Interview with William O'Grady on Emergentism

(by Mei Yang, of Guangzhou University, 2009)

MY: You define "emergentism" as "the idea that the properties of language are best understood in terms of the interaction of more basic, nonlinguistic forces". We hope that you can help us to better understand several key words in this definition by answering the following questions:

In O'Grady (2008:448), you state that "although linguistic emergentism denies the existence of certain types of grammatical principles, it does not deny the existence of grammatical properties—some a matter of stipulation (perhaps adjective-noun order, as observed by Dryer, 1992: 95-96) and some the result of deep-seated principles (various aspects of agreement and binding, for instance)." The word "property" seems to be very important in your theory since you have repeatedly mentioned it in your works. Can you say more about what you mean by "property"? Is it also the case that the input-based emergentism does not deny the existence of grammatical properties? Do you think that the emphasis on "property" might lessen the emergentist position of your theory?

WDO: Acknowledging the existence of grammatical properties is just another way of saying that aspects of a sentence's form can affect its acceptability and its interpretation. A sentence such as *That student works hard* is acceptable, but **That student work hard* is not. A sentence such as *Mary's sister admires herself* does not mean the same thing as a sentence such as *Mary's sister admires her*. And so on. The existence of such contrasts is uncontroversial, and is accepted by everyone—including proponents of all varieties of emergentism.

The more difficult issue has to do with *why* a sentence's form affects its acceptability and interpretation in the particular ways that it does. Is it because there are (possibly inborn) grammatical principles that make reference to particular aspects of a sentence's structure?

The standard answer is 'yes'—Binding Principles, the Subjacency Condition, the Case Filter (all from traditional Universal Grammar) offer fine examples of what principles of this type might look like. In contrast, the emergentist answer is 'no'—other things are responsible for why a sentence's form affects its acceptability and its interpretation in certain ways. I have argued that one of those things is an efficiency-driven processor whose defining property is a commitment to reducing the burden on working memory [and lowering the cost of processing in general]. This idea is developed at length in my 2005 book, *Syntactic Carpentry* (Erlbaum), but a shorter summary can be found in my paper, 'An emergentist approach to syntax,' which is available at my Web site (http://www.ling.hawaii.edu/faculty/ogrady/).

MY: Concerning the word "interaction", it seems that the interaction suggested in linguistic emergentism is both different and similar to the "interaction" proposed in Michael Long's Interaction Hypothesis: while the latter focuses more on social interaction, the former includes interaction at all levels. Can you help us to better

understand the type of interaction assumed in your definition of "emergentism"? Do you think that the interaction between cognitive systems is of the same importance as interaction between people?

WDO: The particular type of interaction on which I concentrate involves cognitive phenomena—processing, working memory, pragmatic reasoning, perception, knowledge of lexical properties, and so on.   Social interaction is no doubt relevant to certain aspects of language use, but my view is that interactions involving the processor are the most crucial for understanding the general architecture of language and how its more abstract properties are acquired. For example, I have never seen an explanation for the workings of verbal agreement or for the acquisition of constraints on co-reference that is based on social interaction. In contrast, it *is* possible to see how these phenomena can be explained in terms of the interaction between processing and working memory, as I argue in my book.

MY: You use "nonlinguistic" and "nongrammatical" interchangeably in your works. Can you give us a brief explanation of them?

WDO: That terminological practice, which is probably unfortunate, reflects the assumption, common in formal linguistics, that knowledge of language should be equated with knowledge of a grammar. Hence, a phenomenon that is non-linguistic would also be non-grammatical, and vice versa. In fact, of course, even those committed to formal linguistics recognize that many phenomena in language have little or nothing to do with grammar in the usual sense of the term—politeness, for instance.

MY: In your recent work (to appear b), you divide emergentist approaches to language acquisition into two types: input-based emergentism (as advocated by Ellis, McWhinney, Tomasello, etc.) and processor-based emergentism (as put forward by Hawkins and yourself). In O'Grady (1999), you also label your theory "general" or "cognitive" nativism to distinguish it from the "special" nativism as proposed in UG. We can see from this that your theory has been developing in the past decade. Can you tell us what motivates you to hold the emergentist view? Do you agree if we call your theory as one between nativism and emergentism?

WDO: This is really a purely terminological matter—the terms 'general nativism' and 'cognitive nativism' describe a view that is now more widely called 'emergentism,' and it made sense to adopt the newer term, just to avoid confusion as to the type of position that I hold.

Nonetheless, it is true, as you note, that my position has evolved over the years—especially with respect to the role of processing in understanding why sentences have the particular form and the particular interpretation that they do. In my early work, I focused on trying to find generalizations that avoided reference to inborn grammatical notions and relations such as c-command, bounding node, barrier, governing category, and the like. But the generalizations I proposed were static; they did not have the on-line, dynamic character that processing phenomena do. At the

time, I was essentially a dualist, believing in the existence of both a (non-UG-based) grammar and a processor. In my more recent work, of course, the focus is on the processor and on the idea that the processor, once properly characterized, does the work that previously had to be attributed to the grammar—it explains why sentences have the particular form and interpretations that they do.

MY: Since you refer to your theory as processor-based emergentism, there is no doubt that your research concentrates on the role of "an efficiency-driven processor" whose primary goal is simply to reduce the burden on working memory. Concerning the processor, can you help to answer the following questions?

(1) Can you provide the readers a brief introduction of the processor?

(2) From your work we find that you hold a view that the processor is innate. But we think that it is also possible that the processor reflects cognitively developed abilities. Do you agree with this? Why?

WDO: As I see it, the defining property of the processor is its commitment to reducing the burden on working memory [and the cost of processing in general]. This is what I mean when I say that it is efficiency-driven.

More concretely, this means that the processor adopts particular strategies. One of these, dubbed the Efficiency Requirement in *Syntactic Carpentry*, ensures that dependencies (lexical requirements) are resolved at the first opportunity. Thus, the processor acts immediately to take care of agreement dependencies such as the one introduced by the suffix *-s* in *Mary knows*, it seeks a quick resolution to referential dependencies such as the one introduced by the reflexive pronoun in *Bob admires himself*, and so on. What is surprising in all of this, as I try to show in *Syntactic Carpentry*, is that this simple assumption offers major insights into the formal properties of syntactic structure, agreement, and binding, among other phenomena.

Another major strategy associated with an efficiency-driven processor involves an aversion to 'backtracking'—going back and changing the interpretation of a previously interpreted element. As I have tried to show in a series of recent papers (e.g., O'Grady 2008a, to appear b), various crucial properties of scope seem to follow from this strategy.

One thing that I'd like to emphasize is that when I refer to the 'processor' and say that it is innate, I'm actually speaking quite abstractly. As I note on p. 210 of *Syntactic Carpentry*, there is probably no such thing as 'the processor,' especially if you think of it as a concrete cognitive mechanism located at some particular point in the brain. Rather there is simply 'processing,' which takes place in many different places in the brain and which crucially involves activating particular patterns of neuronal connections in response to internal and external stimuli (e.g., hearing a sentence). 'Working memory' too is an abstraction—it simply refers to the ability of the brain to maintain patterns of neuronal activation. It's precisely because neuronal activation is difficult to maintain that the 'processor' (more precisely, processing activity) seeks to reduce the burden on 'working memory' (that is, to reduce the amount of activation that has to be maintained).

So when I say that the 'processor' or 'working memory' is innate, I'm actually

talking about very general operations and propensities—not about anything specifically linguistic or grammatical. No doubt, the neuronal activation associated with many sorts of cognitive activity is subject to limitations very much like those associated with language, whether it involves visual images, episodes, music, pragmatic reasoning, or mathematical computations. Moreover, there is reason to believe that the processing improves with experience and age, at least to the point of puberty (e.g., Ullman 2001).

MY: In O'Grady (To appear a: 25), you state that "my position with respect to UG is that it does not exist; a simple efficiency-driven linear processor lies at the heart of the human language faculty and carries the burden of explaining why language has the particular properties that it does and how those properties are acquired with such apparent ease by children." So you do not acknowledge there is such thing as UG, but do acknowledge the existence of "the human language faculty" and the processor as you suggested lies at the heart of this faculty. What do you think is the nature of such a human language faculty? Is it also autonomous and closed as suggested in UG or is it different? Do you think that the acknowledgement of the existence of a "human language faculty" is incompatible with the emergentist view?

WDO: Acknowledging the existence of a human language faculty just means (for me) acknowledging that humans have a capacity to learn and use language—something that we all agree on, independent of our theoretical perspective. The far more difficult question has to do with the *nature* of the human language faculty—that's where all the disagreement lies.

My view of the language faculty is perhaps best summed up by Bates & MacWhinney's (1988:147) insightful suggestion that it is 'a new machine built out of old parts.' That's essentially the emergentist thesis: non-grammatical propensities and abilities involving processing, perception, pragmatics, and so forth interact to create languages with the particular properties that we find in communities around the world.

MY: It seems that you do not take the semantics into account in your analysis (2008: 451) of agreement in English in terms of the operation of the linear, efficiency-driven processor. For example, according to your analysis, in the sentence "There is milk and water on the table", "is" is used because the agreement dependency is resolved when the verb combines with just the first conjunct of the coordinated phrase, the nominal milk. However, according to Garrett's (1975) and Levelt's (1989) speech production models, in language production, there is a stage before the sentence formation—conceptualization. At this stage, we decide what it is that we want to say in the given context, considering what we know and expect others to know or be aware of. This stage depends on general cognition, and the product of it is a pre-verbal message. Therefore, before the formation of the sentence "there is milk and water on the table", the objects of "milk and water" come into our mind as a whole rather than word by word. In this sense, if the speaker firstly conceptualizes what he wants to say, he might very possibly use "are" rather than "is" in the

sentence. Can you provide us your idea on this possibility? Why do you exclude semantics from your theory? If there is any misunderstanding here, can you explain to us in more detail?

WDO: That's a very timely question, since my seminar course this coming semester (spring 2009) will focus on a series of issues in the syntax of agreement, including the one that you've just raised. One idea that I will be pursuing is that production and comprehension differ with respect to the processing of agreement, as others have suggested as well (e.g., Thornton & MacDonald 2003:756).

MY: You stated in your work (2008) that although the frequency of input occurrence is extremely important, it is not more important than the calculus that assesses the burden that computational operations of various sorts place on working memory. Since both frequency and the processor are important, do you think that there should be certain relationship between frequency and the processor? If yes, what kind of relationship do you think that would be? Do you agree that we say it is the interaction of them that determines language use?

WDO: The processor is highly sensitive to frequency—that's a given, and it's been demonstrated many times. The real question, as I see it, has to do with the relationship between frequency and computational cost (burden on working memory)—is one more important than the other?

   Not surprisingly, there is a strong correlation between the two: patterns that are easier to process tend to be more frequent than those that are difficult to process, just as one would expect. But occasionally, we find dissociations. For instance, subject relative clauses (*the man who chased the dog*) are easier to process than direct object relative clauses (*the man who the dog chased*), but direct object relatives seem to be more frequently used [Diessel 2004:146]. Or, to take another example, patterns containing plain pronouns (*Bob criticized him*) are far more common than patterns containing reflexive pronouns (*Bob criticized himself*), but the reflexive pronoun patterns are easier to process.

   What is particularly interesting here is that subject relatives are mastered before direct object relatives in the course of language acquisition, and language learners usually make fewer errors on reflexive pronouns than on plain pronouns. This suggests that the processor (which drives language acquisition on the view I hold) cares more about computational cost than it does about frequency per se when the two are in conflict.

   Of course, all of this is a far cry from putting forward a theory of 'language use.' It seems reasonable to think that frequency and computational cost (and their interaction) will be *among* the factors that enter into a theory of language use, but there are no doubt many other factors (some of them nonlinguistic—such as speaker intentions) that are relevant as well. Figuring all that out will be very difficult.

MY: According to many emergentists, the properties of a complex system are critically shaped in interaction with its environment. It seems that you do not say a lot

about the role of environment in your theory. Can you tell us why it is the case? What is your opinion on the relationship between the "system" and the environment? What is the role of the environment in your theory?

WDO: In my opinion, a weakness of much emergentist work is an over-emphasis on the environment (the 'input'). The fact of the matter is that many features of language are simply not encountered frequently enough in the input to be learned from experience: frequency can only matter when phenomena occur with a certain minimum frequency—and many things don't.

This point is related to what proponents of Universal Grammar call the 'poverty of stimulus', and I think that they are absolutely right about its existence and about the importance of studying it intensely. I discuss this in detail in O'Grady (2008a), among other places. My key point is that an efficiency-driven processor directs language learners to the right analysis of phenomena that are inadequately instantiated in experience, allowing them to overcome the poverty of stimulus problem without the need for inborn grammatical principles.

This is not to deny that the input/environment DOES matter—that's why children in Beijing learn Mandarin and children in Toronto learn English. But it's not possible to understand how language acquisition works if one considers only the input, or if one assumes that the input contains all the information needed to learn a language. Very vital components of our linguistic knowledge emerge from the operation of the processor and the way in which its propensity to reduce the burden on working memory shapes the learner's reaction to particular types of input.

MY: MacWhinney (2006: 731) proposes that emergentism offers "new methods of prediction". Cameron and Deignan (2006: 687) caution that 'emergentist accounts can describe, can explain but only at a general systems level, and cannot predict. Prediction and explanation are replaced by the comparison of descriptions of system behaviour and a search for patterns of change that may recur.' On Stephan's (1999) account, predictability is excluded in strong but not in weak versions of emergentism. Can you tell us your opinion on the predictability of your emergentist theory? Do you agree that we take your theory as "weak version of emergentism" if you do not exclude predictability in your theory?

WDO: Yes, I see my theory as an instance of 'weak emergentism' in Stephan's sense, so I do not rule out making predictions about what can or cannot happen in language. In fact, though, the question of prediction-making by linguistic theory is a very complex one. It's been observed many times that as impressive (and correct) as the Darwinian theory of evolution is, it does not make particular predictions. It explains all sorts of things, like how genetic variation interacting with natural selection can lead to the development of vision or language, but it doesn't *predict* that vision and language *had* to happen.

Linguistic theory usually works this way too: it focuses on explaining the properties that we observe in language. Only rarely does it make precise predictions about what type of languages are possible (and even more rarely do such predictions

survive for more than a few weeks before they are falsified). There are just too many unknowns and too many things that we don't yet understand to be able to make real predictions with any sort of accuracy at this point in time. The same is true of emergentist work on language of course.

MY: Cook & Kasper (2006) refer the emergentist approach to SLA as a paradigm. Do you think there is a paradigm shift in the study of SLA?

WDO: As things now stand, there really isn't a paradigm in the study of SLA—or in the study of language in general. At best, there are a number of mini-paradigms, which really just means that there are a number of different ways of looking at language and [a number of different] expectations about how we may be able to explain the things that we find. I don't see any evidence that emergentism is about to become the dominant paradigm in linguistics, although there certainly are indications of an increased interest in emergentist work on language acquisition. One example of this is that four major journals have recently devoted special issues to emergentism and related issues— *Applied Linguistics* 27.4 (2006), *Bilingualism: Language and Cognition 10.1* (2007), *Lingua* 118 (2008), and *The Modern Language Journal* 92.2 (2008).

MY: Cook & Kasper (2006:554) state that "emergentism recognizes language as a dynamic system whose interacting properties are not reducible to the sum of their parts". What is your understanding of language as "a dynamic system"? What do you think can your theory contribute to the study of language as "a dynamic system"?

WDO: Saying that a system is dynamic usually just means that it is in a state of flux. This is certainly true of language—new vocabulary is constantly being added, some words are falling out of use, sound change and grammaticalization of various sorts are underway, the relative frequency of certain structural patterns is changing, and so on. This is perhaps less flux at the level of a person's idiolect, but certainly nothing is completely stable.

   So far, so good. But how does the fact that language is a dynamic system in this sense actually help us understand anything significant about how it works? For example, does it help us understand why verbs are far more likely to agree with subjects than with direct objects? Does it offer any insight into why reflexive pronouns are interpreted the way they are? Does it say anything about why scope works differently in Korean and English? Does it help explain how children are able to learn language? I don't think so. Moreover, and perhaps more tellingly, the most promising answers to these sorts of very fundamental questions seem to come from properties of cognition that are very stable, such as the propensity to minimize the burden on working memory.

MY: Many interesting examples have been used to illustrate the features of complex systems, for example, the red light queues (Ellis, 1998:643) and the hexagonal shape of the cells in a beehive (MacWhinney, 2002). Some other examples make reference to

the chemical combination of substances or the factors leading to the complexity of meteorology. There is a big difference between the system involving human factors and those involving non-human factors—when human factors are involved, we should take into consideration the intention of human beings, both as individuals and as whole. What is your view on this difference? Do you think this difference has any implications for the study of SLA?

WDO: I think that it's important to distinguish between how language is used (for example, to mislead or to inform, to anger or to soothe, to unite or to alienate) and why it has the particular structural properties that it does. The former type of question can only be answered by reference to 'human factors' such as intention, character, and so forth. In contrast, the latter question—which is the one that interests me—has nothing do with factors over which human beings have much control. The sorts of processing considerations that underlie the explanatory program that I am trying to develop are essentially invariant and subconscious. They have nothing to do with one's goals or character; they simply reflect the fact that neuronal activation is difficult to maintain.

MY: Larsen-Freeman & Cameron (2008) warn against the reductionist approach in the study of language acquisition. Holland, however, in his seminal works <u>Emergence: from Chaos to Order</u> (1998:2) states that "the hallmark of emergence is <u>much coming from little</u>." Therefore, it seems that SLA studies should try to find out those <u>little</u> principles to explain such <u>much</u>. Can we take your processor as one of the <u>little</u> principles? What is your view on the warning against reductionism proposed by Larsen-Freeman & Cameron?

WDO: When Larsen-Freeman and Cameron warned against 'reductionism', they were arguing against the idea that you can figure out the properties of the entire system by just consider the properties of its parts without regard for the possibility that the interaction of those parts can yield new properties. (The properties of subject-verb agreement work this way, according to the analysis outlined in O'Grady 2008a, for example). There is therefore actually no incompatibility between this point and Holland's idea that much can come from little (including the interaction of little things with each other).

For example, in the spirit of Holland's point, we can say that the propensity to minimize the burden on working memory is a 'small' fact. If I'm right, a great deal follows from that fact and how it impacts on processing—including major insights into why language has the properties that it does and how those properties are acquired by language learners in response to quite limited (and sometimes irrelevant) types of experience. That is what makes the approach I adopt 'emergentist' in Holland's sense.

MY: What do you think the emergentist approach can offer for the second language teachers and learners? What do you think the L2 teachers can get from your theory? Can you give us your prediction about the prospects of emergentism and its

application in applied linguistics?

WDO: The emergentist approach offers language teachers the same sort of pay-off that any theory, if successful, offers—which is an insight into the nature of the cognitive states and skills that are the target of the language acquisition process. Although the practical consequences of such advances are often not obvious at the outset, a deeper understanding how things work in any domain can be expected to have pedagogical benefits [in the long run]. Hopefully, that will be true in the case of language too.

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