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On the adequacy of buzzsaws

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For decades, controversy has swirled around the question of whether some kind of innate capacity is required for language to develop normally. Ostensibly, there has been progress over the years on the old 'nature-nurture' question. Only the most die-hard theorists would now publicly argue for anything other than some sort of interactionist position. Nonetheless, as Sabbagh & Gelman (S&G) note in their review of *The emergence of language*, there is little clarity about the nature of that interaction or about what constitutes an emergentist position on it. As good scientists, S&G propose to evaluate emergentism, despite its vagueness, by describing a 'strong' emergentist position as one that must include the following tenets: domain-general cognitive processes ('buzzsaws' as they call them) like attention and memory are sufficient to account for the elegance of language as well as the ease and speed of its acquisition by children; these domain-general processes do so without explicit rule-based knowledge representations; and the same processes account for all aspects of language. There is much to agree with in the review by S&G. They cite the importance of development and performance as pluses for emergentist views, but they also raise serious questions about the limitations of emergentist accounts: these often either leave unanalyzed crucial concepts like similarity or hide what look suspiciously like rule-governed knowledge representations. Despite their concerns, S&G are gracious in their conclusions; they seem cautiously optimistic about the enterprise of accounting for language development in an emergentist framework. Such optimism, however, seems appropriate only insofar as the framework is not taken in its strong form. S&G's arguments (made by others as well) about the vague and hidden aspects of some emergentist models give the lie to the claim that all aspects of language can be accounted for by the same domain-general processes. Those arguments also raise questions about whether domain-specific rule-based representations can be completely done away with.

Moreover, the heart of the strong emergentist claim, that domain-general processes will wholly account for language acquisition, can be questioned even further. In the past, whenever any system has been proposed as a foundation on which to build language, two questions have arisen: first, whether that system itself is sufficiently strong (i.e. developed, sophisticated, or powerful) to support such acquisition, and second, whether the algorithms

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for mapping the language to the strong system are well-specified. Convincing, positive answers to these questions have been in short supply. For example, the claim that language, particularly grammar, can be built wholly on powerful social abilities falters on the evidence for the gradual development of social cognition and on the lack of a well-specified theory of the social bases of language acquisition. (See Shatz, 1992; for further discussion of these points.)

S&G fault the social-abilities-as-foundation claim on somewhat different grounds. They argue that those abilities themselves have been described as rule-based representations and hence violate 'strong' emergentism, which eschews such representations. They note that others have argued that the data supporting the social abilities argument can be equally well explained by more basic processes, and this leads S & G to ask, 'what are the candidate domain-general cognitive processes from which language emerges?' This question, however, asks only for more clarity about the foundational properties; it still presumes that those processes are powerful enough to support language development. The genius of the more sophisticated emergentist approaches (e.g. that of Elman) is that the very immaturity of the proposed domain-general capacities is now said to be an advantage for the language learner. A critic, then, can no longer ask the question of whether the foundational capacities are themselves strong enough to serve as a basis for language acquisition – the limitations themselves are now central to the language-learning enterprise.

Clever as the immaturity approach is, it nonetheless raises several issues. First, it would seem that even domain-general processes need some 'blueprints' for how and when to work (for example, see Shatz, 1987, on operations that function as a consequence of processing limitations), and if such blueprints are not 'representations', as S&G call them, then they need some alternative description. Second, how immature capacities themselves change to sustain gradual acquisition needs better description. It is too mysterious for emergentists to say only that as domain-general capacities become less limited, more language will be learned; one needs to specify how those limitations are lifted. Indeed, the very acquisition of language seems to lift limitations on at least some domain-general capacities. Much work on memory, for example, shows that the organization (syntactic as well as semantic) of lexical content influences memory capacity. (See for example, Hitch & Halliday, 1983). Similar findings exist with regard to attention (for example, Treisman, 1960). If these sorts of bootstrapping go on, there would seem to be no *a priori* reason to think that the blueprints underlying nascent domain-general capacities like memory and attention are somehow primary and sufficient to pick out the basic units of language without the help of some language-specific 'blueprints', limited though they might be, either for

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getting the system started or, possibly, for tuning it. Instead, there may indeed be some language-specific 'blueprints' to assure an appropriate trajectory so that the language system itself can become a tool for the later development of some domain-general processes. Evolutionary biologists agree that it is remarkable not that experience changes the organism, but rather that in the face of varied experience, the organism stays on its developmental trajectory (Waddington, 1957, 1974). If the problem is maintenance of developmental integrity, it may be most efficient for 'nature' to build into the organism both domain-general and domain-specific blueprints which together function to support development throughout the larger system. At this point in our understanding of 'the nature of nature,' we know very little about what is most efficient.

As with earlier criticisms of other foundational systems of language, the issue of the specification of the algorithim is relevant. In essence, S&G raise this when they ask 'what specific linguistic phenomena can be considered emergent from these [domain-general] processes?' They rightly note that rarely are such relations made explicit in emergentist work. When they are made explicit, as in the Aslin *et al*. research, the insufficiency of the domain-general process under investigation often becomes apparent and must be supplemented by additional constraints. How many of these can be explained by still other domain-general processes is an empirical question.

In sum, like S&G, I laud efforts to consider how domain-general processes and performance and developmental factors may affect the character of any domain-specific 'blueprints' necessary to explain language acquisition. Nonetheless, just as I have argued with regard to other 'strong' forms of acquisition theories (Shatz, 1994), I do not see much hope for a 'strong' emergentism offering a complete explanation of language acquisition. A weak version, in which developmental and performance factors and domain-general processes account for some aspects of language behaviour without rule-based representations, may very likely be appropriate, but as S&G note, a weak version vitiates claims to theoretical distinctiveness. Yet, this need not be a fatal concern, depending on the true goals of emergentism. If, on the one hand, the goals are to explain language behaviour, that is an important enterprise in and of itself, compatible with the one needed to explain language knowledge. It is unclear why the two enterprises necessarily have to compete with one another; rather, they should complement and inform each other, and in so doing give us the full and satisfying explanation of language acquisition we seek. If, on the other hand, the goals, in the service of anti-nativism, are to ignore the insights of those working on knowledge of language, then the apparent progress made on the nature–nurture issue will prove illusory.

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