Concrete constructions or messy mangroves? How modelling contextual effects on constructional alternations reflect theoretical assumptions of language structure

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Abstract
Depending on the theory of language employed, the paradigmatic and lexical variation associated with a given composite form-meaning pair is treated in different ways. First, variation can be treated as independent of the constructional semantics, an approach typical of modular theories. Second, paradigmatic variation can be considered indicative of constructional semantics; its variation constituting networks of closely related families of constructions. This is a common approach in construction grammar. Third, there exists a trend in cognitive linguistics and construction grammar to treat grammatical constructions as non-discrete emergent clusters of many-to-many form-meaning mappings. This study explores the possibility of extending current methods for quantitatively modelling construction grammar to an approach that does not assume discrete grammatical constructions. The speaker choice examined consists of the English future constructions *will* and *BE going to* and their use in contemporary informal British English. The constructions are examined with the behavioural profile approach. Three different regression modelling methods are applied to the grammatical alternations, each operationalizing one of the theoretical assumptions. While the results show that all three approaches are feasible and comparable in predictive accuracy, model interpretation becomes increasingly difficult with added complexity.

Keywords: behavioural profile approach; construction grammar; future constructions; logistic regression

1 Introduction

The grammatical construction can be understood as constituting an inventory of concrete form-meaning parings (Fillmore 1988: 37, 2008: 49), that is, a list of discrete lexico-syntactic chunks of language. By contrast, the same notion can also be understood as entirely emergent, that is, as dynamic form-meaning patterns of use. Here, grammatical knowledge has been compared to a mangrove forest where trees emerge from the entangled roots beneath the water (Dąbrowska 2017: 65). Evidently, between these two poles, various degrees of reification and dynamic emergence can be posited to explain grammatical knowledge while still maintaining the principle of cognitive plausibility (Pijpops et al. 2021). Questions on how to best model grammatical constructions lie at the heart of much of the theoretical debate in construction grammar. Since a “construction” is the object of study, deciding what exactly what this constitutes is a non-trivial issue. This study examines three approaches to modelling constructions with various degrees of formal discreteness.

The question of what constitutes a construction is not just fundamental at a theoretical level, but equally important empirically, especially when using quantitative methodology. A clearly operationalized dependent variable is a sine qua non if we are attempting to model speaker choice. This study examines various heuristics that can be employed in modelling speaker constructional use, depending on the theoretical assumptions or constructional approach of any given study. It is not the aim of this study to compare those theories or their descriptive and predictive power, but to demonstrate that comparable quantitative modelling of these various understandings of a grammatical construction is possible.

In order to demonstrate how these different approaches to a construction can be modelled, the study looks at the English future constructions *will* and BE *going to* and how they interact with grammatical person and verb class. Depending on the constructional approach employed, such paradigmatic and lexical variation can be treated as one of the following:

1. Independent of constructional semantics
   Empirically: grammatical person and verb class as random variables
   Theoretically: modular approach or formal approach
   Example: [*will* + INF] vs. [BE *going to* + INF], where verb semantics and grammatical person are treated as noise

2. Indicative of constructional variants
   Empirically: grammatical person as multinomial dependent variable, verb class as random variable
   Theoretically: network approach or family approach
   Example: [1st person + *will* + INF] vs. [3rd person + *will* + INF] vs. [1st person BE *going to* + INF] vs. [3rd person BE *going to* + INF], verb semantics is treated as noise

3. Indicative of constructional semantics
   Empirically: grammatical person as multinomial dependent variable, verb class as independent variable
   Theoretically: cluster approach or many-to-many approach
   Example: [1st person + *will* + INF] vs. [3rd person + *will* + INF] vs. [1st person BE *going to* + INF] vs. [3rd person BE *going to* + INF], verb semantics included in model

First, the “modular” approach assumes that grammatical constructions are stored schemata associated with constraints and preferences that are instantiated in use where they are combined with other stored structures. This would correspond to lexical functional grammar’s understanding of the construction or Pijpops’ (2020) third alternation type.

Second, the “network” approach assumes that grammatical constructions are discrete, stored, and instantiated, but that the level of granularity needed for a valid generalization, is more fine-grained. Such an understanding of the construction could be described as a set of allostructions (Cappelle 2006) or Goldberg’s (1995) construction network and thus be labelled, following Pijpops’ (2020) typology, as a choice point for the speaker.

Third, the “many-to-many” or “emergent cluster approach” approach assumes that constructions are non-discrete clusters emerging from usage instances of similar forms and similar functions. Following this understanding, we may label frequent instantiations of form-function patterns as constructions, but this reification is, in fact, epiphenomenal. This radical approach to grammatical competence does not assume choice points or even alternations since the utterance is merely a combination of its component parts. Although this does not preclude the possibility of relatively reified form-meaning combinations, it treats their existence as an entirely empirical question. One of the greatest challenges for such an understanding of the grammatical construction is how to model it.

2 Method: sample and annotation

A sample of *will* and BE *going to* were extracted from the LiveJournal Corpus (Speelman and Glynn 2012) and subsequently manually sorted to obtain a data set consisting of 400 occurrences. All occurrences of the constructions with no future time reference as well as idioms were removed. The data are exclusively British English and consist of informal personal online narratives (blogs) spanning a 10-year period (from 2002 to 2012). The potential impact of speaker variation was controlled for by extracting only one token per speaker per construction. The contexts of negation and interrogation, which both correlate with BE *going to* and are often seen as indices of processing factors (see Mikkelsen and Hartmann 2022), were excluded from study. Furthermore, we did not include the reduced forms *'ll* and *BE gonna*, as they can be considered constructions in their own right (Lorentz 2013; Flach 2020). Other processing factors such as priming effects (Szmrecsanyi 2003), social variables such as age and region (Denis and Tagliamonte 2017), and phonetic variables (stress patterns) were not controlled for. Finally, during the annotation process, the actual construction was hidden from the annotator to minimize the effects of annotator bias.

The method employed is commonly referred to as the behavioural profile approach in cognitive linguistics (Dirven et al. 1982; Geeraerts et al. 1994; Gries 2003; formally proposed by Divjak and Gries 2006; Glynn 2007, 2009; and Gries and Divjak 2009). This method uses manual feature analysis of a sample to identify patterns of usage interpretable as criteria for a quantified description of lexical semantics or grammar from a functional perspective (however that is defined). These patterns are identified using "a co-occurrence table that provides the relative frequency of co-occurrence of each [construction with each feature]; the vector of these co-occurrence percentages" for a construction constitutes its behavioural profile (Gries and Otani 2010: 128). In our case study, the statistical significance of a variable improving the prediction of a speaker's choice is used to identify those patterns.

If we assume that the choice of future construction in any given context is simultaneously affected by different factors, then a multivariate technique like regression analysis is particularly useful. Indeed, this statistical technique is arguably the most popular method for the quantitative description of grammatical alternations (Grondelaers 2000; Heylen 2005; Bresnan et al. 2007; Grondelaers et al. 2009; Glynn 2010; Szmrecsanyi 2010; Krawczak and Glynn 2015; Krawczak et al. 2016; Krawczak 2021; Pijpops et al. 2021 *inter alii*). Although the interpretation of the results of predictive modelling is a complex issue in itself, regression modelling can be summarized as a family of techniques that are used for inferring (as opposed to determining) causal relationships between dependent variables and independent or explanatory variables. In alternation studies, the outcome or the predicted dependent variable is the grammatical choice of the speaker and the independent variables used to predict that choice are a set of hypotheses about its underlying motivations. For the sake of systematicity, all of our models are calculated with Elff's (2020) mclogit package for R. The package is designed for multinomial outcomes with random effects and employs maximum likelihood with Laplace approximation. For a detailed presentation of regression with nominal outcomes, see Agresti (2002), Harrell (2015), and Hosmer et al. (2013). With respect to linguistic data specifically, see Baayen (2008), Speelman (2014), and Speelman et al. (2018).

After sample extraction, the data were submitted to manual feature analysis for a range of potentially important variables. From the substantial literature on the alternation between *will* and BE *going to*, the following four semantic dimensions were distinguished: intentionality, operationalized as speaker or subject intention; temporal proximity and speaker certainty, operationalized as scalar values based on temporal and epistemic marking; and present relevance, operationalized as a situation in which the conditions for carrying it out are given at the time of speech (link to t_0) or which is independent of future conditionalities (contingency). While *will* is typically characterized as a "neutral" expression of "pure" futurity or "prediction", BE *going to* is described as the more marked of the two forms (see Mikkelsen [forthcoming] for a review of previous research): expressing intentionality, as in (1); temporal proximity, as in (2); a higher degree of certainty, as in (3); or a clearer link to the moment of speech, as in (4):

(1) *I'm **going to learn** brewing this year* (girl_o_stunts)
(2) *Today calls for a bubble bath and a glass of wine, otherwise **I'm going to be** a complete bitch tomorrow* (dannyfranx)
(3) *This **is going to happen** fast – if we're lucky, we've got a year or two to prepare for it* (blufive)
(4) *Did realise **I'm going to miss** Hellboy 2, The Mummy 3, loadsa book releases and general musical theatre news in the 6 months I am off* (amzh87)

Notice that while these variables are similar, possibly pointing towards a single underlying difference, they are independent of each other: sentence (1) expresses an intention, but is not temporally proximate; example (2) is temporally proximate, but does not express an intention; example (3) is construed as something inevitable and is thus portrayed with a high degree of certainty, but is neither intentional nor temporally proximate; and the future event in (4) is clearly linked to the moment of speech since the condition for its realization (going away) is already programmed.

In addition to these semantic categories, the contextual variables of grammatical person and verb class (the lexical verbs were manually sorted and placed into 10 different categories, based on Levin 1993) were included. Table 1 presents an overview of the variables examined.

Table 1: Annotation schema.

Variable	Levels and annotation
Grammatical person	first Person, second person, third person
Verb class	action verbs, change of possession, change of state, communication, existence, motion, obligation, perception, psych, social interaction
Temporal proximity	5-point scale
Speaker certainty	3-point scale
Contingency	dependent, independent
Link to moment of speech (t_0)	attached, detached
Intention	intentional, non-intentional

It must be stressed that this study is primarily concerned with different understandings of what constitutes a construction and how that affects the dependent variable in logistic modelling. Questions on model selection, that is how to determine what predictive variables should be included in the model, just as how one can compare the predictive power and descriptive adequacy of different models, lay beyond the purview of the current investigation. In no way should this be understood as suggesting that such questions are not important.

3 Results

Comparing the predictive power of different models with different outcomes and different degrees of complexity is not immediately obvious.[1] Moreover, there are many ways to judge the goodness-of-fit and predictive accuracy of a logistic model. For the current purposes, the concordance statistic is employed to demonstrate the comparability of the models and to demonstrate their descriptive acceptability, not to gauge their relative predictive power (see Hosmer et al. [2013: 177] for a discussion on how to interpret the concordance statistic). Only the coefficients (effect sizes) and alpha levels for significant predictors are listed along with the concordance statistics for each model outcome. Since the aim of the study is not descriptive, other model diagnostics and the log-odds are not included. Nevertheless, the models are all tested for parsimony and include all and only predictors (explanatory variables) that contribute significantly to the outcome. Furthermore, it should be repeated that comparing the predictive accuracy of a simple model with that of a complex model is not straightforward. Higher numbers of predictors can contribute positively to the predictive accuracy just as more outcomes (levels in the dependent variable) can contribute negatively. Lastly, given the nature of some of the predictors tested here, collinearity is an ever-present concern in model fitting. All variance inflation factors of the models were lower than 4 (Glynn 2014: 136).

3.1 Modular approach

If one assumes that speakers' competences rely on relatively "high-level" generalizations and that constructional variation, whether resulting from lexical contribution or "grammatical" variants, are simply instantiations of a construction, then one can discretely model constructional choice by treating such variation as random. According to this understanding, a construction belongs to a definitive list of constructions (the constructicon) and these constructions license lexical entries. Applying this heuristic, Table 2 presents the results of mixed-effects binary multiple logistic regression analysis, where grammatical person (representing paradigmatic form) and verb class (representing lexical semantic variation) are modelled as random effects. This means that the quantitative model seeks to isolate the semantics associated with the constructions from the effects of grammatical person and the lexical semantics of the predicate.

Table 2: Regression results for modular model (construction ~ temporal proximity + link to t_0 + intention | grammatical person | verb class).

Predictors	**Effect size (all nominal)**	**Effect size (nominal and ordered)**

[1] The metadata that results from the annotation as well as the R commands and scripts that are used in this study are available at https://github.com/dsglynn/LV_FUTURE.

Temporal proximity: 5 levels (ordered)	—		0.8993	**
Temporal proximity: distal (nominal)	1.0843	*	—	
Intention: subject	1.6161	**	1.5146	*
Contingency: independent	−0.7085	.	ns	
Speaker certainty: moderate certainty	1.1775	**	—	
Link to t_0: detached	1.0993	***	1.3264	***
Concordance statistic	0.7603		0.7395	

***$p < 0.001$. **$p < 0.01$. *$p < 0.05$. A full stop indicates $p < 0.1$.

Remembering that the aim of the study is to compare different ways of modelling constructions, we included two sets of results: one where the continuous variables in the model are treated as ordinal and another where those variables are treated as nominal. Although variables such as temporal proximity constitute, in reality, continuous dimensions, operationalizing them in a nominal fashion is widely accepted in the literature. Indeed, to the best of the authors' knowledge, effectively all corpus-driven manually annotated research currently operationalizes such variables as nominal. It is likely that this practice is merely a result of training and/or limitations in earlier versions of the software used to run logistic models. The authors believe that the current state of the art should expect such variables to be included as ordered predictors. Treating them nominally, where there is no inherent relation (or order) between the different features or levels, not only omits potentially vital information, it increases the risk of a spurious correlation being indicated as significant and interpreted.

In both cases, non-significant variables are excluded from the models. Moreover, for sake of clarity, non-significant levels are not reported in the tables. For each variable, the predictors are calculated relative to the reference level, for which no effect size is calculated. The complete results and full tables of coefficients are available online.[2] Effects listed as "negative" contribute to a prediction of the BE *going to* construction where "positive" effects contribute to the prediction of the *will* construction. The abbreviation "ns" indicates non-significance. Both models are similar, the main difference being that speaker certainty is not significant when temporal proximity is treated ordinally. This suggests that speaker certainty is not likely to play a role in the choice, especially when we take into consideration that, counter-intuitively, it is the mid-level "moderate certainty" that is significant in the nominal model. It is precisely this kind issue that underlines the importance of using ordinal variables as predictors. In both models, intentionality, link to moment of speech (link to t_0), and temporal proximity are significant predictors (while contingency is borderline, $p = 0.085335$), suggesting that these dimensions are part of constructional semantics. It should be noted, however, that one of the variables does not behave as expected. Intentionality predicts *will*, rather than BE *going to* (cf. Mikkelsen, forthcoming). The final line of the table offers the concordance statistic (C-score).

3.2 Network approach

The network approach to constructional generalization assumes that speakers' competences include relatively fine-grained sets of similar constructions that are formally and semantically

[2] https://github.com/dsglynn/LV_FUTURE.

distinct yet related. For the future forms in English, modelling the difference between the reduced forms *'ll* and *gonna* and the full forms *will* and *going to* would be ideal. However, for reasons of simplicity, we instead examine the distinction between first person and third person uses. Preliminary research revealed that grammatical person plays a part in the constructional variation for the expression of future reference. This is not surprising given that epistemic concerns such as speaker's certainty and intention, but also potentially the link to time of speech and event contingency, interact with the grammatical person of the utterance.

Following this, we run a multinomial model with grammatical person adding levels to the dependent variable of construction. In other words, we seek to predict four grammatical forms: first person *will* vs. first person BE *going to* vs. third person *will* vs. third person BE *going to*. Due to a lack of data, second person occurrences are omitted. Whether these grammatical forms are considered constructions, constructional variants, or allostructions is an open question and not the concern of the present study. The point here is to compare the predictive modelling of a construction when we take what would traditionally be considered a random variable (that is not part of the form-meaning pair believed to be a unit in the speaker's competence) and treat it as a more fine-grained level of distinction for the notion of "unit" in the speaker's competence.

Table 3 below presents the results of the logistic regression analysis with the combinations of grammatical person and future construction as an outcome and verbal semantic class as a random variable. The person-construction combinations are labelled in the following manner: *will* + first person (W-1st), *will* + third person (W-3rd), BE *going to* + first person (GT-1st), and BE *going to* + third person (GT-3rd). Just as in the previous results, the table includes a model with all nominal predictors and a model with ordinal predictors and nominal predictors, where appropriate. To interpret the effect sizes or coefficients, the reader should consider each column with respect to the so-called baseline. For example, with respect to (that is, in comparison with) first person *will*, first person BE *going to* is significantly associated with link to t_0 (that is, moment of speech).

Table 3: Regression results for family model (construction * person ~ temporal proximity + link to t_0 + intention | verb class).

W-1st baseline	**Effect size (nominal)**	**Effect size (nominal and ordered)**	**W-3rd baseline**	**Effect size (nominal)**	**Effect size (nominal and ordered)**
GT-1st + temporal proximity: 4 levels ordered	—	−0.9583 .	GT-1st + temporal proximity: 4 levels ordered	—	−1.6105 **
GT-1st + temporal proximity: neutral	−1.515 .	—	GT-1st + temporal proximity: neutral	−2.7933 **	—
GT-1st + temporal proximity: distal	−1.160 .	—	GT-1st + temporal proximity: distal	−1.3052 .	—
GT-1st + link to t_0: detached	−1.471 ***	−1.495 ***	GT-1st + intention: speaker	1.8478 ***	1.8457 ***
GT-3rd +	−3.802 ***	−3.850 ***	GT-3rd + link to	−1.4186 ***	−1.4186 ***

intention: speaker					t_0: detached				
GT-3rd + link to t_0: detached	−2.219	***	−2.239	***	GT-3rd + intention: speaker	−1.6965	**	−1.6904	**
					GT-3rd + intention: subject	−1.3279	*	−1.3574	*
					W-1st + link to t_0: detached	0.8144	.	0.8131	.
					W-1st + intention: speaker	2.125	***	2.156	***
Concordance statistic	0.7409		0.7415		Concordance statistic	0.7416		0.7371	
GT-3rd baseline	**Effect size (nominal)**		**Effect size (nominal and ordered)**						
GT-1st + temporal proximity: 4 levels ordered	—		−1.1492	*					
GT-1st + temporal proximity: neutral	−2.772	**	—						
GT-1st + intention: speaker	3.477	***	3.5070	***					
Concordance statistic	0.7156		0.7163						

***$p < 0.001$. **$p < 0.01$. *$p < 0.05$. A full stop indicates $p < 0.1$.

Multinomial models are complex and can be run using different heuristics. Although there are various possibilities, the basic difference is between one-versus-rest and polytomous predictions. In the former, one has multiple binary models where a single outcome is predicted relative to all the other outcomes combined, this then being repeated for each of the outcomes (thus it is always one option versus the other options combined). Although this approach is conceptually and computationally simpler, it is unlikely that it represents speaker choice in natural language production. To the extent that we believe speakers make choices between ways in which they wish to express themselves, it is unlikely that a speaker considers each possibility in terms relative to all the potential options "clumped together". The second heuristic treats the outcome as polychotomous. Each prediction is made across all outcomes simultaneously. The results can still be expressed as relative to a baseline outcome, but the actual predictions are polytomous. Although the results can be difficult to summarize, and indeed interpret, they represent an arguably more cognitively plausible heuristic.

The results of these models are comparable to the previous one, both in terms of significant predictors and concordance statistic (showing acceptable discrimination). However, the variable speaker certainty is no longer significant. Furthermore, it is immediately clear that grammatical person does interact with the other dimensions: first person uses are more intentional, while third person uses tend to be temporally distal and detached from the moment of speech (see Mikkelsen [forthcoming] for discussion). The identification of semantic differences between the formal variants of a construction is essential if one expects such variants to be potentially choice points for speakers.

3.3 Cluster approach

Lastly, we turn to a heuristic for modelling an emergent cluster or many-to-many understanding of grammatical constructions. In this case, the model predicts formal variants of the alternation as in the network approach above, but includes lexical semantics as an important predictor. Ideally, an entirely bottom up approach, looking for any significant form-meaning pairings, should be employed (see Glynn [2015] for an example of how this can be done). For reasons of brevity, in this study we add lexical variation to the network model presented, simulating the many-to-many to many clustering that such an approach posits. The model, therefore, although not entirely many-to-many, includes a relatively high number of fine-grained form-meaning combinations.

It is worth making explicit that, from the theoretical perspective, the speaker choice being modelled here is entirely functional. In other words, any possible utterance which indicates the intention of the speaker is an option for that speaker and therefore should be considered. In more concrete terms, one needs to accept the proposal that a speaker chooses between the constructions exemplified, with artificial utterances, in (5)–(7):

(5) a. *I'll submit the paper by the 15th*
b. *I'm gonna submit the paper by the 15th*
(6) a. *The paper'll be submitted by the 15th*
b. *The paper's gonna be submitted by the 15th*
(7) a. *They'll get the paper by the 15th*
b. *They're gonna have the paper by the 15th*

Although these options are not equally probable (indeed that is the aim of the regression analysis), all these options are potential ways of expressing a comparable function and therefore should be included in any model that seeks to explain the differences between them.

The models themselves are interpreted in the same manner as the network models. Again, we use the baseline approach to a polychotomous outcome or dependent variable. The interpretation of the results in Table 4, therefore, is identical to that in the previous results. The only difference is that here, the verbal semantics are contributing to the prediction rather than being treated as a random variable.

Although the models, both with the ordered and nominal predictors, are largely comparable to the previous models, the importance of the verbal semantics should be immediately obvious. Verbs of existence show a strong preference for third person (both *will* and BE *going to*), while verbs of perception and obligation are highly associated with third person *will* and first person BE *going to*, respectively. That the regression model is able to reveal such effects – interactions between grammatical person as an outcome and verb choice as a predictor, effects potentially representing speaker competence in a cognitively plausible manner – is important for judging the viability of this approach to grammatical constructions.

Table 4: Regression results for cluster model (construction * person ~ verb class + temporal proximity + link to t_0 + intention).

W-1st baseline	Effect size (nominal)		Effect size (nominal and ordered)		W-3rd baseline	Effect size (nominal)		Effect size (nominal and ordered)	
GT-1st + speaker certainty: moderate certainty	−1.1651	*	—		GT-1st + temporal proximity: 4 levels ordered	—		−1.524	**
GT-1st + link to t_0: detached	−1.5411	***	−1.5411	***	GT-1st + temporal proximity: neutral	−2.6674	**	—	
GT-1st + verb class: obligation	1.9015	*	1.9015	*	GT-1st + speaker certainty: moderate certainty	−0.9438	.	—	
GT-3rd + intention: speaker	−3.8384	***	−3.8384	***	GT-1st + intention: speaker	2.0639	***	2.064	***
GT-3rd + link to t_0: detached	−2.2099	***	−2.2099	***	GT-1st + verb class: existence	−2.4813	***	−2.481	***
GT-3rd + speaker Certainty: moderate certainty	−1.5151	*	—		GT-1st + verb class: obligation	2.2865	*	2.2865	*
GT-3rd + temporal proximity: neutral	1.7716	.	—		GT-1st + verb class: perception	−2.3725	.	−2.3725	*
GT-3rd + verb class: existence	2.0432	*	2.0432	*	GT-3rd + intention: speaker	−1.6823	**	−1.6823	**
W-3rd + intention: speaker	−2.1561	***	−2.1561	***	GT-3rd + intention: subject	−1.5944	*	−1.5944	*
W-3rd + link to t_0: detached	0.8912	.	0.8912	.	GT-3rd + link to t_0: detached	−1.3186	**	−1.3186	**
W-3rd + verb class: existence	2.0530	**	2.0530	**	GT-3rd + speaker certainty: moderate certainty	−1.2939	*	—	
Concordance statistic	0.7411		0.7411		Concordance statistic	0.7164		0.7164	
GT-3rd baseline	**Effect size (nominal)**		**Effect size (nominal and ordered)**						
GT-1st + temporal proximity: 4 levels ordered	—		−1.2668	**					
GT-1st + temporal proximity: neutral	−2.9772	**	_						
GT-1st + intention: speaker	3.7462	***	3.7462	***					
GT-1st + verb class: existence	−2.4715	**	−2.4715	**					
Concordance	0.7164		0.7164						

statistic

***$p < 0.001$. **$p < 0.01$. *$p < 0.05$. A full stop indicates $p < 0.1$.

4 Discussion

Recently, several authors have argued for a non-discrete understanding of grammatical constructions (Dąbrowska 2015, 2017; Glynn 2015, 2022; Goldberg 2019; Schmid 2020). We have shown that it is possible to predictively model constructions understood in these terms; using a quantitative method commonly used for more traditional approaches to constructional alternations. However, we have not shown how it is possible to directly compare the results across the approaches. The concordance statistic is arguably a reasonable index for judging the predictive accuracy of a logistic model, but it assumes comparable parsimony. The principle of parsimony holds that, all things being equal, the simplest explanation is the best, and herein lays the problem – all things are not equal. The network model and the many-to-many model are both attempting to predict a considerably more complex phenomenon than the modular approach. Indeed, that is one of the principal reasons for a modular approach to an object of study, *videlicet*, to render it simpler for analysis and description. However, the network and many-to-many understandings of grammar both hold that this modularization reduces the object of study in manner that renders the explanatory power of the model inadequate. Even if modular models of language are predictively more accurate, they must then account for lexical licensing and constraints on grammatical variation and so on, for which extra, often ad hoc, explanations must be supplied. Non-modular approaches, on the other hand, attempt to integrate such complexity into a single model, *scilicet*, a holistic model.

In summary, we have demonstrated the practical feasibility of employing regression analysis for the predictive description of the alternation of non-discrete constructions. However, despite the consistency of the results and the quantitative method for obtaining them, we are not able contribute to the debate over the relative predictive power, and therefore arguably explanatory adequacy, of the different theories. Future investigation into the comparison of models with different degrees of complexity and/or experimental studies will be needed to resolve such questions.

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