Nick C. Ellis, **Ute Römer** and **Matthew Brook O'Donnell**. *Usage-based approaches to language acquisition and processing: Cognitive and corpus investigations of construction grammar.* Hoboken, New Jersey: Wiley-Blackwell. 2016. 316 pp. ISBN: 978-1-119-29652-2. Reviewed by **Fanny Meunier**, Université Catholique de Louvain.

This impressive volume from the *Language Learning Monograph Series* presents, explains and illustrates usage-based approaches to language acquisition and processing. Focusing on construction grammar, and on verb argument constructions (VACs) more specifically, the authors provide us with a detailed and learned account of psycholinguistic, corpus and experimental evidence on the acquisition of VACs. Grounding their work in solid theoretical underpinnings, the authors walk the readers through a series of research studies on the acquisition of constructions in first and second language. The volume is divided in ten chapters, with the first two being more theoretical and epistemological in essence. Chapters 3 to 9 present a number of experiments and studies on VACs which have been carried out using different research designs. Chapter 9 concludes the volume and discusses both the strengths and limitations of the dense research agenda presented.

The first chapter addresses theoretical approaches to construction grammar and usage-based approaches to language acquisition. The authors introduce key notions in construction grammar (inter alia basic-level constructions and embodiment; the inseparability of lexis, grammar, and semantics; the probabilistic and rational aspects of construction processing; and structural priming in VACs). The chapter also includes a discussion on formulaic language and on corpus approaches to language analysis, as well as a section outlining the contents of each chapter.

The psychological factors that "conspire in the acquisition and use of any linguistic construction" (p. 45) are at the heart of Chapter 2. Such core and interconnected determinants of learning include: i) frequency effects, ii) categorization, meaning, and prototypes, iii) contingency (viz. the association of forms and meaning); iv) salience, and v) various forms of learning (implicit vs. explicit).

These notions are clearly explained and concrete examples and illustrations are regularly provided.

The series of research studies are presented in Chapters 3 to 9. Chapters 3, 7 and 8 present corpus-linguistic analyses of VACs in different speaker populations: adult native speakers (L1) in Chapter 3; children L1 speakers in Chapter 7; and seven adult non-native speakers (L2 learners) in Chapter 8.

Chapters 4 and 5 describe experimental analyses carried out to test L1 and L2 speakers' knowledge of VACs. Those studies were carried out on a large number of subjects: 285 L1 speakers in the fourth chapter and 577 L2 learners from three mother tongue backgrounds (viz. German, Czech and Spanish) in the fifth chapter. Free association and verbal fluency tasks were used to investigate the ways in which the processing of VACs is sensitive to statistical patterns of usage. The results of Chapter 4 showed that native speakers "implicitly [unconsciously (my addition)] represent the statistics of VAC language usage" (p. 155), which means that VACs are mainly learned from usage and that lexis, syntax and semantics are inseparable. The authors also explain, however, that some conscious processing can be at play during free association tasks. Chapter 5 reports similar conclusions for non-native speakers who are also shown to be sensitive to statistical patterns of use. Cross-linguistic influence is however interfering in the process, together with effects of language typology on verb semantics. In sum, L2 constructions can be said to "reflect usage of both L2 and L1" (p. 151).

Chapter 6 presents five psycholinguistic experiments that investigate the effects of the various psychological factors underlying the online processing of VACs, viz. "VAC frequency, type-token frequency distribution, contingency, and semantic prototypicality" (p. 43). Experiments 1 and 2 test perceptual recognition and naming respectively. The next three experiments focus on successive lexical decision, inter-posed lexical decision and meaning evaluation.

In Chapter 9, we find (complex) computer simulations investigating the dynamic interactions of the psychological factors listed above. As explained by the authors, using computer simulations is a way of "Extending the scope to cover the community of language users and the timescale" (p. 241). The first connectionist simulations of acquisition use serial recurrent network (SRN) analyses of language forms, syntactic forms and semantics. The results of the SRN analyses are then used to model VAC acquisition. The second type of simulations presented are agent-based models. The section on agent-based simulations of VAC usage and intergenerational transmission has been written together with **Krishna Bathina**.

The last chapter provides a summary of the key findings and implications, together with limitations and future research priorities in terms of usage, processing, acquisition and modelling of acquisition of VACs in L1 and L2. This concluding chapter also situates language cognition in social usage and presents it as a complex adaptive system which emerges "from the meaningful interactions of its many agents across a broad range of timescales and contexts" (p. 44).

Whilst I concur with Ortega that, content-wise, the book "is a phenomenal synthesis of a formidable research program" and "a feast of corpus, psycholinguistic, acquisitional, and simulation evidence" (back cover of the book), I am however not sure that an A5 book format offers the best venue for such a feast. As I was busy reviewing the paper version of the monograph, I often felt that the numerous figures and visuals could not possibly be given appropriate treatment as their readability was impaired by the format itself, which is a pity. Examples include: the various Figures on p. 131 (lemmatized verb types produced by learners plotted in the space defined by their log token generation frequency against log token frequency of the VAC in the British National Corpus), correlations of verb responses between three groups of learners (p. 138), semantic networks for some verbs (p. 196), or cumulative acquisition plots (pp. 205–206). This limitation was probably also felt by the authors as the text is interspersed by cross-references to supplementary information files. This is an innovative feature of the monograph as, for each of the research chapters, "Supporting Information" (more Tables, Figures and Graphs) can be found online on the publisher's website. This said, the accessibility options to these supplementary files are not made explicit anywhere for readers who would only have bought the paper version of the book.

Disregarding the format limitations, one strength of the book is that it offers a mine of information on usage-based approaches to language in its acquisition and processing aspects, and this both theoretically and practically (research designs, methods and tools). The theoretical concepts are explained clearly, not only thanks to numerous references to previous work but also thanks to very concrete illustrations and short awareness-raising tests for the readers. In the research studies, the mixed-method approach adopted presents readers with a multitude of options for future research or replications studies in other contexts, with other subjects or with other constructions. We are introduced to, inter alia, search graphs, semantic networks and metrics, correlation studies, multiple-regression analyses, stimulus materials and experiments, meaning judgements, generalized linear mixed models predicting – for instance – meaningfulness judgment reaction times or tanglegrams. One potential drawback of providing readers with a mine of information and approaches is however that – especially

for the research studies chapters – little room is sometimes left for more in-depth explanations of the various methodological choices and tools.

In terms of readership, the theoretical chapters will inspire all readers, even those who are not initially familiar with usage-based approaches and who will, after reading the chapters, no doubt be tempted to adopt such approaches. Some of the research chapters could prove challenging for readers with less expertise in the various research designs and tools presented. I would for instance be hard put to comment in detail on the computer simulations in the present review as I have no experience or knowledge of these rather complex computational methods. To ensure a thorough grasp of the numerous concepts and tools presented, it would perhaps have been a good idea to include a commented glossary of the key research terms used in the book (be it in the paper version or in the supplementary materials).

The joined expertise of the three authors, viz. **Nick Ellis**, **Ute Römer** and **Matthew Brook O'Donnell**, is truly impressive and includes psychology, psycholinguistics, corpus linguistics, cognitive linguistics, second language acquisition, computational social science and natural language processing. A large number of positive and so-called 'extreme' adjectives do apply to the volume – and some of these have already been used by initial reviewers of this book: it is phenomenal, superb, comprehensive, outstanding, inspiring and forward-looking. This volume is a must-read (and probably re-read too) for all researchers interested in first and second language acquisition and processing.