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Book Review

Laura A. Janda (ed.), *Cognitive linguistics: The quantitative turn*. Berlin/Boston: De Gruyter Mouton, 2013, 321 + vii pp., ISBN 978-3-11-033388-6. E-book (Institutional price) 450 EUR/630 USD/339.99 GBP. Paperback 29.95 EUR/42 USD/22.99 GBP

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This collection exemplifies the quantitative turn in which cognitive linguistics currently finds itself. It comprises seminal articles from *Cognitive Linguistics* between 2008 and 2012, selected as exemplars of statistical models that have been found to be particularly appropriate when studying linguistic phenomena. The choice of period is no trivial matter: during this time a great change in approaches to linguistic analysis has unfolded in the pages of the field's flagship journal. Janda proposes two eras in cognitive linguistics: the pre-quantitative era from 1990 to 2007, and the current, quantitative, era. In a discussion of quantitative methods at the 13th International Cognitive Linguistics Conference at Northumbria University in 2015, Janda noted that at least 50 % of articles published in *Cognitive Linguistics* since 2008 have been quantitative, increasing to 80 % in 2014.

In her introduction, Janda outlines the quantitative turn in cognitive linguistics, and briefly speculates about its future. She then provides a summary of each model presented in the book and of the article chosen to represent it. Before closing her introduction, Janda offers a set of alternative models to those presented in the volume. Again, Janda selects articles that exemplify these models, this time directing the reader beyond the pages of the book.

In the first selected paper, Anatol Stefanowitsch presents a corpus study of *Constructional preemption by contextual mismatch*, described as the phenomenon whereby constructions are restricted in terms of the discourse context in which they may be used. Where a particular construction does not fit the discourse context, alternative constructions must be used. Stefanowitsch notes that constructional preemption by contextual mismatch has been proposed to explain the problem of absent negative evidence in language acquisition.

Stefanowitsch focuses on prepositional dative constructions, such as *John told a story to Mary* (p. 35), testing the prediction that the information-structural profiles of constructions containing alternating verbs (those that can also be used in the ditransitive construction) are significantly different from those containing non-alternating verbs (verbs that can only be used in the prepositional

dative). In the first study, which considered 100 tokens extracted from the ICE-GB, the information-structural profile was defined in terms of givenness, syntactic weight and animacy of each referent. The chi-squared statistic produced no significant differences in the information-structural profiles of prepositional dative constructions containing alternating or non-alternating verbs.

His second study considered four verbs: *tell* and *read* representing the alternating category, and *explain* and *mention* representing the non-alternating category. In these verbs, only givenness and syntactic weight were of interest as the animacy of each referent is highly conventionalised. Using the chi-squared statistic again, Stefanowitsch found no significant difference in the information structure in which alternating and non-alternating categories of verbs are used, but did find a significant difference *within* the categories.

Stefanowitsch proposes that individual verbs – rather than alternating and non-alternating categories of verbs – differ in the extent to which they conform to the information-structural profile constraints of the constructions in which they are used. He concludes that information structure may be one of a number of factors that determine which construction and verb are used in a particular communicative context, thus limiting the explanatory power of constructional preemption by contextual mismatch in answering the question that absent negative evidence raises.

Adele E. Goldberg expands on Stefanowitsch's study in the second selected paper: *Corpus evidence of the viability of statistical preemption*. Using a larger corpus sample than Stefanowitsch, she finds that there is, in fact, sufficient evidence of statistical preemption that children may make use of when establishing which constructions are grammatical. This paper therefore represents an example of how the quantitative turn encourages us to revisit existing findings.

Goldberg reports converging experimental evidence gathered by Boyd and Goldberg (2011), which showed that individuals use statistical preemption to guide use of novel *a*-adjectives (adjectives that begin with an unstressed schwa, followed by a semantically-related stem, e. g., *a-sleep*). After witnessing some novel *a*-adjectives in a preemptive construction (e. g., *the fox that's addax* [p.67]) only a few times, participants used those and other novel *a*-adjectives in that construction, showing a dramatic decrease in prenominal uses (e. g., *the addax fox*). This indicates that information gathered from statistical preemption can be generalised to other members of the category.

In *Embodied motivations for metaphorical meanings*, Marlene Johansson Falck and Raymond W. Gibbs, Jr. use a psychological survey and corpus study to test the hypothesis that the way we think and talk about *paths* and *roads* in metaphorical contexts are related to and guided by our embodied experience with paths and roads.

The first study surveyed twenty-four students' mental imagery of paths and roads, and the chi-squared statistic established that participants identify paths and roads with different characteristics, e. g., width. In the second study, the authors identified the source and target domains of metaphorical uses of 1,000 instances of *path* and *road*, extracted at random from the British National Corpus. The chi-squared statistic indicated significant differences in the target domains of metaphorical uses of *path* and *road*.

The authors conclude that there is a relationship between the way we think and talk about paths and roads, and propose that this relationship is borne of embodied interactions with and understanding of paths and roads. Importantly, and as was the case in Goldberg's article, this conclusion is based upon converging evidence: data were drawn from empirical studies of native speakers' imagery of paths and roads, and how *path* and *road* are actually used. The importance of seeking evidence from multiple methodologies has been the topic of discussion during this quantitative era (e. g., Arppe et al. 2010), and these studies exemplify this approach.

Anna L. Theakston, Robert Maslen, Elena V. M. Lieven and Michael Tomasello present a study of *The acquisition of the active transitive construction in English* by one child, Thomas (Lieven et al. 2009). The study is based upon uses of transitive verbs in VO and SVO constructions, divided into two stages: the early stage (2;1 to 2;6), and the later stage (2;7 to 3;0). The chi-squared statistic is used to assess whether there are significant differences in certain aspects of the transitive utterances produced by Thomas, and between Thomas and his mother.

Based on the data collected, and with a caveat acknowledging the limitations inherent in using the speech of a single child, the authors conclude that Thomas's later use of transitive verbs was closely related to the way in which the same verbs were previously used. Further, verbs acquired during this early stage had an advantage over verbs acquired in the later stage in terms of their inclusion in SVO constructions. The data also indicate variation in the semantics of Thomas's early transitive uses. Lastly, the authors conclude that the animacy of subjects and objects used in Thomas's speech closely corresponded to those used in his mother's transitive utterances and those expected in the Preferred Argument Structure proposed by DuBois (1987).

Beate Hampe's corpus study, *Discovering constructions by means of collocation analysis*, questions whether linguists' focus on caused-motion and resultative constructions comes at the expense of considering a distinct construction which the author labels the "denominative construction" (p.141). Using the ICE-GB, and extending the application of collostructional analysis (Stefanowitsch and Gries 2003), the author investigates whether there is a

functional distinction between argument-structure constructions with locative or predicative complements, and those with NP complements.

Applying the Fisher/Yates Exact test, Hampe used a simple collexeme analysis to consider the frequency of a verb X in a construction Y, the frequency of X in other constructions, the frequency of construction Y with other verbs, and the number of all other verbs in all other constructions in the corpus sample. The Fisher/Yates Exact test established whether the frequency with which a given verb appears in the construction is significantly different from chance. The collocation strength of the collexemes and the construction was represented by the log-transformed *p*-value. Collocation strength values for each lexeme revealed the degree of attraction (manifested as significantly above-chance token frequency), and repulsion (significantly below-chance token frequency) with the construction; these values were then ranked. A distinctive collexeme analysis was used to identify which lexeme occurring in the three complex transitive constructions was most distinctive. Finally, Hampe used the “co-varying collexemes analysis” (Gries and Stefanowitsch 2004) to examine which pairs of collexemes appeared together in construction patterns featuring locative and adjectival complements significantly more frequently than would be expected by chance.

The data support Hampe’s prediction that argument structure constructions with NP complements are functionally distinct from those with locative or predicative complements. She argues that a quantitative approach to the study of a large sample of attested uses allows fuller study of linguistic patterns, and that the study and methodology used facilitated both the discovery and description of a distinct argument structure construction. In this way, the paper demonstrates how statistical models have been harnessed in cognitive linguistics to produce sophisticated analyses of corpus data.

In the sixth corpus study of the anthology, *Phonological similarity in multi-word units*, Stefan Th. Gries assesses whether there is a significant relationship between the cohesiveness of idiomatic expressions, measured by corpus frequency, and the presence of alliteration in the expression. He presents two case studies. The first examines fully-lexicalised idioms such as *bite the bullet*. The second examines the less lexically-specified *way*-construction.

The exact binomial test revealed that in both case studies there was a significant relationship between alliteration in the idiom and its frequency, and showed that alliteration in both fully-lexicalised and less lexically-specified idioms occurred significantly more frequently than would be expected by chance.

In the first case study Gries used collocational analysis to assess whether alliterative idioms are more attracted to each other than non-alliterative idioms,

and what pattern emerges in non-idiomatic V-NP_{DirObj} controls. The analysis revealed a higher collocational strength amongst alliterative idioms than non-alliterative idioms, and that the reverse was true in control items. In the second case study, Gries used collostructional analysis to establish whether verbs in the way-construction that begin with [w] are more attracted to the construction than those which do not. While statistical significance was not reached, the data do suggest that [w]-initial verbs have higher collostructional strength with the way-construction than non-[w]-initial verbs.

In the first experimental study reported in the anthology, Ewa Dąbrowska, Caroline Rowland and Anna L. Theakston use elicited imitation tasks to study *The acquisition of questions with long-distance dependencies* (LDD). Specifically, they test the prediction that children's repetition of prototypical examples of questions with LDD and their declarative counterparts will be better than their repetition of non-prototypical examples. They use the ANOVA test to measure whether there are significant differences in how often children and adults correctly repeat these sentence types.

The authors conducted three studies. The first tested how well children aged 4;6 to 5;3 repeat prototypical, non-prototypical and deeply-embedded examples of these sentence types. There were significant main effects of construction and prototypicality; children were better able to repeat declaratives, and their performance with prototypical questions was significantly better than with non-prototypical and deeply-embedded questions.

The second improved on the first study by controlling the lexical material used, and by ensuring that the sentences were articulated consistently. The children were older, and divided into two groups: one of five-year-olds, and one of six-year-olds. This allowed the study of an additional independent variable: age. The data from this improved study indicated a near-significant main effect of prototypicality. No other effects were found. The authors note, however, that while many children failed the task completely, many of their errors were lexical in nature. These errors do not provide any information about the children's knowledge of question formation and complementation. In light of this, the authors recoded answers with lexical errors as correct. These data were reanalysed, and a significant main effect of prototypicality was found. There was a further significant relationship between construction and age: five-year-olds scored higher on questions than on declaratives. The same significant relationship was not found in the six-year-olds. The authors studied the recurrent, non-lexical errors to further understand children's difficulties with the constructions tested.

The final study saw adults completing the same task as in study 1, with a minor amendment – the addition of a delay between hearing and repeating the

sentence – to make the task more demanding, after a pilot study showed that adults found the original task too easy. A significant relationship between construction type and prototypicality was found, showing that prototypical questions were correctly repeated more reliably than non-prototypical questions. No difference was found within the declarative sentences.

The authors conclude that children rely on lexically-specific templates for questions with LDD and their declarative counterparts as late as age 6, and that adults also use lexically-specific templates for LDD questions. They argue that this outcome is consistent with the usage-based approach, which predicts that children acquire lexically-specific templates for complementation constructions by generalising over their exposure to instances of relevant constructions.

This study exemplifies good practice in experimental research. Specifically, potential flaws in the experiment design and procedure were observed. The authors describe how the design was improved to address these flaws. The methodology and procedure is described in sufficient detail to allow another experimenter to reproduce the study, either fully, using the stimuli included in the appendices, or in part, by following the procedure and using their own stimuli.

In *Iconicity of sequence*, Holger Diessel undertakes a corpus study of temporal adverbial clauses to investigate whether the iconicity principle predicts the position of these clauses in complex sentences. The iconicity principle predicts that clause positioning reflects conceptual order – in this case, the order of events. Prior events are therefore predicted to manifest as initial adverbial clauses, and posterior events as final adverbial clauses. The author studied 570 examples of *when-*, *after-*, *before-*, *once-* and *until-*clauses extracted from the ICE-GB.

A chi-squared analysis revealed a significant relationship between conceptual order and clause position, in line with the predictions of the iconicity principle. However, Diessel notes that a significant number of examples violated the principle. He concludes that there is a significant effect of iconicity of sequence on clause position, but that it is not the sole determinant. He expanded his study to examine the role of additional characteristics: the meaning, length and complexity of each sentence. The role of these variables, in addition to the iconic sequence, was tested using logistic regression.

Diessel concludes that the logistic regression provides further support for the iconicity principle as a predictor of clause order, with other factors implicated as significant predictors of linear structure. He argues that while iconicity of sequence is often understood in terms of its semantic information, it may be better understood as a means of maximising processing efficiency, noting Givón's (1985: 189) comment that "a coded experience is easier to *store, retrieve*

and *communicate* if the code is maximally isomorphic to the experience” (original emphasis).

In *Cognitive Sociolinguistics meets loanword research*, Eline Zenner, Dirk Speelman and Dirk Geeraerts offer methodological improvements to an existing body of literature on the success of loanwords. Focusing specifically on English person reference nouns in Dutch, they apply a mixed effects model to corpus data representing the two national Dutch varieties. They offer these improvements following their criticism of the use of raw token frequency counts as a measure of the loanword’s success. They propose onomasiological profiles as a suitable alternative, in which success is defined as “the relative preference for the Anglicism vis-à-vis existing synonymous expressions” (p.255). They note that such profiles have been used in other areas of cognitive linguistics, but have not been applied in contact linguistics.

The authors also make recommendations for how large-scale corpora can be exploited. They note the preference for exhaustive inventorisation of loanwords, and that identification is typically manual. This creates a bottleneck, discouraging researchers from using massive corpora in favour of more manageable, smaller corpora. The authors adopt a more limited and automated approach: a subset of Anglicisms is used, and is analysed automatically as far as possible.

The paper describes the case study, identifying the Anglicisms and their synonyms studied; the corpora used; the means by which the corpus extractions were cleaned before calculating their success rate; and finally which variables might predict loanword success, and how they were coded. These variables, together with log-transformed odds ratios corresponding to percentage success rates, formed the fixed effects used in the mixed effects model; the random effect was the concept expressed.

The model indicates that the English person reference nouns used in the corpus are more successful (1) if they are the shortest lexicalisation in the profile; (2) if the concept expressed is low-frequency; (3) if the loanword is necessary and was introduced before a Dutch alternative was coined; and (4) if the loanword lexicalises a concept closely related to, or originating in, Anglo-American culture. The authors propose that the findings are consistent with the multifactorial nature of linguistic phenomena that cognitive linguists endorse.

The paper therefore offers a number of suggestions about how contact linguistic methodology might be improved. First, it offers an alternative to raw frequency counts, and recommends that onomasiological profiles be built to establish the relative frequency of the loanword and its synonyms. Second, it suggests that a small subset of loanwords be used and analysed by automated rather than manual means. Finally, it showcases a multifactorial analysis using

the mixed effects model, which the authors argue offers insights into the linguistic factors that might influence the success of the loanword.

In the final chapter, *What constructional profiles reveal about synonymy*, Laura A. Janda and Valery D. Solovyev outline a corpus study of Russian SADNESS synonyms, and their antonymous HAPPINESS counterparts. They use chi-squared and hierarchical cluster analyses to study the relationship between meaning and the constructions in which particular nouns appear. Specifically, they aim to compare the constructional profiles of synonymous nouns, their antonyms, and unrelated nouns. They test two hypotheses: (1) nouns have particular constructional profiles; (2) nouns with meanings that are more similar have significantly more similar constructional profiles than those which are less similar.

The first study compared the constructional profiles of four non-synonymous words, and the chi-squared statistic revealed significant differences in the distribution of the nouns across the eight constructions tested; thus providing initial support for the second hypothesis. Cramer's V revealed a large effect size.

The second study examined the distribution of six SADNESS nouns across five constructions. Constructional profiles of the synonyms were significantly different, albeit with a weaker effect size. Analysis of the similarities and differences of the distribution of each noun across the five constructions showed that some nouns had more similar distributions than others, indicating that some of the synonyms were near, while others were more distal. Hierarchical cluster analysis produced a solution consistent with this interpretation.

The final study addressed HAPPINESS synonyms. As before, the chi-squared statistic found significant differences in the distribution of each synonym across the five constructions, but produced an effect size weaker than was observed in the study of SADNESS synonyms. Again, the distribution values indicated that some synonyms are semantically closer than others. Hierarchical cluster analysis provided further evidence in support of this interpretation.

The paper exemplifies the use of multiple statistical models to extract converging data. Evidence from chi-squared analyses produce initial data implicating near-synonymy, and weaker synonymy. This is supported by data from hierarchical cluster analysis, which returns shorter Euclidean distances between near-synonyms than those that are less similar. The conclusion, that both hypotheses are supported, is therefore made more robust.

Conclusion

Through this collection, Janda thoroughly addresses the norms that cognitive linguists are implicitly forging. The book acts as a flag in the sand: it says loudly

that cognitive linguistics embraces quantitative approaches to linguistic analysis (though it is not, it must be added, closed to the application of qualitative and introspective approaches [p. 6]). It also showcases a body of work demonstrating cognitive linguists' expertise in exploiting a range of statistical models. This latter fact serves an important practical purpose, too; it offers a set of high quality studies to introduce the statistical models Janda considers particularly important at this time. Moreover, the volume highlights a commitment to the scientific method adopted in related disciplines. The papers demonstrate that it is not enough to be satisfied with a single (set of) observation(s); instead replication is necessary to establish whether the findings can be generalised to other phenomena (see especially Goldberg and Gries).

However, there are few points of minor contention that require discussion. For example, there is inconsistency in how *p*-values are reported. While full *p*-values are given by Theakston et al. (p.125) and Dąbrowska et al. (p.211), Johansson Falck and Gibbs report summary values (p.93), and Stefanowitsch reports *p*-values as *less than* a particular value, for example, "*p* > 0.74" (p. 47). Likewise, there are differences in interpretation of *p*-values. For example, Dąbrowska et al. state that a *p*-value of 0.070 nears significance (p.210), Stefanowitsch reports that differences with *p*-values of 0.1 (p. 46) and 0.069 (p. 52) are "marginally significant", while Theakston et al., describe a *p*-value of 0.13 as representing no difference. Significance in the study of linguistic phenomena conventionally ends at a *p*-value of 0.05 (McEnery and Wilson 2001: 85). Readers may wonder where marginal significance begins and ends and, indeed, whether there are any further bands of significance that one may report to support a particular conclusion. Of course, the articles selected for this volume were not originally intended as exemplars of a particular statistical model. These observations do, however, highlight the need for greater consistency in presentation, and a discussion of significance across the field. Similarly, there is inconsistency in the degree to which authors report details of the research process; for example, Goldberg's discussion of her experimental work with Boyd does not report any details of the participants or data, and did not specify which statistical test was used.

Nevertheless, this book serves as a fine introduction to a set of statistical models. Beyond its pages, Janda directs her audience, not only to wider reading, but to websites hosting data and the statistical code used to analyse it. Indeed, the introduction to this volume serves as a podium on which Janda makes a call to the CL community to share their data and statistical code in this way, for example through the Tromø Repository of Language and Linguistics (TROLLING 2016). At the time of writing, the repository stores data, statistical code and

information about the data collection procedure of 41 studies; these resources have been downloaded more than 1,490 times.

I agree with Janda's proposition that statistics should become part of "graduate programs and professional expectations" (p. 7). This text would be a worthy part of the syllabus. I recommend reading this book alongside a volume that addresses methods one might use to study a linguistic phenomenon, such as Gonzalez-Marquez et al.'s (2007) edited volume of *Methods in Cognitive Linguistics*. Researchers new to cognitive linguistics, and/or empirical research, may also be interested in the *Empirical Methods in Cognitive Linguistics* workshops.

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