any researcher in the field of early language acquisition, or anyone with an interest in cognitive factors affecting language development, and should therefore be considered a vital addition for most university libraries. Almost all the chapters provide a valuable overview of theoretical and methodological issues and possible future developments. They therefore serve as gateways to the wider research literature, either for the researcher who wishes to update their knowledge of their own field, or for researchers wishing to investigate another field. The volume certainly succeeds in its aim to bring recent longitudinal research to a wider audience, and foster the critical analysis and development of new research paradigms. It should prove an inspiration for future developments in both theory and methodology.

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R. H. Baayen, *Analyzing linguistic data: A practical introduction to statistics using R*. Cambridge: Cambridge University Press, 2008. Pp. 368. ISBN-13: 978-0-521-70918-7.

Baayen's *Analyzing Linguistic Data: A Practical Introduction to Statistics using R* is aimed specifically at researchers from the fields of adult psycholinguistics and corpus linguistics. We feel, however, that it potentially has much to offer to people coming from the related discipline of language development. It is very innovative in its structure and content: it emphasises the practical need to learn and use statistics, and introduces advanced and modern techniques (Mixed-Effects Models) using cutting-edge software. These aspects of the book set it apart from most introductions to statistics for psychologists and might help in bringing

about a much needed step forward in the way the child language research community understands and applies statistical techniques.

Although statistical methods have been well established in psychological research for some time, our use of them has always been somewhat conservative. We tend to stick to a few simple and popular techniques, for instance *t* tests and ANOVAs (both based on the so-called General Linear Model). These are robust methods, which are well-suited for most experimental, factorial designs. As such, they are sufficient in many cases. It is thus easy to forget that statistics is itself a growing field: the methods it offers constantly changes, new ones are constantly being developed and some of them might be better fitted for particular specific needs than older techniques.

Our conservativeness in the application of statistical techniques might be at least partly explained by the fact that statistical textbooks for psychology and related sciences are conservative as well. Most of them discuss at length basic concepts of probability, scales of measurement and hypothesis testing, and then offer step-by-step explanations of procedures, such as the calculation of a *t* test. The aim is undoubtedly to make the logic underlying the application of statistics as clear as possible, at least intuitively, which is an important undertaking. However, it comes at a certain cost: there is little or no space left for introducing modern or more advanced techniques.

As an introduction to statistics, Baayen's book differs importantly from a typical textbook. It is intended to provide a radically practical course of using statistical techniques in psycholinguistic analyses. To that end, the author has chosen a number of real-world, published studies and the whole book consists of a series of examples in which he shows what one can do with these data and why one might want to do it. In taking this approach, he does not dwell on any theoretical and formal issues (other than the absolute minimum). Instead, the layout allows him to present particular methods (including new and advanced ones) in their contexts of use together with ways of implementing them in the statistical software of his choice, the software package R.

Chapter 1 introduces R and explains some basics of using the software and various ways of handling data in it. This package is very different from what most of us are used to and, as the book is also an introduction to it, the software deserves a brief description here. R might be described as a combination of programming environment and statistical package. From a layperson's point of view, an important consequence is its command-line interface. For someone accustomed to the graphical interface of contemporary operating systems and applications R may have a flavour of old-school DOS, but it should not be much more tiresome than using the CLAN utilities from the CHILDES project.

Furthermore, as anyone who has discovered the SPSS syntax hidden behind its dialog boxes will confirm, once mastered, a command-line syntax offers much more flexibility than a graphical interface (in terms of available options and a potential for semi-automatization). R's flexibility goes even deeper: since it is in fact a programming language and it is maintained and developed by a user community, it can offer various cutting-edge techniques and methods before (if at all) they are available from commercial software and is virtually bug-free (on discovering a bug one can immediately fix it or inform the author of a particular piece of code, rather than submit and wait for a response from the programming team of commercial software).

Arguably, learning the command line syntax takes more time than learning which dialog box to open and what options to set. However, it encourages understanding of a given procedure rather than simply memorizing the steps necessary for applying it, which is often the case when using traditional software. Moreover, the typical output of popular packages, which usually consists of a vast number of complicated tables, does not support understanding either. As Baayen puts it himself:

> Statistical packages tend to be used as a kind of oracle, from which you elicit a verdict as to whether you have one or more significant effects in your data. In order to elicit a response from the oracle, you have to click your way through cascades of menus. After a magic button press, voluminous output tends to be produced that hides the p-values, the ultimate goal of the statistical pilgrimage, among lots of other numbers that are completely meaningless to the user, as befits a true oracle. (p. x)

Chapter 2 focuses entirely on graphical data exploration. However, various techniques that are introduced there recur throughout the whole book. Baayen praises R's graphical facilities as remarkable and devotes a lot of space to show their potential, every time emphasizing the importance of visually inspecting one's data. It might be observed that this is something of a commitment to a particular approach to statistics. No statistical textbook can be totally neutral or objective, though, simply because statistics itself – as was noted – is a field of science, with its own debates and controversies. Baayen's book is no different. Indeed, in several places he digresses to present his views on various topics and, given his lively and opinionated style ('although most journals will accept a significance level of 0·05, no one in his right mind would want to cross a bridge that has a mere probability of 0·05 of collapsing', p. 69), his disregard for arbitrary cut-off points for rejecting hypotheses or his critique of the common practice of dichotomizing continuous variables make the book an interesting read even for non-novices.

Chapters 3 and 4 introduce basic statistical distributions and methods (e.g. t tests, ANOVA, their non-parametric counterparts), respectively.

Thus, what constitute the main topics of typical textbooks, Baayen covers in a mere two chapters. However, we should note that this very concise introduction of analysis of variance is certainly not enough for a beginner to run analyses of data gathered in complex experimental designs (see Field (2005) and Howell (2007) for good introductory textbooks).

The rest of the book (chapters 5 through 7) is devoted to some more advanced techniques. Chapter 5 introduces methods useful mostly in corpus-based studies. It explains Principal Component Analysis and Multi-Dimensional Scaling, among many others. Chapter 6 is a very straightforward introduction to regression modelling, dealing in an easy way with all the steps required for a proper analysis with a level of detail unusual for general introductions to statistics. Finally, chapter 7 might be considered a continuation of chapter 6: it introduces Mixed-Effects Models, an alternative to the General Linear Model. Mixed-Effects Models are one of those cutting-edge methods available in R and one vigorously advocated by Baayen (see also Baayen, Davidson & Bates, 2008) as a solution to the so-called 'language-as-a-fixed-effect fallacy'.

The fixed-effect problem has been recognised in the field of 'adult' psycholinguistics at least since Clark (1973), but has gained little attention in the child language literature. It concerns the generalizability of results obtained from a given sample of linguistic items to a broader set; for example, when eliciting past tense forms of English verbs, does children's performance with test items tell us anything about their ability to inflect verbs in general? Given that one cannot test all potential linguistic exemplars of any given type, the problem one faces is similar to that of drawing conclusions about a whole population from a limited sample of participants: linguistic items, just like participants, should be treated as random factors in an analysis. The problem is that the General Linear Model (GLM) cannot deal with random factors being crossed with each other. According to Baayen, Mixed-Effects Models, which enable the crossing of random factors, might be a more appropriate solution to analysing psycholinguistic data than running separate by-subject and by-item ANOVAs (and calculating complex quasi-F ratios).

Interestingly, since Mixed-Effects Models are regression techniques, they can be easily extended, just like traditional GLM regression models, to handle dichotomous dependent variables. Thus they can easily be applied to analysing binary responses, which are so widespread in the field of child language research and developmental psychology more generally: we are often interested in whether the child responds in a certain expected way or not to a given test item. It is common to calculate the proportions of expected responses for each child (e.g. the proportions of correct past tense productions) and perform an ANOVA on them (to avoid the language-as-a-fixed-effect fallacy, it is also possible to calculate proportions

for each item, e.g. each verb, to perform a by-item analysis). However, proportions, by their very nature, violate the normality assumption which is central to any statistical test based on the General Linear Model. To overcome this problem, we are usually advised to apply the arcsine transformation to proportions. It is only a half measure nonetheless and, particularly when the denominator is very small, the approximation of the normal distribution will be very weak (and when testing young children we cannot afford to have many test items). The solution the book provides to this problem is to give up proportions altogether and use mixed-effects logistic regressions on individual responses with participants and items as crossed random factors.

The three final chapters (from chapter 5 to 7) deal with fairly complex material, which is hardly ever covered by introductory textbooks. The author's approach is always to discuss everything on the level of practical application, by working out a number of real-world examples. There is a potential drawback of focusing on a limited number of real studies though. Psycholinguistic research is very diverse and different studies will have very different statistical needs (unless they follow the same design, e.g. most priming studies or lexical decision tasks require the same kinds of analyses). The author risks that for many readers the examples he has chosen will not be any more useful than some clear and nicely thought through artificial examples. In fact, the latter may have more general appeal. One might easily learn how to apply a mixed-effects model to, say, a priming study, but remain relatively uncertain when extending this knowledge by applying the technique to a different study.

Perhaps an even bigger drawback of using the same example studies throughout the book is that it is difficult to treat it as a quick reference. For example, someone interested in using a particular technique might want to consult a relevant section; however, the section will usually pick up an example left in another chapter, and so on. Hence, in order to follow the argument one will need to refer to various previous fragments of the book.

Nevertheless, the above two disadvantages might be seen as inevitable trade-offs of combining an introduction to statistics for novices with a coverage of some more advanced techniques. Maintaining a very practical level of explanation, showing how complex techniques can be applied to particular real problems, was probably the best if not the only way of introducing those techniques to beginners. Modern statistics is becoming increasingly complicated and if we want to stay up-to-date we probably have to accept the fact that our understanding of some new methods will be much more superficial than that of some old traditional ones.

To sum up, *Analyzing Linguistic Data: A Practical Introduction to Statistics using R* is an entertainingly written book on using statistics with (psycho-)linguistic data and is full of interesting insights on the general

nature of statistical analyses. However, combining a non-mathematical introduction to statistics for psycholinguists with coverage of some more advanced techniques and an introduction of a difficult software package might have proven too ambitious a goal. Each of the three ideas that together gave rise to this book might secure a separate volume on its own. This book would not be enough as an introduction to statistics. It is instead most successful as a practice book to learn R in order to use new statistical techniques – the large amounts of code are useful if you work through the book sat by a computer, cumbersome otherwise. It is most likely to appeal to those who already have some statistical and computing experience, who are aware of the limitations of traditional statistical methods and who are interested in trying out R to run more appropriate analyses of their data. If you fit this bill, this is an excellent book that is worth the effort of working through.

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Michael Tomasello, *Origins of human communication*. Cambridge, MA: The MIT Press, 2008. Pp. 393. ISBN 978-0-262-20177-3.

Language is commonly considered a unique human property. Any typically developing child who is surrounded by and interacts with mature speakers acquires the language of the community without any explicit instruction. Acquiring language seems to be so natural that Pinker (1994: 11) claims that language is a human instinct and an evolutionary adaptation. If language is an evolutionary adaptation, then where did it come from and how did it evolve? These core questions are not that simple to answer. Hauser, Chomsky & Fitch (2002) propose that if one starts the inquiry from the common ancestor of primates and humans, then one needs to determine what was inherited from the common ancestor, what has undergone modification, what is qualitatively new and what selectional pressure led to