Productivity is a vexed question in morphology, intimately related to notions of regularity, creativity, frequency and so on, but not reducible to any of these. Indeed, it isn’t even clear whether the phenomenon should be treated as linguistic or extra-linguistic (or both). Bauer has provided us here with a very helpful survey of the issues and of recent research, including psycholinguistic and corpus-based statistical studies. The book consists of seven chapters and includes a separate language and subject index.

The Introduction sets the scene and uses English -ment suffixation to illustrate the way that productivity can change over time, that is, the way that a process can become unproductive. Chapter two is a historical review of the issues, addressing such topics as degrees of productivity, domains, the diachronic dimension and the peculiar conceptual problems posed by morphological productivity for some versions of the competence/performance distinction (Coseriu’s distinction between system and norm is alluded to here as well).

Chapter three discusses the fundamental notions associated with productivity. The factors discussed include the distinction between existing, new and potential words, notions of lexicalization, frequency, phonological and semantic transparency and regularity. Bauer also looks at defaults, paradigm pressure and analogy before providing a preliminary characterization of productivity. One important distinction is that of Corbin between available (‘disponible’) and profitable (‘rentable’) processes. A process is available in a given domain if the synchronic grammar allows new words to be coined with that process. This is an all-or-nothing property. For example, a verb in -ise can be nominalized by -ation but not by -ment, so -ation suffixation to V-ise is available but not -ment suffixation. A process is profitable to the extent that it actually leads to the coining of new words. This might be affected by all sorts of systemic (linguistic) and extra-linguistic constraints, such as phonological form, or pragmatics. For instance, the (pseudo-)prefix step- ‘related by marriage’ can be added to certain kin terms but these constitute a small closed class and all the possible derivates are well-attested. Thus, step- prefixation can’t lead to the coining of new words and hence has zero profitability.
Chapter four reviews some of the psycholinguistic studies that are relevant to the issue, specifically the notions of storage and production. The question here is whether there are psycholinguistic ways of determining whether a word is stored whole in the mental lexicon and accessed directly in recognition and production, or whether we parse and compile word forms on line from stored components (as we presumably do for sentences). Chapter five examines the idea that there might be degrees of productivity, and summarizes the principal research that attempts to quantify these scales (especially the work of Baayen and his colleagues).

Many of the conceptual issues are then exemplified by a set of concrete case studies in chapter six. In the first case study, Bauer considers the historical vicissitudes of the cognates of Germanic -dom. Next, he reports on an informal experiment with -ness nominalizations of English colour terms to investigate to what extent we can say that whiteness is a ‘better’ word than purpleness. Then he applies the various statistical measures of productivity to deverbal nominalizations in a one-million-word corpus. Finally he discusses whether agentive and instrumental nouns in -er differ in productivity and if so what this might mean. The Conclusions provide us with a summary of the issues, returning in particular to the distinction between availability and profitability. Bauer provides us with a final definition of productivity, normalized to these two notions, and then briefly extends the general ideas to syntax and phonology.

Bauer self-consciously refuses to take any particular theoretical framework as a point of departure. I find this a strength, since he is dealing with leading ideas which should be common to any linguistic framework and it would only hamper discussion to be tied to a particular architecture. By and large I found the discussion sensible and well-informed. Just occasionally there were theoretical claims which jarred. I was disappointed that the discussion of productivity in syntax completely failed to mention the now sizeable literature on constructions in syntax. Even the discussion of the dative shift alternation (214–216) fails to mention the work of Goldberg (1995), for instance. Many linguists are beginning to appreciate the tight connection between morphology and syntax and the question of the productivity of syntactic constructions is likely to assume no little importance in the near future.

Corbin’s (1987) availability/profitability distinction is a key to understanding productivity. Bauer’s final characterization is disjunctive and effectively defines productivity as an ambiguous term, referring to two distinct phenomena: ‘The availability of a morphological process is its potential for repetitive rule-governed morphological coining, either in general or in a particular well-defined environment or domain’ (211). On the other hand, ‘profitability is a matter of degree, and as such it can be measured in various ways’ (213).

Why should derivational morphology show less than 100% profitability? It seems to me that a prime reason is that word coining is often restricted to
those cases where it’s necessary to name a specific concept, as opposed to describing an event or situation. For instance, agent nominalizations mean more than just ‘one who VERBs’. In fact, the person denoted by the nominal doesn’t necessarily have to carry out the action denoted by the base verb (a retired baker, conductor or surveyor is still a baker etc., without being ‘one who bakes, etc.’). As a result, whenever we hear a new nominal, there is a strong tendency to assume that it denotes a specialized type of agent. This is often taken as a habituality restriction on agent nominalizations, though arguably the real determinant is name-worthiness.

If derivation has the function of naming identifiable concepts rather than describing novel situations, then this will mean that derivation isn’t usually paradigmatic in the way that inflection is paradigmatic. A paradigm results when we pre-define a set of functions or meanings. Whenever we work with a fixed set of features and a finite set of feature combinations, we are (implicitly, at least) defining a paradigm. Usually a paradigm will be finite in size (though recursion could make it unbounded). If derivational morphology were maximally profitable, then we could represent the space of derived words paradigmatically. However, this becomes increasingly difficult where we have extensive lexicalization and non-compositional interpretations. It also becomes difficult if we find a large number of unmotivated gaps. But this is exactly what happens if derived words are coined solely to name specific concepts, rather than in order to describe novel situations. This point is implicit in much of what Bauer says but he doesn’t seem to bring it out explicitly anywhere.

The picture is muddied somewhat by the fact that inflection itself isn’t always regular. The literature is full of cases of accidental gaps or defective paradigms which have no apparent motivation. Defectiveness is a serious problem for any theory of morphology, precisely because inflection is supposed to be obligatory. This point is not very clear in Bauer. For instance, he discusses the difference between the productivity of individual inflectional processes (such as -ed past participle formation vs. -en past participle formation) and the productivity of what he calls ‘groups of processes’. He points out that on Separationist assumptions (such as are made by the majority of students of inflection) we would normally speak of the productivity of the past tense formation process; then he writes (15):

The productivity of the paradigm slot depends on the productivity of the individual processes which fill the paradigm slot. It is impossible to imagine filling a paradigm slot for any member of a word-class without using some morphological process to fill the slot in an individual case. Any productivity that might attach to paradigm slots must therefore be reducible to productivity of individual processes.

But this view confounds different things, and fails to appreciate the nature of paradigm-driven morphology. Such morphology is fully productive by
definition. If a cell in a paradigm lacks a specific realization rule then some kind of default is invoked (for instance, in a language such as English, we would generally use the root form of the word). This appeal to defaults guarantees that there is always some form available to realize every cell.

In Bauer’s terms it would appear that we can speak about the productivity of specific inflectional realization rules, such as -en past participle suffixation as opposed to the regular -ed suffixation. However, it’s not clear that this corresponds to any of the notions of productivity that Bauer is dealing with. The -en suffixation process simply isn’t available to any verb which isn’t specifically marked for it (in the technical sense of ‘available’) and by definition it will be maximally profitable with respect to those lexemes that are marked for it (modulo such quirks as inflectional doublets and accidental gaps).

There are two points arising from paradigmatic word formation, both related to the notorious difficulty in distinguishing inflection from derivation. First, there are various instances in which an inflectional process seems to be less than fully productive. Second, there are instances of transpositions, that is, word formation which changes the lexical category of the lexeme without adding any semantic component (and hence, in an important sense, not creating a new lexeme).

One instance of less than fully productive inflection which Bauer himself mentions (217) is the English comparative/superlative in -er/est. This is only available to mono- or disyllabic stems; otherwise comparison is expressed periphrastically. A simple response to this, however, is to say that comparison is completely regular and productive for gradable adjectives but that in most cases it is expressed periphrastically. However, this doesn’t take account of the fact that the periphrastic expression exists alongside the synthetic form, systematically giving rise (in principle, at least) to doublets. Although it’s not uncommon for inflection to be partitioned into synthetic and periphrastic constructions, it’s less common for the synthetic construction to be largely redundant in this fashion.

A very common type of non-productive inflection is seen in case systems. In Uralic languages, for instance, nouns generally inflect for a variety of cases. In these systems we often find that there is a residue of cases which only occur with a small number of nouns, often in fixed expressions. Here it seems as though we need to invoke the notion of an unproductive inflectional category. Other examples include certain types of participle in languages with rich conjugation systems. For instance, the present passive participle in Russian is restricted in various ways to a relatively small number of verbs, though the past passive participle and the present active participle are freely and productively formed.

The second point about paradigmatic word formation relates to the example of deverbal nominalizations, which Bauer discusses in some detail in chapter six (177f.). These nominalizations are also instances of transposition,
at least when they aren’t lexicalized. Thus, we can think of the destruction of the city by the enemy as the name of the event the enemy destroyed the city. Bauer discusses the productivity of various suffixes (though not, interestingly, the default suffix -ing). However, as with other types of transposition, there is a sense in which we are dealing with a paradigm here. Other things being equal, we expect a verb to have a nominalization, just as we expect it to have a past participle. In this respect we can think of ‘nominalization’ as being a perfectly regular and productive process (though there are interesting twists in the story). What is less regular is the morphology deployed for the purpose, but then we are presumably just talking about the number of lexemes which belong to a particular paradigm class with respect to nominalization morphology. Asking whether -ment is a productive nominal suffix is therefore a little like asking whether the -a of criteria is a productive plural suffix. It’s not clear to me whether the productivity of such individual affixation operations is comparable to the productivity of derivational processes which introduce a predicate, such as cat-like or Marxism. Rather, such cases are more reminiscent of the relative productivity of inflection classes (declensions and conjugations).

The author states that one of his principal aims is to stimulate further developments in the field. He lays out the issues with clarity and he deserves to succeed in that aim. I would particularly like to see those interested in the notion of ‘construction’ in grammar taking Bauer’s challenge seriously. Bauer’s book presents the issues in a helpful way and provides much food for thought. It should be read not just by morphologists but by linguists generally.

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In 1873, A. J. Ellis advised the Philological Society of London against ‘filling wastepaper baskets with reams of paper covered with speculations on the
origin of … tongues’ (Stam 1976: 256). There are many linguists who still feel that research into the evolution of language is too speculative. After all, how can we ever know what happened? Simply to draw the line there, however, is to miss the real point of much of the current research in the field. It has long since ceased to be interesting only to ask ‘Where did language come from?’ Nowadays, the questions are more likely to be: ‘What aspects of language are most fundamental, and are they necessarily the oldest?’, ‘What social, ecological and biological circumstances must prevail for language to be worth the trouble of having?’ and ‘Could Universal Grammar exist without a genetic blueprint?’ Questions like these give the research a relevance well beyond its immediate remit, and should place its published output squarely back on the general reading list of the rounded linguist.

Thus, you don’t need to be sold on language evolution, nor indeed be a computer buff, to get something valuable out of Simulating the evolution of language (SEL). Certainly, it helps not to be computer-phobic, because there are some complicated diagrams to contend with, and even the odd very scary mathematical formula. But SEL is not really a book about computers any more than a recipe book is a description of the effect of heat on the physical properties of food.

Computer simulations are simply, in the words of the editors, in their own substantive chapter, ‘a new way of expressing scientific theories’ (257). They actualise ‘a set of hypotheses about the causes, mechanisms, and processes that underlie a given class of phenomena’ (ibid). The product of a simulation is the logical outcome of the hypotheses, and can be assessed as a more or less accurate depiction of the real world.

Simulation studies come into their own when the power of the computer is able to lead the researcher into otherwise inaccessible areas of investigation. It is possible to track and manipulate highly complex interactions of variables, and to observe events over many thousands of generations of learning agents. On the other hand, the very power of the computer is a potential limitation, and simulations have to be heavily constrained – if they are not, it becomes impossible to work out what is going on. A major skill of the researcher lies in deciding what it is legitimate to omit from a simulation, a question that entails major theoretical decisions about the relationships between components of the language package.

SEL is divided into seven parts. The inner five focus on specific areas of language evolution, while the first and last offer generic overview material of different kinds. Part I introduces us to the nature of simulation research. The editors begin (chapter 1) by locating each of the book’s chapters on a map of the field. For the linguist who is unfamiliar with issues in the evolution of language, it will provide a useful opportunity to identify the sorts of questions that are currently of interest.

In chapter 2, Huck Turner begins by approaching things from the other end, outlining the design parameters available for creating simulations: rules,
neural networks, agent evolution, game theory, and so on. This first part of the chapter will most interest those who have come to the book because they like what computers do, and want to see how they do it to language evolution. Readers who are content to accept that computer programs are terribly ingenious could reasonably skip the first twelve pages, but should not overlook the second half of the chapter, where Turner offers a contextualisation of simulation studies as methods for investigating innateness and adaptive benefit.

Part II deals with the evolution of signalling systems. Jason Noble, Ezequiel Di Paolo & Seth Bullock (chapter 3) consider several issues relating to ‘costly signalling’, a puzzle of considerable interest both in its own terms and because language constitutes an exception to it. In many animal species, certain kinds of important signals are potentially detrimental to the survival of the individual. Mating behaviour often involves displays of cumbersome feathers or antlers, or profligacy with food. Warning signals about predators, while benefiting the group, can be dangerous to the individual, by drawing attention to its position. Costly signalling works because there are pay-offs, while the risks ensure that only honest signallers gain the benefits – large antlers evolve to be a direct index of physical strength, since an individual that looks stronger than it is will pick battles beyond its capacity to win, and hence forfeit its mating rights. Noble et al. use simulations to arbitrate between different theories about how costly signalling works, and demonstrate that the processes are more complex than might otherwise be assumed.

In chapter 4, Bart de Boer examines a very different aspect of signalling, asking whether sound systems are determined by pre-existing perceptual categories, or whether unregulated systems will automatically settle themselves into consistent patterns over time. He reports simulations in which agents are challenged to match noisy sounds to a prototype, as determined purely by acoustic distance. The results show that ‘the universal tendencies of human vowel systems can be explained as the result of self-organization under constraints of perception and production’ (94). Unfortunately, the start of the paper is marred by an oversight during the conversion of the files for typesetting, rendering de Boer’s example from the Bahing language incomprehensible. The pronunciation of the words for ‘monkey’ and ‘man’ is given, in both cases, as /mɾe/ – not only unrecognisable but also identical, when the author’s point is that they are pronounced differently. In fact, they should read /mɔɾa/ and /muru/ respectively (de Boer, personal communication).

Daniel Livingstone (chapter 5) asks why there are dialects: is linguistic diversification a product of social dynamics leading to natural selection, or simply an effect of evolving systems? Using agents that interpret each other’s signals as representations of existing meanings, he shows how a small amount of ‘noise’ will cause variation – and dialect spread across the spatial domain – purely as a function of the system dynamic.
Part III focuses on the evolution of syntax. The common theme is that the characteristics of human language grammar can be accounted for without recourse to innate preprogramming. Simon Kirby & James Hurford (chapter 6) use an Iterated Learning Model, encompassing both I-language and E-language, to show that languages will naturally evolve compositionality as a function of cultural transmission. Natalia Komarova & Martin Nowak (chapter 7) ask: ‘What are the conditions that UG has to fulfil for a population of individuals to evolve coherent communication?’ (151). They use simulations to demonstrate that there is a ‘coherence threshold’, mathematically determinable, which falls between the two extremes of the learning necessary with no memory, and with infinite memory. In chapter 8, Morten Christiansen, Rick Dale, Michelle Ellefson & Christopher Conway argue that universal patterns and tendencies, such as word order constraints and consistency in head position, need not be explained in terms of arbitrary design features innately preprogrammed. Instead they can be naturally explained because ‘recursively consistent combinations… are easier to learn’ (175). Their experiments, unlike most of the others in the book, involve real agents – human beings – learning artificial languages. While it is unsurprising that humans should take best to artificial languages that adhere to the patterns observed in real human languages, connectionist models (which certainly have no innate language learning device) also learn these languages more easily.

In part IV, the focus is on how language becomes grounded, that is, how forms become associated with meanings. Grounding is a non-trivial problem. In some simulations it is simply assumed that agents already know which symbol means what. Other simulations build in the grounding by providing direct information to a listener about what is in the mind of the speaker. In reality, however, a listener does not know what a speaker’s mental state is, and can only construe meaning on the basis of assumptions about likely shared perceptions. Angelo Cangelosi, Alberto Greco & Stevan Harnad (chapter 9) explore two ways in which learners can bootstrap themselves into greater understanding. In one, the individual learners decompose sensory input into base units of consistent meaning. In the other, they take information on trust from another individual (symbolic theft). Cangelosi et al.’s simulations of foragers learning to differentiate edible from poisonous mushrooms demonstrate that symbolic theft is only advantageous when it is kept in balance with some directly grounded meaning.

Luc Steels’ Talking Heads experiments (chapter 10) explore convergence on form and meaning when two agents are faced with complex visual input, only part of which is relevant for their communication. Steels models the grounding of symbols as a coupled event: his agents have to learn not only how to express meaning but also what meaning to express. The concurrent learning of representations and their symbols means that each can influence the other.
Behavioural and neural factors in language evolution are the focus of part V. Michael Arbib (chapter 11) addresses the role of mirror neurons in making us ‘language-ready’. He first reports computer simulations of how monkeys learn to grasp. He goes on to describe the role that mirror neurons might have played in a seven-stage development to full human language. Domenico Parisi & Angelo Cangelosi (chapter 12) challenge themselves to answer, within one experimental design, three fundamental questions about language origin: the origin of speech in the individual, the origin of speech in the species, and the development of language in the social group. Thus they unite the studies of ontogeny, phylogeny and the cultural dynamics of language change. Their complex simulation scenario, they propose, ‘permits a better understanding of the way biological, behavioral, and cultural phenomena interact and of their role in the origin and evolution of language’ (273).

Papers by Edwin Hutchins & Brian Hazlehurst (chapter 13) and Takashi Hashimoto (chapter 14) together make up part VI: ‘Auto-organization and dynamic factors’. Their joint message is that in order to understand how a lexicon and grammar arise one must take into account cycles of acquisition, the use of language for communication, the survival of the ‘fittest’ versions of the language, and how meaning is conveyed through language. Hutchins & Hazlehurst present accounts of two of their own models within the context of a very useful overview of the basic approaches that can be taken to modelling the evolution of the lexicon and of syntax. Hashimoto argues that ‘stability and adaptability’ must operate hand in hand with ‘commonality and individuality’ because ‘linguistic structure can always change in response to the development, through acts of communication, of the internal structures of subjective language users’ (322). In other words, language should not be construed as static, but rather as an evolving organism.

The final chapter is something of a puzzle in relation to the book as a whole. Occupying a dedicated part entitled ‘Conclusion’, it might be expected to draw together arguments, arbitrate between positions, relate simulation research back to theoretical linguistics, and/or lay out future agendas. But it does none of these. Michael Tomasello’s chapter summarises current understanding about the symbolic and psychological capabilities of monkeys, apes and children, but with no more than cursory reference to the content of the rest of the book. Presented as offering a perspective on the underlying questions that simulations need to address, there is no attempt, either by Tomasello, or elsewhere by the editors, to tie it in as such. It is a useful chapter, but it just seems to be in the wrong collection.

SEL is not bedtime reading. If an edited book is like a box of chocolates, this one has some hard centres, and it may be a little unpalatable in places to those who ‘just’ wanted to know how language evolved. However, the clear arrangement of the content, and the various brief overviews of theory and practice – albeit sometimes hidden in tracts of denser text – do mean that with a little care most readers should be able to find something that will
augment their understanding of this field, however basic or advanced their starting point.

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The past decade has seen a focus on the constraint-based Optimality Theory. Until very recently, issues concerning distinctive features and representations were largely outside the mainstream of research interests in this framework. Partly to show that feature theory is still worthy of detailed attention, a conference on distinctive features was organized at ZAS in Berlin in October 1999. The particular themes of the conference, as announced in the call for papers, were feature geometry and underspecification, autosegmental phonology (e.g. harmony and tone) and the relationship between phonological features and phonetic representations.

The volume under review includes a number of articles that grew out of the presentations at the conference. T. Alan Hall, the editor of the volume, states that the goal of the book is to address two broad issues: ‘(i) the nature of featural representations in the phonological component, e.g. feature geometry and underspecification, and (ii) the connection between featural representations in the phonological component and the interpretation, or implementation, of these features in the phonetics’ (1–2). The book begins with an introductory article by Hall that summarizes some of the major research on these topics. Hall divides the introduction into two main sections: distinctive features (the need for distinctive features, binarity and privativity of features, non-linear representations including autosegmental phonology and feature geometry, underspecification and redundancy, prosodic features) and the phonetics/phonology interface (levels, phonetic implementation of phonological features). In addition, he places each of the contributions to the volume into this research background. The introduction should be useful to someone wanting a thumbnail sketch of some of the
major debates surrounding distinctive feature theory, broadly construed. (I tend to interpret the term ‘distinctive feature theory’ narrowly, to refer to the substance of features, rather than to issues around representations; thus my use of the term ‘broadly’.) As Hall points out, the authors represented in the volume generally employ a fairly standard model of phonology with a division of labour between phonology and phonetics, taking notions such as contrast to be central to phonological theory.

While the articles are arranged in alphabetical order by first author, there are several ways in which they could be categorized, and I will divide them into two major groups. One set of articles is concerned largely with arguments for what distinctive features are required. These include Peter Avery & William J. Idsardi (‘Laryngeal dimensions, completion and enhancement’), Michael Jessen (‘Phonetic implementation of the distinctive auditory features [voice] and [tense] in stop consonants’), Bertus van Rooy & Daan Wissing (‘Distinctive [voice] implies regressive voicing assimilation’), Janet Grijzenhout (‘Representing nasality in consonants’) and Richard Wiese (‘The phonology of /r/’). Another set of articles deals with how features come to be specified phonologically and what features are necessary in the phonology of particular systems; these include G. N. Clements (‘Representational economy in constraint-based phonology’), Mirco Ghini (‘Place of articulation first’) and K. David Harrison & Abigail Kaun (‘Patterns, pervasive patterns and feature specification’). While each article encompasses more than one issue, those identified here are central.

Laryngeal features have long been a topic of study, and the three articles on this topic make different types of contributions. What unites these articles is a concern with identifying the substance of laryngeal contrasts. All share in arguing for a narrow interpretation of voicing, where in some two-term laryngeal systems there is a contrast in obstruents between what is usually called voiceless unaspirated and voiceless aspirated, while in others the basic distinction is between voiceless unaspirated and voiced. (This is opposed to a broad interpretation of voicing, where one feature does all the work.) A language such as English falls in the former category, with voiceless unaspirated and voiceless aspirated stops, while a language like French is in the latter, with voiced and voiceless unaspirated stops; see Iverson & Salmons (1995) for earlier discussion. In the articles on laryngeal features, the authors argue for a view of phonology in which phonology under-determines phonetics, but nevertheless has a direct interface with phonetics.

Avery & Idsardi offer the most abstract of the representations. While it is common to use features such as [spread], [constricted], [stiff], [slack], [raised (larynx)] and [lowered (larynx)] as phonological features, the authors argue that these features themselves are organized into three supercategories, or dimensions: glottal width, glottal tension and larynx height. These dimensions function in the phonology, and features (e.g. [spread]) enter in to enhance and complete representations phonetically.
Jessen too examines laryngeal features, arguing that phonological features have a set of basic correlates which are unique to a particular feature. The feature [voice] has a basic correlate of closure voicing, while [tense] has aspiration and duration as its basic correlates. Non-basic correlates are not distinctive and involve characteristics such as duration of closure, and the preceding and following context. Jessen argues that German has a primary correlation of tenseness rather than voicing.

Van Rooy & Wissing use regressive voicing assimilation as a diagnostic for voicing type, arguing that languages with regressive voicing assimilation employ the feature [voice] to distinguish what are generally thought of as voiced and voiceless stops, whereas languages without regressive voicing do not utilize this feature. This is an interesting argument, assuming universality of the process of regressive voicing assimilation. If this process is found, then the feature [voice] is present; if it is not found (and its structural description is met), then another feature is in use.

The articles on laryngeal features converge in many ways. All argue for the narrow interpretation of voicing, requiring that what is often thought of as voicing be represented in more than one way. The arguments that the authors bring to support this conclusion differ, and the foundations for the features, in either articulation or audition/perception, are also not agreed upon. It is the general nature of the features required that provides the source of agreement.

Grijzenhout takes up a different feature, nasality. While it has been argued that [nasal] is not always present in the underlying representation of surface nasal consonants (e.g. Rice & Avery 1991, Rice 1993), Grijzenhout argues that there are two fundamentally different types of nasals phonologically and phonetically, a plain nasal and a light nasal. The former has the feature [nasal], and this feature is phonologically active; the latter does not have this feature, and thus [nasal] cannot be phonologically active and is not present phonetically either. Grijzenhout makes an assumption similar to that made by van Rooy & Wissing about regressive voicing assimilation, namely that the presence of nasal harmony in a language reveals the type of nasal found in that language, and thus the type of representation required. A more standard assumption, I think, is that rules are optional (or constraints are, by and large, freely rankable), with some languages having nasal harmony and some not. For Grijzenhout, the rule/constraint is not optional but obligatory if [nasal] is present, serving as a cue to the representation of nasals in that language.

The final article on features is by Wiese, on /r/. Wiese provides an overview of the kinds of problems that /r/-like articulations pose to a featural theory. He argues that r-like sounds have something in common, but not something that can be captured easily phonetically or in featural terms. Rather, he argues, the common core for the various realizations of r-like sounds lies in syllable prosody, or sonority, where /r/ is defined as a relative point on the sonority scale.
These articles on features (or lack of features) show the kinds of debates around what features are required in phonology, how these features are organized, what the phonetic foundations for features are (articulatory, acoustic, auditory) and what arguments for features are.

The articles by Clements, Ghini, and Harrison & Kaun are concerned with an important issue in the featural literature: how do features come to be present in a phonological representation? These articles (and others in the volume) seek to restrict what features can occur in underlying representations. Clements argues for a theory of representational economy (also assumed in many of the articles). He claims that features are specified in a language to the extent that they are required to express generalizations about the phonological system of that language and, further, that they are autosegmental only to the degree required by constraints active in the language. This allows for varying phonological representations across languages, reflecting differences in patterning. Constraints drive phonological activity in this model – if a constraint refers to a feature then that feature must be present. Constraints do not drive the choice of a particular feature, however, as argued for by van Rooy & Wissing and Grijzenhout. For van Rooy & Wissing, for instance, the presence of regressive voicing assimilation is an indication that [voice] is present and the absence of this assimilation signals that [voice] is absent. For Clements, on the other hand, the effect of the constraint would indicate that the feature [voice] is active and autosegmentalized; the low ranking of relevant constraints would mean that the feature is not prominent, and thus is not phonologically active, although it could still be present to capture contrasts. While I could quibble with details of Clements’ proposal, this model is in major conception close to the model of phonology which has been developed by what Clements refers to as the Toronto school of contrast (represented in this volume by Avery & Idsardi and Ghini).

Ghini works within a framework which is similar to that proposed by Clements, testing his model against the vowel system of Miogliola Italian. Ghini’s theory is based on a notion of scope (e.g. Dresher 2000), where features are introduced one-by-one until an entire inventory is differentiated. In particular, Ghini proposes that in the phonological inventory of Miogliola, it is necessary to assign place of articulation features (dorsal, labial) before height features (low, high). A result of this is that the vowel /i/ is labelled as high phonologically while the vowel /u/ is not. Ghini argues from vowel reduction in unstressed environments that this is an appropriate result.

Harrison & Kaun’s article is in essence a response to a model of phonological representation proposed by Inkelas (1995), Archiphonemic Under specification. Inkelas argues that underspecification is possible just in the case of predictable alternations, but that in other cases full specification is needed. Harrison & Kaun adduce evidence from Hungarian, Tuvan, Finnish...
and Turkish to argue that systematicity and idiosyncrasy rather than alternations or lack thereof are the fundamental notions required to determine when underspecification is allowed, and they propose that underspecification is allowed just in predictable systematic cases. Their goal differs from that of Clements and Ghini – it is not so much to examine the relationship between how features come to be present and phonological activity, but rather to ‘characterize precisely the circumstances under which speakers will posit abstract lexical entries’ (234).

Overall, this collection provides thought-provoking material which stimulates many questions. Perhaps fundamental is what the set of features should be: enrichments are proposed, which require more systematic examination. The nature of representations at both underlying and surface levels, and how and when features come to be present, are all continuing topics of debate. The use of processes as diagnostics of feature activity, as discussed in several articles, has precedents in the literature; particularly interesting is another claim, namely that processes are universal, and serve as diagnostics for deciding between features or featural representations. Exactly how this plays out in a theory of violable constraints, a topic discussed by van Rooy & Wissing, is worthy of further attention.

On the whole these articles speak to a conception of phonology in which a phonological representation is distinct from a phonetic one, with an interface that operates under a set of well-defined principles. The articles present a picture of feature geometry and underspecification that arises out of research from the late 1980s and the early 1990s. This work has never really ceased, but constraint-based theories, and Optimality Theory in particular, largely set aside many of these concerns for some time. The new century has seen features re-entering the picture with work by Padgett (2002) on the role of feature geometry in Optimality Theory, a collection edited by Lombardi (2001) on segments in Optimality Theory, and some recent dissertations, including de Lacy (2002) on featural markedness. The introduction of issues of features, their organization, and specification into Optimality Theory brings to the forefront once again the fact that features are part of the heart of phonology. This book will spur research on, and the issues raised are important to any theory of phonology.

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REVIEWS


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This book is an attempt at a thorough investigation of interrogative formations and their variation across languages. It is dedicated to presenting abundant evidence in support of a derivational approach to syntax rather than a representational approach. The central issue addressed in this book is the crosslinguistic variation with respect to \textit{wh}-movement, observed among three types of languages: (i) languages in which all \textit{wh}-phrases move overtly to clause-initial position (e.g. Bulgarian and Serbo-Croatian); (ii) languages in which all \textit{wh}-phrases remain in situ (e.g. Japanese and Chinese), and (iii) languages in which one \textit{wh}-phrase per clause undergoes overt movement and all others remain in situ (e.g. English). Chapter 1 lays the groundwork by discussing briefly some major approaches to this issue proposed in the literature and presenting the position to be adopted in the book. It defends the classical theory of \textit{wh}-movement advanced by Huang (1982) and Lasnik & Saito (1984), which claims that although all languages have a process of \textit{wh}-movement as part of the properties of UG, they differ with respect to the level (or timing) at which it applies. As such, this book does not break entirely new ground for the theory of \textit{wh}-movement and its crosslinguistic variation. However, the attempt to broaden the scope of investigation to handle a wide range of facts drawn from a variety of languages, and to give them a fairly detailed explanatory account within the minimalist program, makes this book a valuable contribution to the study of syntactic theory.

It has been generally assumed that subjacency constrains overt movement, but not covert movement, from which it follows that in languages like English, subjacency effects are present, while in \textit{wh}-in-situ languages like
Chinese its effects are absent. Richards challenges this view of movement, providing evidence that wh-in-situ languages (type ii) do not form a natural class with respect to subadjacency, and that the same holds true in overt multiple wh-movement languages (type i). In chapter 2 he presents a novel way of classifying languages, whereby two types of languages are distinguished depending on which position wh-phrases move to. In the first type of language, including Bulgarian and Chinese, wh-phrases move to (multiple) specifiers of CP (these are referred to as CP-absorption languages). In the second type of language, including Serbo-Croatian and Japanese, wh-phrases move to IP-projections, reminiscent of scrambling and Quantifier Raising processes; these are referred to as IP-absorption languages. A cluster of several properties that distinguish the two types of language are illustrated; these include wh-island effects, Superiority effects, and interactions of wh-dependencies (including Path Containment Condition effects), each of which is examined in depth in the following chapters.

Chapter 3 is devoted to an extensive discussion of a group of ‘Superiority’ phenomena that involve interactions of multiple applications of movement. The specific problem addressed is how the ordering of multiple applications of movement to specifiers of a single head is determined. This is the most interesting and perhaps the most important part of this book, since the idea proposed here is highly innovative and constitutes the central core of the theory put forth by this work. Richards tackles the issue of multiple instances of movement by utilizing a feature-based cyclicity, which requires that a strong feature be checked as soon as possible, and the notion of Shortest, which subsumes the effects of Shortest Attract and Shortest Move. This gives the result that when more than one element is attracted by a single head, the highest one moves first, followed by movement of the next highest one slotting into the position below the landing site of the first move, thus forming crossing paths. It is shown that this theory of feature-based cyclicity, together with the notion of Shortest, offers a unified account for various facts such as Superiority and Anti-Superiority phenomena, successfully deriving the correct order of multiple specifiers.

Chapter 4 develops well-formedness conditions on chains formed by movement. It is argued that a movement chain can be a well-formed PF object only if a unique member of the chain is identified as the one to be pronounced, and that a strong feature plays a crucial role in identification, giving instructions to PF. On the one hand, this theory derives the basic effects of Procrastinate, allowing a chain to be formed by overt movement to a strong feature checking position, but not by movement to a weak feature checking position. On the other hand, it also permits a wider range of possible chains than does Procrastinate. Thus, a chain formed by movement to a weak feature checking position, either followed by or following movement attracted by a strong feature, is allowed under this approach. A variety of phenomena are shown to lend support to this theory of chains,
including participial agreement in Romance, anti-agreement, *wh*-scrambling in Japanese, and so forth.

Chapter 5 concerns the extent to which syntactic constraints come into force to restrict certain dependencies. This issue acquires considerable importance when one is confronted with various phenomena in which some violation of syntactic constraints is unexpectedly saved. Richards examines a number of such phenomena, including Subjacency amelioration effects, additional *wh*-effects, Path Containment Condition effects, and so on. He argues that these phenomena all fall under the scope of the Principle of Minimal Compliance (PMC), which is an extension of the insight of Brody (1995). Its essential idea is that a violation of a given constraint may be ignored if the constraint has already been satisfied in an earlier stage of the derivation. Take Subjacency amelioration effects, for example:

(i) (a) *What do you wonder who bought?*
    (b) Who wonders who bought what?

It is argued that by virtue of the PMC, the matrix C in (1b) is made immune to the potential violation of Shortest that would arise by covert movement of *what*, skipping the lower *who*, as the matrix C has already satisfied Shortest by overt movement of *who*. The advantage of this analysis over the standard assumption that Subjacency only applies in overt syntax lies in the treatment of multiple overt *wh*-movement. It is observed that similar sorts of additional *wh*-effects emerge with overt multiple *wh*-movement in languages like Bulgarian, for which the standard analysis does not offer a principled account.

Chapter 6 leads to an overall conclusion. It is argued that this work supports the classical theory of movement by demonstrating curious similarities between multiple overt *wh*-movement languages (like Serbo-Croatian) and *wh*-in-situ languages (like Japanese) which are NOT shared by languages of the mixed type (like English), a phenomenon that other theories of movement cannot deal with.

Let us turn to a discussion of some of the issues raised by this book, beginning with the proposed bifurcation of languages with respect to the properties of *wh*-movement, into CP-absorption languages and IP-absorption languages (chapter 2). The crucial difference between the two types of language is that *wh*-phrases move to the (multiple) specifier(s) of CP in CP-absorption languages, while in IP-absorption languages *wh*-phrases undergo (multiple applications of) movement to the projections of IP, although they can also utilize a specifier of CP as a landing site at least in some IP-absorption languages. However, it is not clear in this analysis exactly what derives this difference or, in other words, what is the fundamental parameter responsible for distinguishing the two types of language. This problem perhaps stems from the fact that the status of IP (and its specifier) is never made clear in the discussion. A number of questions arise,
including (i) what features the head I has in the given languages, (ii) how the feature composition of I (and C) differs between the two types of language and (iii) what features in fact allow for multiple specifiers. Of course, developing a comprehensive theory of syntactic features may be beyond the scope of this work, but some discussion of this issue would have made the author’s arguments more convincing. Another concern has to do with the empirical basis on which the proposed classification is built. There are some questionable facts reported in the discussion concerning, say, Japanese and apparently inadequate treatments of the data are presented in some cases. For example, whether or not ‘wh-movement’ in Japanese is subject to Subjacency has been a matter of much debate. The questionable status of other phenomena reported for the language also casts doubt on the proposed analysis. All in all, it requires some effort to establish solid empirical grounds to justify the proposed classification of the languages.

The most innovative and striking part of this book is the analysis proposed for the ordering of elements moved to multiple specifiers, which is determined by the notions of feature-based cyclicity and of Shortest (chapter 3). This provides a straightforward account for a group of Superiority phenomena, including the rigid ordering of multiple instances of wh-movement in Bulgarian:

(2) (a) Koj kogo vizda?
    who whom sees
    ‘Who sees whom?’
(b) *Kogo koj vizda?
    whom who sees

This theory predicts that the higher wh-phrase, koj, first moves to a specifier of CP, followed by movement of the lower wh-phrase, kogo, into the specifier of CP below the landing site of koj, yielding the correct order in (2a), rather than (2b). Although this theory goes well with multiple applications of wh-movement, its extension to A-movement such as object shift and A-scrambling does not seem to make much success. Based on the assumption that a subject and internal arguments (an indirect object and/or a direct object) are all attracted by a single head, Agr, in object shift languages, it is argued that, after movement of the subject to the highest specifier of Agr takes place, the indirect object moves to the position below the landing-site of the subject, which is followed by movement of the direct object to the lowest specifier of Agr. The crossing paths formed by these instances of movement correctly yield the rigid ordering of subject-indirect object-direct object. Some complications may arise, however, with respect to Shortest in connection with the effects of PMC. Since Shortest is satisfied with Agr by attraction of the subject, it is expected that the PMC would render Agr immune to Shortest, allowing it to attract either direct object or indirect object. Then, the relative
ordering of the two objects should be made free, which is not the case, however. Some refinements seem necessary for the technical details of the proposed analysis. Problems also arise with the analysis of A-scrambling. The author demonstrates that there are some instances of A-scrambling, involving idiom chunks and quantifiers, that preserve the basic order of the scrambled elements, which is shown to claim that multiple applications of this type of A-scrambling respect Superiority, obligatorily forming crossing paths to a single head. However, this analysis is based on questionable empirical facts and undesirable theoretical assumptions, including its treatment of scrambling as a non-uniform operation, which renders the whole argument of A-scrambling rather weak. All of this throws some doubt on the idea that Superiority holds both for A-movement and A'-movement, as required by the proposed theory based on featural cyclicity and Shortest.

A notable feature of the proposed well-formedness conditions on movement chains (chapter 4) is that the well-formedness of chains is imposed by a PF requirement, suggesting that a strong feature of a given functional head unambiguously determines which member of the chain is to be visible (i.e. pronounced) at PF. It is interesting to look at PF-imposed conditions on chains, in view of the fact that so far attention has only been paid to LF-imposed conditions on chains. Thus, the author’s basic insight warrants further development. However, as the author himself notes, the dubious notion of feature strength should be ultimately eliminated from syntactic theory, which, accordingly, requires considerable rethinking of the definition of chains.

There are also somewhat more specific problems with this theory of chains. One of them concerns the fact that it would undesirably exclude successive cyclic movement, since this mode of movement is assumed to give rise to an ill-formed chain containing more than one member to be pronounced. Thus Richards is forced to make several stipulations such that an offending strong feature is somehow turned weak in order to rescue such chains; but this may not be a desirable move to take. Another concern is related to what is referred to as ‘bottom-heavy’ chains, which are formed by overt movement to a strong feature checking position, followed by overt movement to a weak feature checking position. It is argued that this last move is made possible if the moved element makes no phonological contribution, such as in cases of null operator movement. Although this sort of chain is supposed to constitute a strong piece of evidence for this theory, the existence of such chains is not that obvious, because the status of ‘overt’ movement of null elements is far from being clear and the empirical data given to support this analysis are not solid.

The last remark that I would like to make concerns the Principle of Minimal Compliance, presented in chapter 5. Although this principle captures the descriptive core of various phenomena that involve additional wh-effects, its status within the computational system is rather opaque. What
imposes such a property on the computational system of human language? How can the computational system keep track of whether a particular constraint, such as Shortest Attract or Move, can be satisfied with a given element, making it possible to ignore a violation of the requirement at a later stage? There seem to be some fundamental questions, as well as technical shortcomings, that remain to be settled.

While there are some inspiring ideas that require further development and some concrete analyses to be worked out in detail, this book surely sheds new light on the crosslinguistic variation in *wh*-movement, interactions of multiple applications of *wh*-movement, and well-formedness conditions on movement chains. It touches upon numerous theoretically important issues which should attract much attention and it also comes to grips with various phenomena from a wide range of languages, some of which have received little attention in the literature. Thus, I strongly recommend this book to anybody interested in the theory of *wh*-movement and its variation across languages.

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William C. Stokoe, Jr., Professor Emeritus at Gallaudet University in Washington, DC, died on April 4, 2000, aged eighty. When he moved to Gallaudet in 1955 to teach English to deaf students, he found that the faculty viewed the signing used by students merely as a limited set of gestures. Stokoe convinced himself that, rather, these signs constituted a fully formed language, what is now known as American Sign Language (ASL). This realization led to pioneering work on the structure of ASL and its first dictionary (Stokoe, Casterline & Croneberg 1965). The present
book, published posthumously, develops his life-long theme that ‘[b]ecause signed languages are truly and equally languages but differently constructed, they have much to teach us about language that spoken forms cannot’ (7).

*Language in hand: why sign came before speech* is written in a style that will be accessible to a wide non-specialist audience, yet is well-equipped with references to the scholarly literature. It is to be hoped that Gallaudet University Press will arrange paperback publication with a publishing house that can reach the wide audience this book deserves. As its title makes clear, the book is written to make the case that the emergence of sign language laid the basis for the later evolution of spoken language in human history because a visible sign often carries a visual clue to what it signifies. In this review, I will tease out three themes: the structure of sign language, the evolution of language and the multi-modal nature of language. Stokoe also reviews the rise and fall and rise of sign language, with autobiographical notes on his own role in the rise of ASL.

I turn first to the structure of sign language. Stokoe illustrates the power of gesture with this example:

[A] third person sees you and a companion together, leaves for a moment, returns, and shows surprise at seeing you alone. You immediately … make a gesture [that means], ‘She went that way’. But your gesture [also] shows which way she went … [Y]our hand pointed out the direction of your companion’s departure, but your hand also stands for her, the one who departed. (xii–xiii)

Here Stokoe introduces his basic theme: gesture has a natural expressive power that makes it possible to develop a wide range of meanings in a way that is far more natural than for speech. He further asserts that ‘[t]he gesture also has […] syntax because the hand for the person and its movement telling what she did are subject and predicate (or noun phrase [NP] + verb phrase [VP])’ (xiii). I think this is a mistake. It is true that a linguist can often (not always) dub the hand shape of a sign as denoting an object and the movement of the hand as denoting an action, but these are necessarily separable. And if they are not separated, they do not need syntax to put them together again. It is only the translation into English that has this syntax. A refinement to my objection comes from Supalla & Newport (1978). AIRPLANE is signed in ASL with tiny repeated movements of a specific handshape, while FLY is signed by moving the same handshape along a trajectory. Here, both ‘verb’ and ‘noun’ combine handshape and motion. For me, the import of the AIRPLANE–FLY distinction is that, while a ‘natural’ gesture is unitary, extending the range of discourse requires distinctions that cannot be mimed directly. Thus early humans might have developed a natural pantomime which stood equally for ‘a bird is flying’, ‘the flying bird’, ‘flying’, or ‘bird’ – relying on the ‘hearer’ to interpret
the sign correctly in context. As it became useful to distinguish these ‘readings’, so a community had to develop conventions – which were no longer natural – to mark them. I thus see FLYING versus PLANE (which is not part of the ur-vocabulary!) as a ‘language fossil’ of the transition from pantomime to a conventionalized system of signed communication. This does indeed rest on the recognition that a given handshape may be moved along different trajectories, and thus reflect the fractionation of ‘holo-phrastic utterances’ that I see as leading simultaneously to the development of ‘words’ and syntax – the system of conventions for combining these words in such a way as to reduce the ambiguity of likely interpretations by the hearer. A hypothetical example may help. Imagine that a tribe has two unitary utterances concerning fire, which, by chance, contain similar substrings which become regularized so that for the first time there is a sign for ‘fire’. Now the two original utterances are modified by replacing the similar substrings by the new regularized substring. Eventually, some tribe members regularize the complementary gestures in the first string to get a sign for ‘burns’; later others regularize the complementary gestures in the second string to get a sign for ‘cooks meat’. However, because of the arbitrary origin of the sign for ‘fire’, the placement of the gestures that have come to denote ‘burns’ relative to ‘fire’ differs greatly from those for ‘cooks meat’. It thus requires a further invention to regularize the placement of the gestures in both utterances – and in the process words are crystallized at the same time as the protosyntax which combines them.

Stokoe asserts (192) that sign languages have little need for the full panoply of grammatical rules of the grammarians, but this assertion is not supported by this book because he offers no systematic analysis of the expressive power of ASL; for example, we are not told how ASL would translate English verb tense, or restrictive vs. non-restrictive relative clauses. He does, though, note that questions in ASL often end differently from declarative sentences, with the eye gaze focused on the person being questioned and with the hands held momentarily where they were as the final sign ended.

Turning now to the evolution of language, Stokoe asserts (34) that human infants behave as they do because of a genetically determined drive, to perceive-and-act, not to create a language according to genetically determined universal rules. To this, one needs to add that the human’s perception-and-action is driven to expand in an adaptive social way (a ‘drive’ to communicate) so that the sensory-action system in humans is considerably more sophisticated than in other species. In particular, vision had to be coordinated with the movement of limbs evolved to act in ways compatible with what was seen and felt, grasped and let go. Interestingly, Stokoe notes (132) the importance of hearing:

Mammalian as well as primate infants, if they are to survive, must learn early to recognize and respond with appropriate behavior to a mother’s
call or cry, a predator’s shriek or roar, and to other sounds, like calls to the family or troop to assemble or disperse or repel invaders. Sounds, actually sound-response pairs, are common features of the life of many species.

However, he does not give it a primary role in language evolution:

However, after the anthropoid primates came down from the trees … [s]ome of these new primates not only gave up using their front limbs for walking but began to use them in new ways … [Hominids] apparently began to spread from Africa into Europe and Asia in the early part of the long Homo erectus period, roughly one million years ago. The fossil record shows that they had brains much larger proportionately than those of earlier hominid species. There is no evidence that they had and used a sign language, but … they made and used sophisticated stone tools … [The ability to impart knowledge of their manufacture and use] implies … that long before they could speak humans were using language to plan and guide and direct what they did. (133, 149)

However, against this it can be argued that the million-year lack of innovation in tools suggests a more chimp-like transfer of tool use rather than one based on language, whether signed, as Stokoe suggests, or spoken.

Let us define protosign and protospeech as (respectively) the use of manual/vocal gestures for communication at an early stage of hominid history. Stokoe seems to assume that protosign was a full sign language. I offer for consideration the counter-hypothesis that Homo erectus had protosign and protospeech and that these sufficed to maintain a fairly static culture. The benefits of increased vocal fluency could then have favored the emergence of the vocal tract configuration of Homo sapiens, but with the full range of language devices (whether signed or spoken, or both) requiring many millennia of further historical change.

With this, let us look at Stokoe’s discussion of the emergence of speech. Note that the story could be seen as one of protosign providing the scaffolding for protospeech rather than the development of speech atop a full signed language.

[Communicative] gestures would have enhanced [the] social and individual lives [of early humans]. But, with this enhancement, their hands, arms, and eyes would have become more and more occupied with communicating. If we then suppose that as they were using these gestures they made vocal noises as well, they might have discovered that a particular noise associated with a gesture could be used to represent the gesture and its naturally and conventionally related meaning. The next stage would have been the gradual or occasional disappearance of the gesture, leaving the sound pattern by itself to represent the meaning … It seems reasonable to
suppose that both the benefits of human manual activity and the need for supplementing (and eventually almost entirely replacing) manual with vocal representation contributed to the evolutionary pressure causing the physical changes in the vocal tract. (94–95)

However, when speech emerged, it seems unlikely that it would immediately have separate components for conveying the handshape and the movement in a gesture. Nor is it likely that the use of the location of a sign for anaphor would have immediately yielded some spoken form akin, say, to pronouns. It seems that speech may have been initially far less ‘syntax-like’ than sign was at that time. The discovery of sequences of phonemes as an economical way to support the invention of new symbols was different in kind from the type of symbols that arose more naturally from manual gestures. However, the understanding that one could invent new symbols to name objects and actions and so on, and that these could contain conventional non-iconic components (as in distinguishing CHAIR from SIT) would have greatly eased the emergence of protospeech (or speech) by a process of gradual enrichment of protosign (or a signed language) rather than de novo invention of rather arbitrary sound patterns to create a vocal form of communication.

Do gestures suggest word order in speech? Stokoe states:

Once infants have begun to represent actors, they make new gestures to represent the actors and their activities. Indeed, the connection between a great many actions and the gestural representation of them is entirely natural. It is built into our bodies. The hand’s movements reproduce features of the actors’ actions. Something else that most infants see and experience constantly is change, especially change that happens to objects … The order of elements in ‘cookie eat’ is natural … Representing the eating action by the actor, in exactly that order – cookie eat – needs no rules of universal grammar. The cookie is visible for a moment, then it is gone (regardless of who ate it). (35)

Firstly, one must distinguish representing the actor from representing the actor’s action, which, I claim, precedes the representation of the actor as a distinguishable role. Secondly, ‘cookie eat’ is the reverse of the order in languages such as English, which reduces the impact of the claim for natural order. I would imagine (but do not know) that signed languages, like spoken languages, have different conventions for ‘word’ order, as well as ‘case markings’, which reduces the dependence on such ordering.

After both the actor–action and the object–change relationships have been observed and represented regularly by gestures, the infant is ready to take another cognitive step … If something like a pet animal appears for an instant in a doorway and moves out of sight, the infant may point at where the pet was and immediately move the hand to show the direction it went.
Within this gesture, the representation of the pet and what it did are joined together; the hand is naturally, physiologically joined to its movement. (35f.)

Here the pointing is a unitary ‘utterance’, and does not identify the pet – so it is a long way from ‘full’ language. One may make a similar point about writing versus face-to-face speech – many more ‘words’ are needed when context must be established rather than relied upon.

[A] transitive actor’s action often directly affects an object; thus, representation of a three-part relationship begins to appear. The representation may come in stages, as the infant’s hand-eye-brain coordination rapidly matures. First, we may see something that we can easily recognize as meant to stand for ‘cookie’; then perhaps the whole gesture signifies ‘cookie eat.’ Not long after that, the hand may be saying ‘doggie eat cookie’ – taking this order from the earlier actor-action representation … When gestural representation has reached this stage, it encapsulates a whole transitive relationship in a single manual action, and the child is experiencing the mental, visible, and kinesthetic representation of sentence elements. In short, genuine language syntax has begun. (36)

I have four concerns. First, I think that the initial sign may mean ‘cookie eat’ with no separable parts, and with a separate sign for ‘cookie’ emerging only later as the child needs to impart more about cookies. Second, ‘doggie eat cookie’ did not take this order from the earlier representation, which was ‘cookie eat’. Third, one needs more care here to distinguish ‘progress in pantomime’ from the attempt to accommodate to the language around one. Finally, encapsulating a whole transitive relationship in a single manual action is not the same thing as exhibiting genuine language syntax. I would, say, rather (and this is contra Bickerton 1995), that syntax only emerges as discrete ‘words’ fractionate out from unitary utterances.

I turn next to multi-modal language. Stokoe adduces two sorts of evidence for the basic role of gesture in human communication: the spontaneous development of meaningful manual gestures by children, and the existence of alternate languages for sign and speech in some cultures. Concerning early signing by infants, Volterra & Iverson (1995) observe that all children, hearing and deaf, communicate with gestures for months before they use the language (spoken or signed) of their caretaker. Stokoe remarks:

The language or languages used in the infants’ [sic] immediate environment appear to have little to do with the infant’s original communicative behavior. The crucial input to the infants is not the adult language; but they certainly do not have ‘zero input’. Their interactions with things and actors in their environment give their eyes and hands and brains very rich input to work on. (35)
Furthermore, he notes that:

If vision and movement, the perceptual-action system, are natural and necessary for the first representation of mental conceptions, then vision and movement must form the foundation on which cognition, mind, and language are built … [Indeed,] hearing children whose parents communicate with them in ‘baby signs’ have been found to score ‘significantly higher on standard IQ tests’ than children without that experience. (196)

Goldin-Meadow & Mylander (1998) studied children too deaf to hear speech, but whose parents, wishing them to learn to speak and lip-read, kept them away from sign language users. These children made up individual sign systems with remarkable similarities: they tended to produce far more gestures signifying the object of an action than any other sentence part, fewer indicating intransitive actors (‘mouse’ in ‘the mouse ran’) and far fewer denoting transitive actors (‘mouse’ in ‘the mouse eats cheese’). They also almost invariably made gestures for intransitive actors before gestures for the act (‘mouse go’), and produced gestures for objects of an action before the gesture for the act (‘cheese eat’).

We move now to the question of alternate languages for sign and speech. A number of cultures have both a spoken language and a related signed language. The Warlpiri people in Australia treat their sign language and spoken language as equally valid, saying anything in one that they can say in the other; cultural rules indicate when it is appropriate to use each and who should do so (Kendon 1988). In formal story recitation by the Assiniboines in Montana, the storyteller mixes spoken Nakota and Plains Sign Talk, and both must be understood to get the whole meaning (Farnell 1995). (One may compare the use of slides and speech in giving a lecture!)

Stokoe asserts (164) that Kendon’s study finds the spoken and alternate sign languages of the Aborigines remarkably parallel both in form and meaning and he speculates that the sign languages are primary languages that were later translated – by substituting speech sounds for certain sign–meaning pairs – into spoken languages. One would need to check Kendon’s data in some detail to assess this claim, but I suspect that co-evolution of the signed and spoken languages would be required to keep sign ‘in synch’ with the syntactic innovation needed to linearize expression into speech. From another direction, one wonders whether it is plausible that many Australian spoken languages are related if their common ancestor was gestural rather than spoken.

In conclusion, then, Stokoe hypothesizes that protosign developed into a full language, from which speech developed by the replacement of manual gestures by vocal gestures. I find the data he offers even more consistent with the view that protosign provided the scaffolding for the development of protospeech, but that human language as we know it today emerged after the protosign–protospeech merger had occurred.
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