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PARTICLE PLACEMENT IN ENGLISH

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A phenomenon that has attracted considerable interest in linguistics over the last decades is syntactic variation. I will investigate a particular instance of syntactic variation, namely the word order alternation that is possible for English transitive phrasal verbs (TPVs). As an example, consider (1).

(1) a. John picked up the book. construction$_0$ (C_0)
b. John picked the book up. construction$_1$ (C_1)

This alternation has frequently been referred to as Particle Movement. In this study, I will, as in Gries (1999, 2000) use the term particle placement (PrtPl) in order to avoid the movement metaphor and its theoretical implications.

Over the last 100 years, a large number of studies have been devoted to exploring this type of alternation. More precisely, they have attempted, first, to provide an adequate structural description of the two possible constituent orders and, second, to find the variables that determine native speakers' choices governing the alternation[1].

Interestingly, a (at a superficial glance) simple word order alternation seems to be influenced by a large number of variables from many subdisciplines of linguistics. Table 1 (overleaf) gives an overview of variables that have been claimed to contribute to PrtPl. The middle column names the variable whereas the other columns provide the values/levels purportedly correlating with a preference for a construction.

However comprehensive this list of variables may seem at first sight, there are three methodological issues I would like to address (for a conceptual critique of some of these variables, cf. Gries 2000).

First, nearly all of the analyses have been monofactorial in nature. That is, most scholars have concentrated on one variable at a time and have attempted to support its assumed effect on PrtPl. Note that this does not mean they have not acknowledged that several variables are important; it only means that each variable's effect has been investigated in isolation without concern for the simultaneous effect of other variables. Let us consider an example. Fraser (1974:571) has argued that verbs without initial stress entering into TPVs are preferred in construction$_1$. In order to substantiate his claim, he provides the following minimal pairs and acceptability judgements:

(2) a. ?I will insult back the man.
b. I will insult the man back.

Value/Level for C_0	Variable	Value/Level for C_1
stressed DO	stress pattern of VP	stressed particle
	phonetic shape of V	no initial stress
	NP type of DO	(semi-)pronominal
definite	determiner of DO	indefinite / none
long	length of the DO	
complex	complexity of the DO	
idiomatic	meaning of the VP_1	
inanimate	animacy of the DO[2]	animate
abstract	concreteness of the DO	concrete
low	entrenchment of the DO	high
long	distance to last mention of the DO	short
low	times of preceding mention of the DO	high
low	cohesiveness of the DO to the preceding discourse	high
short	distance to next mention of the DO	long
high	times of subsequent mention of the DO	low
high	cohesiveness of the DO to the subsequent discourse	low
	following directional adverbials	yes
high	production difficulty	low

Table 1. *Variables governing PrtPl (as suggested in the literature)*[3].

(3) a. ?We converted over the heating to steam.
b. We converted the heating over to steam.

(4) a. ?They attached up the tag on the wall.
b. They attached the tag up on the wall.

However, the question arises as to how Fraser knows that it is the phonetic form of the verb that is responsible for the purported preference of the (b) sentences rather than some other variables he also discusses in the same paper? The indicated preference of construction$_1$ in all three examples (if it is representative at all) could be due to the DO being simple, very short and definite rather than Fraser's phonological variable. Obviously, the data Fraser cites simply do not warrant his conclusion as they fail to take into consideration these additional variables. This instance shows that, in complex cases like PrtPl, minimal pairs can distort the picture more than they are helpful in spite of their time-honoured place in linguistics.

What is more, it is uncontroversial that, in complex phenomena (given the large number of variables mentioned above), independent variables can interact with each other with respect to the impact they have on the dependent variable. Such phenomena can hardly be identified by using classical minimal pair tests, which contributes further to the lack of an adequate description of PrtPl. Therefore, I advocate the use of multifactorial techniques, which enable the researcher to describe PrtPl more efficiently.

Moreover, with few notable exceptions (Chen 1986; Gries 1999, 2000; Hawkins 1991, 1994) analyses of PrtPl have been based on intuitive and introspective analyses of grammaticality/acceptability judgements alone. This methodology may be found acceptable (and even rewarding) in particular research traditions (most notably transformational-generative grammar). From my point of view, however, this methodology is fundamentally flawed. To name one reason for this opinion, numerous publications have shown (cf., e.g., Labov 1975) that relying on grammaticality/acceptability judgements alone does not meet well-established standards of scientific research (objectivity, validity, and reliability). Thus, my analysis will rely solely on naturally-occurring instances of PrtPl (from the British National Corpus).

Second, in spite of many decades of research, there is still no account of PrtPl that tries to explain why speakers choose one construction over the other in a particular discourse situation. Such an account would, first, identify all relevant variables and subsume them under a (probably) small set of factors and, second, identify all irrelevant variables on a principled basis and eliminate them from further consideration. There are several such analyses which have attempted to provide a unifying hypothesis for the main motivation of the alternation by relating PrtPl to issues of givenness/topicality (which boils down to degree of activation) of the DO's referent (Erades 1961; Chen 1986) or to purely syntactically conditioned processing effort (Hawkins 1991, 1994). However, these previous investigations do not go far enough for two reasons, as follows.

On the one hand, there are only two major empirical analyses of PrtPl (Chen 1986, and Hawkins 1991, 1994), and both suffer from several drawbacks. (The following discussion will only deal with two problems. For a more comprehensive critique, cf. Gries 2000). Both Chen and Hawkins operationalise the givenness of the DO's referent by counting co-referential expressions in the preceding context, a methodology advocated in numerous papers by Givón (cf, e.g., Givón 1983, 1988). However, it has been shown beyond any reasonable doubt that the referent X of some expression is not only activated by strictly co-referential items. Rather, the inferential processes on the part of hearer in particular discourse situations also activate related concepts. While the notion of *related concept* can be criticised as being fairly vague, studies such as Clark (1977) on bridging and by Bolkestein (1985) as well as Bolkestein and Risselada (1987) on cohesiveness have shown that the referent X of some expression can in fact (depending on the particular characteristics of the discourse) be activated by hyperonyms of X, hyponyms of X, co-members of X's level of categorisation, parts of X, the function of X, reasons leading to X, consequences following from X, etc. Therefore, analyses of the influence of givenness/topicality had better incorporate these variables if the investigation of givenness is to be valid. What is more, both the analyses by Chen and Hawkins have been carried out with little degree of statistical sophistication as, e.g., neither analysis uses any significance tests to support their far-reaching conclusions.

On the other hand, Chen's and Hawkins' proposals also fail to account for a variety of factors which cannot easily, if at all, be related to givenness/topicality or purely

syntactically conditioned processing effort, namely the idiomaticity of the VP, VP-final directional adverbials, and the concreteness of the DO, to name a few. Due to these and other drawbacks, an explanatory account of PrtPl that is both coherent and empirically supported cannot be found.

Third, given the shortcomings just discussed, it comes as no surprise that it has not been possible to predict which construction a native speaker will choose. This is a problem that derives from the lack of truly multifactorial treatments of the subject matter.

In the remainder of this paper, I will propose a hypothesis that explains the constructional choices of speakers given a particular discourse context (cf. section 2) and I will show how, by means of using multifactorial statistics, this hypothesis can be supported and native speakers' choices of construction can be predicted with a high degree of accuracy (cf. section 3).

1. THE PROCESSING HYPOTHESIS. In this section, I propose a hypothesis to explain the distribution of the two constructions and outline which variables are, according to this hypothesis, relevant and which are not.

> **The Processing Hypothesis (PH)**: By choosing one of the two constructions for an utterance U a speaker S formulates U in such a way as to communicate the intended message with as little processing effort as possible. More specifically, for most variables at least, this means that construction$_0$ will be preferred for verb-particle constructions (VPCs) with DOs requiring a lot of processing effort; construction$_1$ will be preferred for VPCs with DOs requiring little processing effort[4].

In order to investigate this hypothesis, two different steps are necessary. On the one hand, it must be shown how the above-mentioned variables relate to processing effort. This will be done in the remainder of this section. On the other hand, it must be shown empirically, that (i) the variables included by the PH correlate with PrtPl in the direction predicted above and (ii) the variables excluded by the PH do not correlate with o contribute to PrtPl; this will be the topic of section 2.

1.1. PHONOLOGICAL VARIABLES. The stress pattern of the VP can be straightforwardly related to processing requirements: in functional analyses of information structure, it has been useful to distinguish two kinds of information, namely given and new information. Generally, in English the new (and/or important) information is positioned sentence-finally. Moreover, it is by now common ground that stress on a linguistic expression typically serves to indicate the newness or importance of the referent of this linguistic expression, i.e., to direct the attention of the hearer to the respective referent, thereby increasing the processing cost associated with that referent. Combining these two findings results in the distribution predicted in the PH: the expressions whose referents are to be processed thoroughly occur clause-finally and are stressed.

1.2. MORPHOSYNTACTIC VARIABLES. As far as the TPV is concerned, construction$_0$ facilitates processing because the speaker can complete (and thus disambiguate) the TPV earlier if the particle immediately follows the verb and need not be borne in mind until the DO has been uttered completely (cf. Rohdenburg 1996). But what about the DOs of TPVs? Let us start with the variable *NP type of the DO*.

This variable is, in fact, quite closely connected to utterance processing: personal pronouns and semi-pronominal/referentially vague nouns are only used when their referents are identifiable and active, whereas lexical noun phrases are much more likely to be used with unused and brand-new referents. Again, the distribution is as predicted in the PH: active referents of personal pronouns require little processing effort and correlate with construction$_1$, referents of lexical DOs are, on the whole, more likely to require more processing and occur preferably in construction$_0$.

Likewise, the variable *determiner of the DO* noun phrase is also concerned with processing aspects:

> Linguists traditionally deal with the binary distinction between definite and indefinite, with the former marking topics which the speaker assumes the hearer can identify uniquely, is familiar with, are within his file (or register) and thus available for quick retrieval. On the other hand, indefinites are presumably topics introduced by the speaker for the first time, with which the hearer is not familiar, which therefore are not available to the hearer readily in his file. (Givón 1983:9f.)

Comment is hardly called for: definite determiners are said to prevail in construction$_1$ and indefinite determiners (used for unused or even brand-new referents requiring conscious activation) are said to prevail in construction$_0$ so that the pattern found is as expected.

Length of the DO and *complexity of the DO* (irrespective of how these are measured; cf. Wasow 1997) can be dealt with simultaneously. Obviously, longer/more complex NPs require more processing effort while shorter/less complex noun phrases can be more easily processed. But apart from this purely structurally motivated approach, there is also a functional principle at work: 'the new information often needs to be stated more fully than the given (that is, with a longer, "heavier" structure)' (Quirk et al. 1985:1361). Thus, if the newness of a referent, on average, renders DOs long and complex (in order to provide the necessary information for the hearer to establish a new referential file), the larger amount of linguistic material requires more processing effort than the one needed for given information. This, in turn, increases the likelihood that production and planning effects or mistakes such as hesitations, repetitions, and false starts can be observed in actual speech (cf. Arnold & Wasow 1996). Ultimately, both the length and its functional motivation go hand in hand so that again much processing effort is linked to construction$_0$ and little processing effort to construction$_1$.

1.3. Semantic variables. We know that VPCs come in two different word orders, and we also know that the meanings of VPCs range from literal to idiomatic. In construction$_1$, the particle is positioned in the canonical clause-final position for focal elements, so that the particle is processed more intensively than the DO. Thus, the word order of construction$_1$ naturally underscores the spatial contribution the particle makes to the compositional meaning of the TPV in the utterance. Therefore, construction$_1$ is the natural choice for a speaker communicating a state of affairs where the spatial meaning is prominent[5].

Very often in the case of idiomatic constructions, the meaning of the TPV is not compositional. The particle does not just add some spatial information to a straightforward sense of the verb (as with literal TPVs), but the idiomatic TPV conveys a meaning that is not a function of the meaning of its parts and their interrelations, but must be stored on its own. In other words, when the speaker accesses the meaning of the TPV for production, then the complete idiomatic TPV (i.e., verb *and* particle) are simultaneously accessed. Thus it is only natural that the verb and the particle are uttered following one another directly: it would be uneconomical to process the opaque meaning of a TPV but produce the parts that trigger this opaque meaning in possibly widely disparate positions of the sentence[6].

Turning to the next variable, no significant effect of *animacy of the referent of the DO* on particle placement is to be expected according to the PH: there is no reason to assume that animate referents yield context-dependent processing requirements substantially different from inanimate referents, and there is also no reason to assume that animate referents are more likely to undergo caused motion. Therefore, I will investigate animacy but consider it not to contribute to the constructional alternation.

Finally, the variable *entrenchment of the DO* (as analysed in Gries 1999) will not be analysed directly because the entrenchment hierarchies offered in Deane (1992) and Gries (1999) comprise several variables that will be dealt with separately (and thus much more precisely) in this analysis.

1.4. discourse-functional variables. The discourse-functional variables concerning the preceding context relate straightforwardly to matters of processing effort. Information that is given as a result of having (frequently and/or recently) been evoked in the preceding discourse or being readily inferable from the preceding context requires less processing effort than discourse-new or especially hearer-new information. Thus, the distribution of the two constructions (and their processing cost) relative to these variables is the one given above in Table 1. However, the discourse-functional variables concerning a subsequent context cannot be related to the processing cost of the VPC. Even if it were true that these variables measure the importance of the DO's referent, it is difficult to see how a speaker should be able to foresee precisely the development of the discourse to follow (cf. also Hawkins 1994:225). Thus, I claim that these variables will neither be relevant to nor correlate with the processing cost of the utterance.

	Spoken	Written	Row Totals
Construction$_0$	67	127	194
Construction$_1$	133	76	209
Column Totals	200	203	403

Table 2. *Corpus data*[7].

1.5. OTHER VARIABLES. The next variable is concerned with the presence of a directional adverbial following either the verb or the particle. If a directional adverbial follows the VPC, then it typically serves to elaborate either the path along which the referent of the DO is being moved, (5)a, or the resultant location of the referent of the DO, (5)b and endnote 5.

(5) a. So Tom took Peter along past the new Pump House.
b. Fred put the book down on the table.

For construction$_1$, where the spatial meaning is foregrounded (cf. above section 2.3), it is therefore quite natural to expect additional material (in the form of a directional adverbial) providing additional information on the direction or the endpoint of the movement process. On the other hand, construction 0 does not normally denote a movement process that can be further elaborated with information concerning directionality so following directional adverbials are, though not strictly ruled out, not to be expected. Thus, the distribution predicted in the PH seems to be fully justified.

2. THE STATISTICAL INVESTIGATION: DATA AND RESULTS. In order to empirically test the PH conforming more to the standards mentioned in section 1, I studied a set of 403 VPCs from the BNC. Table 2 gives an overview over the sentences that were analysed.

By analysing the 403 sentences and their context (the 10 preceding and 10 subsequent clauses)[8], each VPC was assigned values representing the values/levels of the variables listed in Table 1[9]. Then, two different procedures were used: first, for each variable, a strictly monofactorial coefficient of correlation was calculated (section 2.1). This may seem surprising, given that I have devoted some space to arguing that monofactorial analyses are ill-suited for problems of such a level of complexity. The reason for including monofactorial correlations is that I wanted to subject all variables to an empirical test, as few variables have already been tested on naturally-occurring data. Second, a multifactorial analysis was conducted in order, first, to find out how much variance of PrtPl we can account for (given the variables we know of) and, second to try to predict native speakers' choices of a construction in natural discourse (section 2.2).

2.1. MONOFACTORIAL RESULTS. Due to the different levels of the variables within the analyses, a variety of different coefficients of correlation had to be computed. To cut a long story short, Table 3 contains the correlation coefficients for each variable.

Variables that were analysed empirically	Correlation coefficient
Complexity of the DO (COMPLEX)	γ=-0.847 ***
Idiomaticity of the verb phrase (IDIOMATICITY)	γ=-0.6 ***
Length of the DO in syllables (LENGTHS)	r_{pbis}=-0.504 ***
NP Type of the DO (TYPE)	ϕ=0.492 ***
Distance to last mention of the DO (ACTPC)	r_{pbis}=0.452 ***
Length of the DO in words (LENGTHW)	r_{pbis}=-0.45 ***
DO's cohesiveness to the preceding discourse (COHPC)	r_{pbis}=0.429 ***
Times of preceding mention of the DO (TOPM)	r_{pbis}=0.415 ***
Last mention of the DO (LM)	ϕ=0.411 ***
Overall mention of the DO (OM)	r_{pbis}=0.358 ***
Concreteness of the DO (CONCRETE)	ϕ=0.339 ***
Determiner of the DO (DET)	ϕ=0.319 ***
Directional adverbial following the DO (PP)	ϕ=0.268 ***
Times of subsequent mention of the DO (TOSM)	r_{pbis}=0.192 ***
Animacy of the DO (ANIMACY)	ϕ=0.166 ***
DO's cohesiveness to the subsequent discourse (COHSC)	r_{pbis}=0.143 **
Next mention of the DO (NM)	ϕ=0.104 *
Distance to next mention of the DO (CLUSSC)	r_{pbis}=0.1 *
Production and planning effects (DISFLUENCY)	r_{pbis}=-0.006 ns

Table 3. *Monofactorial results of the analysis.*

Generally speaking, the higher the absolute value of the correlation coefficient, the more important this variable is for PrtPl. But before we begin to interpret these results, a comment concerning the significant correlation between the variable ANIMACY and PrtPl is necessary. This result might be taken as evidence that the PH is not fully correct since I predicted that ANIMACY should not play a role. This, however, would be mistaken as the variable ANIMACY not only tells us whether the referent of the DO is animate or not; it also tells us something about the concreteness of the DO: if the referent is animate, it must be concrete. Thus, if we want to test the influence of ANIMACY alone, we need to take out the influence of CONCRETE on ANIMACY. There is a statistical technique serving this purpose, namely that of partial correlations, and if we do that, then ANIMACY does not have any influence on PrtPl anymore: $r_{\text{ANIMACY construction • CONCRETE}}$ = 0.04; t_{400} = 0.757; p = 0.449 ns. In less technical terms: ANIMACY only had a significant effect because it tells us something about the concreteness of the DO's referent: if we take out that information, ANIMACY turns out to be irrelevant while CONCRETE remains important (as predicted by the PH). This is a good example of how monofactorial analyses can result in 'statistical evidence' that,

on closer inspection, turns out to result from the artificial separation of variables that are actually closely related.

While it is not possible to go through all of the results in detail, some important conclusions can be drawn from the monofactorial analysis. First, we find a rough ranking of variable groups: morphosyntactic variables are the most important ones, followed by semantic variables and discourse-functional variables pertaining to the preceding context; least important are the discourse-functional variables concerned with the subsequent discourse. Second, on the whole, the PH receives strong support: the variables included by the PH all correlate with PrtPl, one, significantly and, two, in the predicted direction. Third, there are some variables (TOSM, COHSC, NM and CLUSSC) which correlate significantly with PrtPl although the PH has predicted otherwise (interestingly the correlation is exactly the opposite one than that observed by Chen). In this respect, the PH is not supported, but we will return to these variables below. Finally, we have, for the first time, a clue as to the strength of the individual variables in isolation, a level of precision not attained so far.

The following section, however, will approach PrtPl in yet a different way.

2.2. MULTIFACTORIAL RESULTS. While the results of section 2.1 are already a major leap forward (given the absence of similarly thorough analyses so far), they are still not quite satisfactory. The problem is, as was already mentioned, that monofactorial analyses do not enable us to address the issue rewardingly. Consider the choice of construction from the perspective of speech production: Obviously, no given native speaker computes a series of monofactorial correlations or weighs variables independently in order to reach a decision as to the construction to be uttered (although the method of monofactorial analyses seems to imply just that). Rather, for the native speaker, all variables' values/levels are present at the point of time where the constructional choice takes place. Thus, any cognitively realistic account needs to incorporate all the variables simultaneously rather than artificially isolated.

Let us first try to measure the overall success of the research on PrtPl in a multifactorial way. Using the General Linear Model (a generalisation from techniques such as regression analysis and analysis of variance), we can assess the amount of variance of the dependent variable PrtPl that can be explained both by all variables ever postulated and, more interestingly for our purpose, for the PH. Consider Table 4 (overleaf)[10].

In sum, the adjusted multiple correlation coefficient R_c for the variables included in the PH is not only highly significant; it is even slightly higher than R_c for all variables ever postulated to influence the alternation. In less technical terms, if we include variables into the analysis other than those required by the PH, what we get is random noise. Thus the PH receives in this case overwhelming support. However, we would still like to know exactly how the variables behave and how we can predict speakers' choices.

With a so-called discriminant analysis, we can enter all variables into an equation and figure out how important each variable is (by means of a factor loadings) and what choice of construction the analysis would predict. Table 5 provides the results

Statistical index	All variables	Variables of the PH
R	0.79	0.761
R_c	0.719	0.723
F	$F_{94, 308}$=4.4	$F_{53, 349}$=9.074
p	<0.001 ***	

Table 4. *Multifactorial results of the analysis.*

Variables of the discriminant analysis	Loading	Effect on PrtPl
Length of the DO in syllables	-0.545	high variable values → construction$_0$ low variable values → construction$_1$
Lexical DO	-0.496	
Intermediate complexity of the DO	-0.477	
Length of the DO in words	-0.47	
Idiomatic VP	-0.323	
Indefinite determiner of the DO	-0.281	
Production/Planning difficulty	-0.006	given the low factor loadings (fl) (-0.22<fl<0.22), these variables do not discriminate well between the two constructions
Semipronominal DO	0.086	
Distance to next mention of the DO	0.093	
Is there a next mention of the DO?	0.097	
DO's cohesiveness to the subs. disc.	0.134	
Animacy of the DO	0.157	
Times of subs. mention of the DO	0.183	
No determiner of the DO	0.222	high variable values → construction$_1$ low variable values → construction$_0$
VP-final directional adverbial	0.277	
Literal VP	0.308	
Concreteness of the DO	0.336	
Is there a last mention of the DO?	0.42	
Times of prec. mention of the DO	0.426	
DO's cohesiveness to the prec. disc.	0.443	
Distance to last mention of the DO	0.473	
Pronominal DO	0.494	
Simple DO	0.571	
Wilks' Lambda=0.465; canonical correlation=0.73; p<0.001 ***		

Table 5. *Results of the discriminant analysis for all variables.*

Composition of the learning sample	Composition of the prediction sample	Correct predictions
200 oral + 150 written sentences	53 written sentences	81.1%
150 oral + 200 written sentences	53 oral sentences	67.9%
174 oral + 176 written sentences	26 oral + 27 written sentences	88.7%

Table 6. *Prediction accuracy of three analyses.*

of a discriminant analysis for all variables (nominal and ordinal variables were 0, 1-coded; variables failing the tolerance test were omitted).

Given space limitations, three findings deserve attention: first, again all variables included into the PH correlate with PrtPl strongly and in the predicted direction. Second, the overall ranking of the variable groups found in the monofactorial analysis is preserved. Lastly, the most realistic multifactorial analysis further supports the PH in that all the variables that I have argued to be irrelevant (namely ANIMACY and all the discourse-functional variables concerned with the following context) do indeed get only very low factor loadings.

What is more, when we perform a second discriminant analysis including only the variables of the PH, then we can test how accurate the predictions of constructional choices from the PH really are. If we enter all 403 cases into the analysis, the discriminant analysis computes a constructional choice, and we can compare the accuracy of this classification with the 'real' choices by native speakers in their discourse settings. The classification accuracy resulting from this procedure is very high: 85.9% of all the 403 utterance are classified correctly. However, this is not really prediction since the cases to be classified also figured in the analysis from which the discriminant function was derived. Therefore, I have pursued two ways to further support the argument of the predictive power of the PH.

First, I split the sample into two parts, one consisting of 350 cases, the other of 53 cases. The former sample was a learning sample to which I applied a discriminant analysis to obtain a discriminant function; the latter sample was a prediction sample whose constructions were predicted on the basis of the discriminant function derived from the learning sample. In order to anticipate criticism of my possibly biased choice of the samples, I performed this test three times with different learning and prediction samples. Table 6 shows the composition of the samples and the results.

Obviously, the cross-validation also strongly supports the PH: on the whole the constructional choices in the prediction sample can be predicted quite accurately on the basis of the learning sample (with oral data being most difficult to predict, which is, I think, due to the more spontaneous and interactive nature of oral speech as compared to planned writing).

However, the ideal way of testing the predictive power of models is via cross-validation, using the leave-one-out method (also called U-method). If we apply this procedure to the present data, we perform 403 analyses in each of which we predict the choice of construction in a single case on the basis of the remaining 402 cases. This again guarantees that no case is used for its own prediction. The result of this cross-validation for the present analysis is a prediction accuracy of 83.9%. This result is for all practical purposes very much the same as the one we had for the classification accuracy and the split-sample technique, which shows that the results are quite robust and the predictive power of all the variables together is indeed exceptionally high.

3. DISCUSSION/CONCLUSION. We have seen that the Processing Hypothesis subsumes more variables under a single explanatory account than any other previous hypoth-

esis. While the present analysis is not the first one to relate PrtPl to processing cost (cf. Hawkins 1994), it is important to notice that it is the first one that integrates all previous variables rather than excluding them *a priori*. We have also seen that the PH excludes several variables from further consideration. Both of these predictions are borne out by the data to such an extent that we can now, on the basis of an argumentatively sound hypothesis correctly predict 84% of native speakers' choices for a particular construction in a natural discourse setting.

One question, however, remains unanswered. The PH was neutral with respect to whose processing effort we were concerned with although it would be preferable to be able to explicitly relate the processing cost associated to the variables under investigation to one or both of the interlocutors. However, as Arnold et al. (2000) have shown, this is hard to achieve since what is beneficial to the speaker is very often beneficial to the hearer, too. To name just one example, long complex DOs require more processing for the speaker, so he might prefer it to process them once everything else has already been processed. At the same time, hearers also prefer the sentence-final position for complex DOs in order to reduce their memory load in parsing. Thus, the question of shoes processing cost we are primarily concerned with awaits further (experimental) research.

More importantly, however, are probably the methodological ramifications. The study has shown that multifactorial analyses of naturally-occurring data can go way beyond previous kinds of analyses. Not only are these techniques more likely to yield cognitively realistic results, they also enable us to identify spurious correlations (i.e., statistical artefacts, recall the variable ANIMACY) and, last but not least, compare the predictive power of competing analyses. Suppose that some researcher claims to have found additional variables influencing PrtPl or a hypothesis making different predictions. In that case, we simply analyse a set of naturally-occurring sentences with respect to all variables (his/hers and mine) again and test which hypothesis results in a higher prediction accuracy. In the absence of additional indications to the contrary, the analysis with a higher degree of predictive power is to be preferred. In conclusion, I hope to have also shown how rewarding a truly multifactorial perspective on the analysis of syntactic variation can be.

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1 Here as well as in the remainder of the paper, the expressions *choice of construction* or *speakers' decisions* are not meant to imply that there is necessarily a conscious choice on the part of the speaker.

2 Of course, animacy and concreteness of the DO refer to the animacy and the concreteness of the referent of the DO.

3 It is also interesting to note in passing that nearly all of these variables have already been identified single-handedly by Van Dongen (1919). Put differently, not much progress has been made since then as, unfortunately, many analyses have failed to notice this and other early grammarians' insightful works.

[4] This formulation leaves open the question of whose processing effort we are concerned with. This question is not relevant to the subsequent discussions, but it will be addressed briefly in section 3.

[5] Construction$_1$ apparently instantiates a subtype of the caused-motion construction in Construction Grammar (cf. Goldberg 1995 chapters 3 and 8), which has the following basic meaning: 'the causer argument directly causes the theme argument to move along a path designated by the directional phrase; that is, X CAUSES Y TO MOVE Z' (Goldberg 1995:152). Similarly, in TPVs like, say, *Fred brought the book back*, the causer (*Fred*) directly causes the theme argument (*the book*) to move along a path or up to a point designated by the directional phrase (*back*). For this reason, it also follows that concrete referents of DOs will preferably occur in construction$_1$ while abstract objects probably will not: concrete referents can undergo caused motion whereas abstract referents cannot. Finally, note that Goldberg's caused-motion construction is metaphorically related to the resultative construction, which fits previous observations that TPVs can also license a resultative meaning as well.

[6] This claim is supported by the independent observation that idiomatic expressions are in general much less susceptible to syntactic rearrangements than literal expressions.

[7] The majority of the VPCs investigated consist of the most frequent verbs and particles entering into VPCs. The required frequency data in turn result from my own collection of 1,357 different TPVs.

The question may arise why 'only' 403 examples were used for the analysis. First, it has to be observed that, with 403 cases, this is by far the largest quantitative corpus-based analysis of particle placement ever reported (cf. Hawkins' (1994) analysis of a mere 179 cases or Chen's (1986) analysis of only 239 cases). Additionally, the results will show that the predicted effects are all quite strong and highly significant, supporting my claim that the number of cases is in fact not too small at all.

[8] In order not to overly minimise the context, I did not count questions tags, discourse markers (e.g. *you know, I mean*) and repetitions / false starts.

[9] The variable semantic modification of the particle (with words like *right*) was not investigated because the corpus data did not contain a single example of such cases. The influence of stress was not investigated since the available corpus data were not phonologically annotated.

[10] The analysis included two- and three-way-interactions; full-factorial designs of this complexity are difficult to calculate and even more difficult to interpret.

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