporting Early Immediate Constituents although Early Immediate Constituents was incapable of making any specific prediction, which rules out any possibility for empirical falsification. However, counting something as correctly predicted if one's theory has not made a specific prediction about a speaker's constructional choice seems a rather peculiar way of calculating success rates. A more adequate way of reporting the success rate for the above results would consist in calculating a (still convincing) adjusted rate of 80%, namely 100 (i.e. 45+13+13+29) out of the 125 (66+16+14+29) cases where Early Immediate Constituents does in fact make a prediction. While this does not make a huge difference for the results represented in Table 1, it shows that the reported success rates need to be investigated on a case-by-case basis. Finally, it is worth noting that no explanation whatsoever is offered for why 25 cases (21+3+1) do not conform to Early Immediate Constituents.



In a more recent study, Siewierska (1993) analyses Polish texts with respect to the question of which kind of variables (given > new as opposed to short > long) is more important in determining constituent ordering: given > new is operationalized by referential distance (sometimes also referred to as distance to last mention) whereas short > long is operationalized by Hawkins's principle of Early Immediate Constituents. On the basis of the corpus data, Siewierska argues that short > long is not as powerful as Hawkins would like us to believe (1993: 247). However, no unequivocal conclusion is arrived at: "Therefore no definite conclusions about the strength of the weight and pragmatic principles are in fact possible" (Siewierska 1993: 263).

The final approach to be reviewed here does not aim at comparing the syntactic and functional analyses of grammatical variation in order to support the superiority of syntax over discourse or vice versa: Arnold et al. (2000) investigate dative constructions and Heavy NP Shift in English. They report the results of a corpus analysis and an elicitation experiment which show that

1) both syntactic weight and newness do in fact govern constructional choices and
2) that neither of the two variable groups can be subsumed under the other although syntactic weight accounts for the constructional choices slightly better.

More interestingly, however, they conclude that "when two factors are found to influence a particular choice or interpretation, the effect of each is usually stronger when the other factor is less constraining" so that "the role of each factor depends in part on the strength of competing factors" (Arnold et al. 2000: 49–50).

This review of some recent approaches to grammatical variation can, of course, not do justice to the multitude of both specific analyses and general perspectives. The general point to be made is twofold: First, very often, analyses concentrate on demonstrating how one approach is superior to the other (while, at the same time, admitting strong interrelations between both approaches). Second, the number of analyses explicitly trying to include interactions between the two possible kinds of variables is, unfortunately, limited, although such a unifying approach yields promising results. In the following section, I would like to pursue the line of argumentation inherent in Arnold et al.'s (2000) study in more detail by investigating and accounting for interactions between variables and variable groups.

## 3. Particle Placement in English

### 3.1. Introduction

The phenomenon of grammatical variation that I will analyze has become known as Particle Movement. This involves transitive phrasal verbs allowing two different truth-conditionally equivalent constituent orderings, as in examples (2a) and (2b).

(2) a. *John picked up the book.* Verb-particle-object ordering
b. *John picked the book up.* Verb-object-particle ordering

In order not to commit myself to the movement metaphor and its theoretical implications, I shall use the term Particle Placement. This word order alternation has been analyzed in a large number of studies: They reveal that a superficially simple alternation is influenced by a variety of different variables from different domains of linguistic analysis. I have enumerated these elsewhere in some detail (cf. Gries 1999, forthcoming: chapter 2), so a brief summary of the most common variables in the form of a table will have to suffice.

Table 2 is to be interpreted as follows. The central column names the variables that have been claimed to influence the choice of construction, whereas the adjacent columns name the values/levels of these variables that are associated with a constructional preference. For instance, if we look at the variable *NP type of the direct object*, then we find that it has been argued that pronominal direct objects tend to occur in verb-object-particle ordering, as in (3).

(3) a. **John picked up it.*
b. *John picked it up.*

Similarly, the row for *distance to last mention of the direct object's referent* tells us that it has been proposed verb-object-particle ordering is preferred when the referent of the direct object has been mentioned shortly before, as in (4).

(4) a. *?We'll make up a parcel for them ... On the morning of Christmas Eve together we made up the parcel.*
b. *We'll make up a parcel for them ... On the morning of Christmas Eve together we made the parcel up.*



*Table 2.* Variables that are argued to contribute to Particle Placement

| Value/Level for verb-particle-object ordering | Variable name | Value/Level for verb-object-particle ordering | Type of variable |
|---|---|---|---|
| stressed direct object | stress pattern of the verb phrase | | phonological |
| | NP type of the direct object | (semi-) pronominal | morpho-syntactic |
| definite | determiner of the direct object | indefinite / none | |
| long | length of the direct object | | |
| complex | complexity of the direct object | | |
| idiomatic | meaning of the verb phrase$_1$ | | semantic |
| | semantic modification of the particle | yes | |
| low | cognitive entrenchment of the direct object's referent | high | |
| direct object | focus of the verb phrase | particle | |
| high | news value of the direct object's referent | low | discourse-functional |
| long | distance to last mention of the direct object's referent | short | |
| low | times of preceding mention of the direct object's referent | high | |
| short | distance to next mention of the direct object's referent | long | |
| high | times of subsequent mention of the direct object's referent | low | |
| | following directional PP/adverb | yes | other |
| yes | particle = preposition of following PP | | |
| high | production difficulty of the utterance | low | |

However impressive the above list may seem at first, several weaknesses need to be pointed out:

1) most variables are only based on introspective analysis and non-authentic (i.e. made-up) example sentences: it is doubtful that behavioural phenomena sensitive to 17 interacting variables can be fruitfully examined by intuition alone;
2) for several variables we only know the consequences of one value: does that mean the other value has the opposite effect, no effect or that one simply does not know? Saying that complex direct objects prefer verb-particle-object ordering (i.e. occur more frequently in verb-particle-object ordering than in verb-object-particle ordering) is only

interesting if simple direct objects do not also prefer verb-particle-object ordering.

3) most analyses only consider monofactorial results while, for speakers, all variables are present simultaneously. Consider the example *He insulted back the man* vs. *He insulted the man back*, which Fraser (1974) used to substantiate his claim that verbs without initial stress favour the discontinuous construction. Yet Fraser fails to present empirical evidence showing that the phonetic form of the verb is really responsible for the fact that the latter sentence is preferred rather than the fact that the direct object is simple, very short and definite (all of which are features that are argued to also yield a preference for the latter construction). Given the data, Fraser's conclusion is not warranted, and, unfortunately, most approaches are replete with similarly problematic cases.
4) Table 2 does not yet include any potential effects due to the choice of a particular register.

In this paper, it is not possible to address all of these points in detail. However, the methodology employed in the subsequent analysis will show how several of the problems pointed out can be avoided from the very start.

In order to assess the importance of the morphosyntactic and discourse-functional variables mentioned above in Table 2 (something that is hardly possible on the basis of assigning introspective acceptability/grammaticality judgements to artificially isolated examples), the following set of verb-particle constructions was obtained by searching the British National Corpus (BNC).

*Table 3.* Corpus data entering into the analysis

| | Spoken data | Written data | Row totals |
|---|---|---|---|
| Verb-particle-object ordering | 67 (33.5%) | 127 (62.6%) | 194 (48.1%) |
| Verb-object-particle ordering | 133 (66.5%) | 76 (37.4%) | 209 (51.9%) |
| Column totals | 200 (100%) | 203 (100%) | 403 (100%) |

In order to also investigate all of the above-mentioned discourse-functional variables, for each verb-particle construction, the ten preceding and the ten subsequent clauses were also included in the analysis.



### *3.2. The strengths of variables*

As a first step, it is necessary to find out which group of variables seems to be strongest in the present data set. To that end, it is useful to first have a look at the impact each variable has on the choice of construction. The methodology employed here, however, differs drastically from all previous analyses of grammatical variation I am aware of. Commonly, the impact of variables is measured in isolation, e.g. by looking at contingency tables such as Table 4.

*Table 4.* Observed distribution of constructions relative to the givenness of the direct object's referent

| | Discourse-new | Discourse-old | Row totals |
|---|---|---|---|
| Verb-particle-object ordering | 141 (68.1%) | 53 (27%) | 194 (48.1%) |
| Verb-object-particle ordering | 66 (31.9%) | 143 (73%) | 209 (51.9%) |
| Column totals | 207 (100%) | 196 (100%) | 403 (100%) |

On the basis of this distribution, a coefficient of correlation such as $\lambda$ (asymmetric lambda) can be calculated. In this example, where the attempt is being made to predict the choice of construction, $\lambda$ assesses the percentage of reduction of error in predicting the dependent variable (here: choice of construction) once we know the value of the independent variable (here: givenness status). In this case, $\lambda$ is 0.386 ($p < 0.001$ ***), which means that, when we try to predict speakers' choices, if we know the givenness status of the direct object's referent, then we make 38.6% fewer mistakes than if we did not know the givenness status. Similarly, we can calculate a different coefficient of correlation for assessing the impact of the direct object's complexity on the choice of construction (Somer's $d = -0.524$; $p < 0.001$ ***) and every other variable we would like to include in the analysis.

While this technique is certainly more informative and reliable than previous, purely introspective analyses, it still suffers from the fact that the artificial isolation of the influence of particular variables' influence does not adequately represent the situation speakers face: for instance, at the point of time the speaker produces a verb-particle construction, the givenness status of the direct object is not the only variable at work since, e.g., its complexity can also influence the choice of construction. For instance,

with complex given objects, the degree of complexity would prefer construction$_0$ whereas the givenness would prefer construction$_1$ – on the other hand, with simple new objects, the degree of complexity would prefer construction$_1$ whereas the newness would prefer construction$_0$. Since, for purely mathematical reasons, the absolute values of the correlation coefficients given above must not be compared, we have two possibilities: we can either take on a truly multifactorial perspective or we can perform pairwise comparisons. The interaction between complexity and givenness in such a pairwise comparison is represented in Table 5.

*Table 5.* The effect of the interaction between givenness and complexity on Particle Placement

| Complexity | Simple | | Intermediate | | Complex | | Totals |
|---|---|---|---|---|---|---|---|
| Givenness | New | Given | New | Given | New | Given | |
| Verb-particle-object ordering | 50 | 26 | 79 | 23 | 12 | 4 | 194 |
| Verb-object-particle ordering | 50 | 136 | 15 | 7 | 1 | 0 | 209 |
| Totals | 100 | 162 | 94 | 30 | 13 | 4 | 403 |

Simply put, if the direct object is complex and given, then complexity wins out and speakers unanimously choose verb-particle-object ordering (4 vs. 0) – if, on the other hand, the direct object is simple yet new, then both constructions are equally frequently chosen (50 vs. 50); both of these ratios are not significant at the 5% level.

That is to say, while we cannot rely on the coefficients of correlation exemplified above to compare the strengths of individual variables, a large number of pairwise comparisons would enable us to estimate variable strengths more reliably. At any rate, even these pairwise comparisons do not fully do justice to the complexity of the problem as there are not only two variables at work (or, for that matter, x variables engaged in pairwise comparisons). Rather, all variables work simultaneously and need to be analyzed as such, which is why more complex techniques are necessary. The technique to be used here is discriminant analysis.

A discriminant analysis is a technique whereby several independent variables (here: the variables arguably influencing Particle Placement) are entered into a single equation in order to (i) weigh their importance for the dependent variable (here: the choice of construction) and (ii) predict the resulting value of the dependent variable (here: verb-particle-object ordering or verb-object-particle ordering). As a result, we obtain the strengths of variables as represented in Table 6.



*Table 6.* The importance of all variables in a multifactorial analysis

| Variable | Loading | Kind of variable | Choice of construction |
|---|---|---|---|
| Length of the DO in syllables | -0.522 | morphosyntactic | high variable values ⇒ verb-particle-object ordering |
| Lexical DO | -0.498 | | |
| Intermediate complexity of DO | -0.479 | | |
| Length of the DO in words | -0.447 | | |
| Idiomatic VP | -0.325 | semantic | low variable values ⇒ verb-object-particle ordering |
| Indefinite determiner of the DO | -0.281 | morphosyntactic | |
| Metaphorical VP | -0.044 | semantic | due to the low factor loadings (-0.22 < loading < 0.22) these variables do not discriminate well between the two constructions |
| Proper name as DO | 0.021 | morphosyntactic | |
| Definite determiner of the DO | -0.016 | | |
| Disfluencies in production | -0.006 | other | |
| Part – Prep of following PP | -0.002 | | |
| Semi-pronominal DO | 0.086 | morphosyntactic | |
| Distance to next mention | 0.094 | discourse-functional (subsequent context) | |
| Next mention of the DO | 0.098 | | |
| Cohesiveness to subs. discourse | 0.135 | | |
| Animacy of the DO | 0.157 | semantic | |
| Times of subsequent mention | 0.183 | discourse-functional (subsequent context) | |
| Complex DO | 0.184 | morphosyntactic | |
| No determiner in the DO | 0.223 | morphosyntactic | high variable values ⇒ verb-object-particle ordering |
| following directional adverbial | 0.278 | other | |
| Literal VP | 0.309 | semantic | |
| Concrete DO | 0.337 | | |
| Overall mention of the DO | 0.358 | discourse-functional (subsequent context) | |
| Last mention of the DO | 0.422 | discourse-functional (preceding context) | low variable values ⇒ verb-particle-object ordering |
| Times of preceding mention | 0.427 | | |
| Cohesiveness to prec. discourse | 0.445 | | |
| Distance to last mention | 0.474 | | |
| Pronominal DO | 0.496 | morphosyntactic | |
| Simple DO | 0.573 | | |

I believe that only after considering the findings introduced in Table 6 can we speak of having both a reliable and cognitively realistic estimation of all the strengths of all variables involved when it comes to determining the choice of construction. All variables enter into the analysis simultaneously (just as they are present for the speaker simultaneously), and the

analysis makes it possible to correctly predict (cross-validated) 83.1% of the subconscious choices of native speakers. This is a proportion that is seldom achieved in the behavioural sciences in a test that has been virtually never attempted in linguistics in the first place, namely trying to correctly predict hundreds of utterance structures in actual discourse.

However, let us now return to the initial question, namely which variable group is more decisive for the choice of construction. From Table 6 alone, the answer is clear, the variables at the top and at the bottom of the list (i.e. those with the highest absolute loadings) are without exception morphosyntactic, so there seems to be no question about the superiority of morphosyntax over discourse-pragmatics. But a closer look at the relation between these variables and Particle Placement will show that the question cannot be answered that easily. This will be the topic of the following section.

### *3.3. The interrelations of morphosyntax, discourse and Particle Placement*

Hawkins (1991: 208–209, 1994: 241) has claimed that the correlation between morphosyntactic variables (the length and the complexity of the direct object) and ordering phenomena such as Particle Placement is strongest, whereas the correlation between discourse-functional variables and Particle Placement is at best epiphenomenal. On the basis of his own results and a superficial look at Table 6, this claim seems to be justified. But, in fact, there are some mistakes underlying his approach.

First, Hawkins operationalizes the givenness of the direct object's referent by the variable distance to last mention. Even though this is a method that has commonly been used, it is not without its drawbacks since it presupposes that only explicit/direct mention of an item or co-referential linguistic expressions contribute to the degree of givenness of referents of linguistic expressions. Thus, Bolkestein and Risselada (1987) suggest refining this method of operationalization by also considering other linguistic indicators of these psychologically grounded phenomena and introduce the notion of cohesiveness of the referent of a linguistic expression to the preceding/following discourse. This notion can best be defined by the authors themselves:

> A constituent x is cohesive if x is coreferent to another item y in the sentence itself or the larger discourse; or if it is semantically related to another item y in the sentence or discourse, for example by sharing certain semantic features; or by being antonymous to y; or by standing in a part-whole relation to y; or by being a co-member of y in some superclass; or by being itself a subclass or superclass of y; or if it is pragmatically related to y, for example by being in contrast with it; or by being 'evoked' by it or 'inferrable' from it; etc. (Bolkestein and Risselada 1987: 503).



The cohesiveness of the referent of the direct object to the preceding discourse was also determined for the present data set: strictly co-referential items added two points to the cohesiveness score of a particular direct object whereas hypernyms, hyponyms and part-whole relations added one point to the cohesiveness score. If we then calculate the monofactorial correlation coefficients for length of the direct object in words and Particle Placement as well as the cohesiveness of the referent of the direct object to the preceding discourse, then we find that there is no difference: $r_{\text{length \& Particle Placement}}^2 = 0.186$ *** and $r_{\text{cohesiveness to preceding discourse \& Particle Placement}}^2 = 0.184$ ***. That is, it seems as if Hawkins's choice of an inadequate method for operationalizing givenness is partially responsible for his results.

Second, the explanation for an instance of grammatical variation is not very likely to be correct, if only one variable (Early Immediate Constituents) out of about 17 is held responsible for the whole variation found. If Early Immediate Constituents is the only relevant causal determinant of Particle Placement, how do we explain the preference for verb-particle-object ordering with idiomatic VPs and indefinite determiners as well as the preference for verb-object-particle ordering with concrete direct objects?

Finally and most importantly for the present study, there is also a more fundamental methodological drawback in Hawkins's argument that discourse-functional variables are merely epiphenomenal which undercuts the argument concerning morphosyntactic primacy right from the beginning. Hawkins's empirical correlations (that is, the correlations between complexity, Particle Placement and the *epiphenomenal* discourse-functional variables) make it impossible to decide on the real-world relation between Particle Placement, morphosyntactic variables and discourse-functional variables: As is known to every beginner in statistics, the correlations observed could be indicative of each of the following causal relationships in the figures below, where arrows symbolize causal relationships; simple solid lines stand for relationships that could but need not be causal; dotted lines symbolize non-causal relations which might exist but need not; and the thickness of any arrow/line represents the strength of the correlation.[2]

On the basis of Hawkins's results, one could, e.g., argue that morphosyntactic variables influence Particle Placement strongly, but that there is not necessarily a relationship between morphosyntactic and discourse-

functional variables. This seems to be Hawkins's interpretation, which could be graphically represented as in Figure 1.

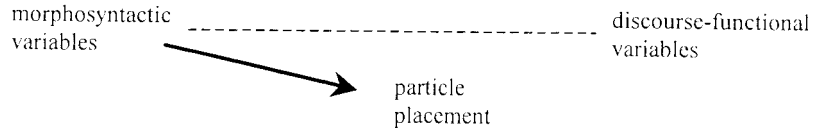


*Figure 1.* Possible explanation of Hawkins's findings 1

However, on the basis of the very same results one could also claim that morphosyntactic variables influence Particle Placement and are in turn influenced by discourse-functional variables without there being any direct causal relationship between discourse-functional variables and Particle Placement, as represented in Figure 2; in this case, discourse-functional variables would correlate with Particle Placement only indirectly (due to their influence on morphosyntax), but not directly.

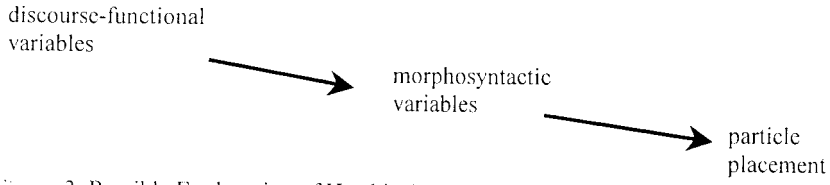


*Figure 2.* Possible Explanation of Hawkins's Findings 2

Lastly, one might assume that discourse-functional variables influence morphosyntactic variables, which in turn determine Particle Placement, and that there is also some causal relation between discourse-functional variables and Particle Placement, as in Figure 3.

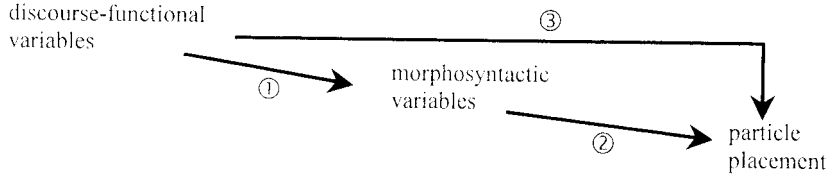


*Figure 3.* Possible Explanation of Hawkins's Findings 3

Since all of the three diagrams would predict that there is a strong statistical correlation between morphosyntactic variables and Particle Placement and a (possibly much) weaker correlation between discourse-functional variables and Particle Placement, Hawkins's contention that



pragmatics plays no role does not seem tenable until these matters are cleared up. The finding that the correlation between Particle Placement and morphosyntactic variables is higher than the one between Particle Placement and discourse-functional variables need not indicate that morphosyntax is thus also more likely to be the cause for the effect (Particle Placement), especially when we consider that a more appropriate operationalization improves the predictive power of the discourse-functional variables markedly. This is also supported by the fact that length/complexity is something that can be operationalized far more easily whereas a latent factor such as givenness can only be inferred on the basis of manifest variables. Since this is likely to be less precise than the clear measurement of syntactic variables, there will be some degree of inaccuracy that might considerably cloud the picture.

It would of course be desirable to be able to decide which of these models is most appropriate for Particle Placement, in relation to our data. Statisticians have developed techniques that are used for testing how causal models conceived by the researcher fit the structure of the data investigated. These models have different labels although their overall line of reasoning is quite similar: path analysis, structural equation modelling or LISREL (for Linear Structural Relationships). In order to determine which of these diagrams is most appropriate, I used the Structural Equation Modelling module of Statistica 99, based on Jøreskog's LISREL. For Hawkins's Early Immediate Constituents (i.e. the morphosyntactic variables), I used the variables complexity and the length of the direct object in syllables and in words. For the discourse-functional variables, I used distance to last mention, times of subsequent mention and cohesiveness to the preceding discourse; the results are given in Table 7.

*Table 7.* Structural equation modelling results

| Model | GFI | AGFI | Population Gamma Index | Adjusted Population Gamma Index | RMSR |
|---|---|---|---|---|---|
| Figure 1 | 0.902 | 0.805 | 0.911 | 0.821 | 21.1% |
| Figure 2 | 0.917 | 0.821 | 0.925 | 0.837 | 11.7% |
| Figure 3 | 0.948 | 0.879 | 0.956 | 0.897 | 6.3% |

These results are to be interpreted as follows: GFI and AGFI are the historically most widely known indices for structural equation modelling. They are goodness-of-fit indices representing how well the model fits the data: the value represents the percentage of variance of Particle Placement that can be accounted for by the model. The AGFI index is the one more

relevant of the two since it is adjusted for the complexity of the model and, thus, much more reliable. We see that the model argued for by Hawkins does not do too well compared to the other two, which do not treat discourse-functional variables as merely epiphenomenal: the latter two models account for more variance of Particle Placement in the sample investigated. The two more modern Gamma indices (of which, again, the adjusted index deserves most attention) support this analysis by showing that we need not restrict this claim to the sample investigated but can also extend it to the larger population: again the latter two models (where discourse-functional variables are assumed to have a [direct and/or indirect] causal influence on Particle Placement) better fit the data than the model derived from Hawkins's claims where only Early Immediate Constituents is causally relevant. This is especially obvious from the rightmost column in Table 7: the RMSR value states how much variance in the data the respective model cannot account for, and we see that the model based on Hawkins's claims leaves about three times as much variance unaccounted for than the model in Figure 3. But is there any evidence supporting the sub-part model of Figure 3 other than the results of the structural equation modelling analysis?

The answer is yes: first of all, it is obvious that the correlations we find between discourse-functional variables concerning the preceding context and the morphosyntactic variables support only the causal relationship represented in Figure 2 and Figure 3 because the converse cause-effect relation would have to work backwards in time. That is, given the temporal unidirectionality of discourse, the morphosyntactic complexity of constituents $C_1$ and $C_2$ in some utterance U cannot influence the discourse status of $C_1$ and $C_2$ before U was even produced. That is, morphosyntax cannot be the sole cause for everything; something must be located temporally/causally before it, even if the consequences of this something are then in turn also constrained by morphosyntax.

Secondly, in a way, one would even intuitively expect such a result. If the morphosyntactic variables are not necessarily influenced by anything else (which would follow from Hawkins's claim that all variables other than his complexity variables are purely epiphenomenal), then how would he explain that speakers sometimes use pronouns for referents of direct objects in verb-particle constructions and sometimes not in the first place? Moreover, it was pointed out that he fails to explain the constructional choices in the 25 cases in Table 1 above which go against Early Immediate Constituents. For these there must be some motivation. Hawkins cannot explain these exceptions since the only variables he claims are important



are morphosyntactic – in the current approach, however, the answer is quite obvious: speakers' choices of, say, pronouns are determined by discourse-functional factors. Thus, the present approach can explain what lies behind Hawkins's variables since it is not constrained by the view that everything apart from morphosyntax as epiphenomenal. Of course, apart from the correlation between morphosyntax and Particle Placement (arrow ②), Hawkins is also aware of the correlation between length and, say, givenness (arrow ①). The point to be made is that he reduces this relation to the question of which is the chicken and which is the egg? (cf. Hawkins 1994: 238), without noticing that a simple monodirectional causal explanation is not the only one, let alone the most plausible one, that is licensed by his observations.

Finally, the discourse-functional variables cannot be purely epiphenomenal since they improve our ability to predict the choice of construction directly (arrow ③) and markedly. Let us look at just a single example supporting this claim. The corpus data show that short direct objects (i.e. object NPs with less than 4 syllables) prefer verb-object-particle ordering: 168 (73.36%) out of 229 verb-particle constructions with short direct objects occurred in verb-object-particle ordering. Similarly, the corpus data also show that previously mentioned referents of direct objects prefer verb-object-particle ordering: 143 (72.96%) out of 196 verb-particle constructions with previously mentioned referents of direct objects occurred in verb-object-particle ordering. Apparently, the level of both variables predict the constructional choice equally well. If, however, both levels are combined (i.e. we look at the distribution of constructions with short objects *and* given referents), then the distribution is even more extreme: 126 (85.14%) out of 148 verb-particle constructions are Verb Object Particle Object. That is, if syllabic length is supplemented by givenness, the prediction accuracy is improved by about 12%. This can hardly be explained by assuming that givenness is purely epiphenomenal, especially since givenness does not only win out in cases where EIC makes no predictions. Rather, we must assume that givenness and Particle Placement add to each other and are directly and causally related in the way represented in Figure 3.

From all this it follows that we need to be more careful with claims as to what is obviously important and what is obviously epiphenomenal. While in some cases cross-linguistic evidence can in fact be indicative of such tendencies, the methods by which such claims are to be supported definitely need to be more advanced. Variables such as givenness need to be operationalized properly, empirical data should be subjected to significance

tests and different causal networks need to be devised and independently tested before such far-reaching claims can be put forth on a solid basis. In the case of Particle Placement, there is strong evidence for a network of interrelated variables rather than one strong morphosyntactic determinant (Early Immediate Constituents) and a variety of other, purely epiphenomenal, variables. I refer the reader to Gries (forthcoming) for such a network on the basis of psycholinguistic theories of speech production (namely interactive activation models).

## 4. Conclusion

I hope to have shown the following: First, on a methodological level, traditional analyses of grammatical variation should definitely be supplemented by multifactorial statistical techniques. This is not to deny totally the importance of minimal pair tests and monofactorial research, but these techniques should only serve as heuristic tools before more advanced methods can yield genuine insights. Other scientific disciplines such as psychology have long since noticed that human behaviour is seldom, if ever, determined by a single cause so a methodology is required that can readily cope with the intricate complexity of such phenomena. With this in mind, there is not a single compelling reason why linguistics should stick to antiquated and error-prone techniques of often little reliability (cf. Schütze 1996), given that the complexity of the phenomena involved is virtually identical to that of psychological phenomena. In the context of variation phenomena, such techniques are especially rewarding since they enable us to subject our theories to the most rigorous test conceivable, namely to actually predict what native speakers will do in a particular situation.

Second, on a linguistic level, Particle Placement is determined by a variety of variables, some of which can be grouped together reasonably. However, the data clearly show that nothing is gained by simplifying the picture too much since it was demonstrated that the variance one can account for is often better explained by a causal model where multiple interrelations are possible. I would go so far as to argue that many of the traditional movement transformations or word order alternations (such as the dative alternation, preposition stranding, the genitive alternation etc.), whose analyses probably no longer stimulate much interest, could still yield interesting results once a multifactorial method of analysis is adopted and cognitively realistic theories about human performance are more rigorously tested than has hitherto been the case.



## Notes

1 This is not to deny that there are also other approaches towards grammatical variation, for instance those explaining the choice of syntactic structures with reference to semantic parameters (cf., e.g., Wierzbicka 1988 or Goldberg's 1995 work in Construction Grammar).

2 Note that this strength of the causal relationship need not match the magnitude of the correlation coefficients since correlation coefficients are blind to whether they measure a causal or some other relationship.

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