Two ideas of creativity

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To appear in Martin Hinton, ed., *Evidence, Experiment and Argument in Linguistics and Philosophy of Language*.

Discussion of the scientific status of linguistics is often clouded by an ambiguity in the terms "creative", "creativity". Linguists have taken to using these words in a way that is very different from the way they are used in everyday English, and this idiosyncratic usage is arguably responsible for serious misunderstandings about the nature of human language.

Whether or not they regard the influence of Chomsky's linguistic writings as positive, many people agree in seeing those writings, from the 1957 book *Syntactic Structures* onward, as having brought about a "revolution" in the discourse of linguistics. One leading feature of that "revolution" is said to be that Chomsky drew attention to the fact that language behaviour is *creative*. What is meant, by those who say this, is that the grammar rules of a human language allow an infinitely numerous range of distinct grammatical sentences, so that most sentences we utter or hear have never been uttered or heard by us (and perhaps by anyone) before. Human languages are contrasted in this respect with the signalling systems used by some animal species, which are said to comprise small finite ranges of possible signals.

Thus, Sir John Lyons's *Chomsky* (1970) was a concise summary of Chomsky's linguistics, addressed to the educated general reader, by an author with wide intellectual horizons who was broadly sympathetic to his subject without being an uncritical acolyte. On p. 24, after drawing attention to "duality of structure" in human language (the fact that languages characteristically have structure at both phonological and syntactic levels), Lyons wrote:

> The second general property of human language to be mentioned here is its *creativity* (or "open-endedness"). By this is meant the capacity that all native speakers of a language have to produce and understand an indefinitely large number of sentences that they have never heard before, and which may indeed never have been uttered before by anyone.

A generation later, O'Grady et al. (1997) was an undergraduate textbook of linguistics which, again, was compiled from a position of judicious theoretical neutrality rather than promotion of any particular theoretical "party line". (It appeared in a series edited by Geoffrey Leech and Mick Short, neither of whom could possibly be accused of wearing Chomskyan blinkers.) In their opening pages (pp. 1–3) O'Grady et al. wrote:

> human language must be *creative* ... Creative systems are found in all aspects of language, including the way in which sounds are combined to form words ... [they give examples of what one might call "grammatical but non-occurring" wordforms such as *prasp* or *flib* versus "ungrammatical" forms such as **psapr* or **bfli*] ... Nowhere is the ability to deal with novel utterances more obvious than in the production and comprehension of sentences. ... much of what you say, hear, and read in the course of a day consists of sentences that are new to you. [They give examples of well-formed versus starred sequences of English words.]

I myself have not taught linguistics since 1990, so in order to check that this idea remains current I googled, and quickly found a webpage "Linguistics 101: An Introduction to the Study of Language" by Jennifer Wagner, a doctoral student who teaches first-year linguistics at the University of South Australia (ielanguages.com/linguist.html, accessed 18 Jul 2015). Her first paragraph says:

> Words in languages are finite, but sentences are not. It is this creative aspect of human language that sets it apart from animal languages, which are essentially responses to stimuli.

I have little doubt that essentially similar remarks could be found in linguistics books and articles published in any one of the past fifty years or so.

To see why this is a very unusual way to use the term "creative", consider another kind of human activity where, equally, the range of distinct potential examples of the activity is infinitely large: multiplying numbers together. I have just multiplied the integers 4792 and 5306 to generate the equation:

> 4792 × 5306 = 25426352

This is almost certainly the first time in my life I have carried out that particular multiplication, and possibly no-one has ever carried it out before. (With four-figure numbers, perhaps the chances are that there have been a few precedents in the long history of human arithmetical activity, but if I had used six-figure numbers, as I easily could have, I suggest it would be quite unlikely that anyone had previously multiplied together just the same pair of numbers.) There is an infinitely large range of distinct multiplications which, in principle, I am competent to carry out, provided we ignore time and memory constraints (in practice I could probably never finish accurately

multiplying million-digit numbers together, or checking such a multiplication carried out by someone else, but similarly I could never utter, or understand, a million-word sentence). Although the range of well-formed multiplications is infinitely large, there are also the arithmetical equivalents of "starred sentences"; for instance, *4792 × 5306 = 25426353 is an invalid equation. The parallels between equations, and grammatical sentences as discussed by linguists in connexion with the concept of linguistic creativity, are really quite striking.

Nowadays, we have machines to carry out multiplications for us. But, almost within living memory, people were employed to execute such tasks. Was that type of work regarded as "creative"? It was not. On the contrary, carrying out arithmetical operations was and is seen as a clear case of uncreative, mechanical work. Some creative intellectuals did such work as an ancillary part of their activities, for instance a physicist or an astronomer might have needed to carry out tedious arithmetical operations in order to check how well some innovative hypothesis agreed with observational data. But the creative aspect of such a person's work was not seen as residing in his arithmetic. Clear examples of creative activity, as that term is understood outside the discipline of linguistics, are activities like writing fiction or poetry, producing paintings or other kinds of artwork, composing music, and so forth. Developing novel scientific hypotheses, or inventing new areas of mathematics, would also be good examples.

What makes these activities "creative", in the ordinary as opposed to the linguistic acceptation of the word, is not to do with the mathematical fact that the range of possible examples is infinitely numerous (though that may well be true). Rather, the key point is that valuable examples of the activity commonly extend our idea of that range. A creative painter will produce a canvas which in one respect or another is at least a little different from anything one might have imagined on the basis of familiarity with the previous history of painting – and yet which, once painted, can be recognized as a worthwhile addition to that history. The activity of multiplying integers does not have that quality, which is why we think of it as uncreative. Any worthwhile instance of multiplication will conform perfectly to the (infinitely large) range of potential multiplications we have implicitly grasped when we learned multiplication at school. Any attempt to go outside that range and generate an "innovative" kind of equation, say:

4792 × 5306 = pelargonium

is not creative, it is just silly.

If it is agreed that we are faced here with two very different senses of "creativity", in order to move the discussion forward we need to adopt terms to identify the respective senses unambiguously. Let me describe activities which characteristically produce examples drawn from a fixed and known (even if infinitely large) range as "F-

creative", and activities which characteristically produce examples that enlarge our understanding of the range of possible products of the activity as "E-creative". (F chosen as standing for "fixed", E for "enlarging" or "extending".) Then I hold that, outside the discipline of linguistics, people who describe an activity as "creative" normally mean E-creative, but that when linguists say that Chomsky describes human language behaviour as "creative", they mean that he sees it as F-creative.

Categories of behaviour which are (merely) F-creative are good candidates as subjects for scientific theorizing. Sir Karl Popper has taught us that the essence of science is to make falsifiable generalizations about observable reality. A scientific theory must identify a class (which may well be infinitely numerous) of distinct potential observations and must assert that members of that class, and *only* members of that class, can occur; the content of the theory depends on the size of the complementary class of "potential falsifiers" – logically-possible observations which are predicted never to occur, so that the theory is refuted if they do occur. Linguists' descriptions of language behaviour as "creative" fit this model very well: notice how O'Grady et al. (like many other linguists) illustrate the "creativity" of language by contrasting sets of word-sequences, or phoneme-sequences, which they regard as possible in English with other, "starred" sequences which they regard as not possible.

Behaviour which is E-creative, on the other hand, is not a candidate for Popperian scientific theorizing. If it is normal and expected that future examples will fall outside any class that might be hypothesized on the basis of past examples, then there is no point in putting forward a falsifiable theory: we know in advance that it will be falsified. In such a domain, the enterprise of scientific theorizing would not make sense. And indeed we do not commonly find people claiming to propound scientific theories of poetry, or of graphic arts.

If this contrast between two ideas of creativity is well-founded, two questions arise. Why did it seem important to Chomsky (and, following him, many other linguists) to urge that human language is (merely) F-creative? And does the deeper concept of E-creativity not apply to language?

The original impetus leading Chomsky to assert the F-creativity of language behaviour seems to have stemmed from his opposition to a point of view which he attributed to the psychologist B.F. Skinner, in a famous negative review (Chomsky 1959) of Skinner's 1957 book *Verbal Behavior*. As Chomsky described Skinner's view, this claimed to explain language behaviour as a set of responses which individuals learn to utter or execute in reaction to particular features of their environment because similar stimulus–response pairings have been positively reinforced in the past. (Stimuli, and responses, can both be either linguistic or non-linguistic: on this view, we are trained to say given things in response to non-linguistic stimuli, and also to act in given ways in response to linguistic stimuli.) I am not sure that Skinner's idea was really as crude as Chomsky portrayed it as being, but, leaving that issue aside, we can all agree that

the view which Chomsky attributed to Skinner is absurdly mistaken. To quote just one of Chomsky's counter-arguments ([1959] 1967: 160):

> Suppose, for example, that while crossing the street I hear someone shout *Watch out for the car* and jump out of the way. It can hardly be proposed that my jumping ... was conditioned (that is, I was trained to jump) precisely in order to reinforce the behavior of the speaker.

Many things we say have no particular relationship with our environment at the time we say them, and much of the language we hear evokes no particular action from us at the time (and is not intended by the speaker to do so). At least as portrayed by Chomsky, Skinner's stimulus–response theory of verbal behaviour is fairly ridiculous.

(Having said that I am unsure whether Chomsky's account of Skinner's linguistics is fair, for ease of exposition I shall assume that it is, and shall use simple phrases such as "Skinner's model" where a more careful treatment would add a qualifying phrase like "as described by Chomsky".)

The link with F-creativity arises from the fact that, if Skinner's model were correct, it would seem to follow that the ranges of distinct verbal stimuli and verbal responses offered by a language would both have to be finite. If acquiring a language means being trained through reinforcement to associate particular responses with particular stimuli, then an individual only has time to learn some finite number of associations (a fairly small finite number, one might think). So the fact that grammars of human languages allow in principle for infinitely large ranges of semantically distinct sentences is a large nail in the coffin of Skinner's model. As Chomsky wrote ([1959] 1967: 157–8):

> It is simply not true that children can learn language only through "meticulous care" on the part of adults who shape their verbal repertoire through careful differential reinforcement ... a child will be able to construct and understand utterances which are quite new, and are, at the same time, acceptable sentences in his language. Every time an adult reads a newspaper, he undoubtedly comes upon countless new sentences ... which he will recognize as sentences and understand ...

Notice how the quotation from Jennifer Wagner above contrasts the F-creativity of human languages with animal languages for which, she says (probably correctly), a Skinner-type model is adequate.

To stress that a human language is more than a finite list of possible utterances would have been worthwhile, then, if linguists before Chomsky had mostly believed in the simple kind of stimulus–response model which he attributed, correctly or otherwise, to Skinner. Did they? I am sceptical. I came to the subject early enough to have read

a fair amount of older linguistics before I got round to reading Chomsky; I had never heard of B.F. Skinner before Chomsky's writings eventually introduced him to me as a kind of intellectual Aunt Sally figure. Reading, then and later, the well-known linguists of the first half of the twentieth century who presumably defined the Ancien Régime that Chomsky's "revolution" was destined to overturn, it has rarely seemed to me that they expressed a belief in a Skinner-type model, either explicitly or even by implication.

Probably the single leading figure among that group of linguists was Leonard Bloomfield. Lyons (1970: 31–2) quotes a number of passages from Bloomfield's *Language* to show that Bloomfield embraced a version of J.B. Watson's "behaviourist" approach to psychology, but it would be quite a stretch to argue that these passages committed Bloomfield to anything like the Skinner model (and Lyons does not argue that). Indeed, Lyons comments (p. 32) that Bloomfield's behaviourism had no appreciable effect upon syntax or phonology in his own work or in that of his followers. The only respect in which Lyons identifies behaviourism as affecting Bloomfield's model of human language was that it hindered him in developing a satisfactory account of meaning in language. That would be more of a criticism, if subsequent linguists had ever improved on Bloomfield in that respect. (On the emptiness of modern "linguistic semantics", see e.g. Sampson 2001.)

In the preface which Chomsky added to his Skinner review when it was reprinted in 1967 (as detailed in my reference list below), Chomsky claimed that Skinner's book was an unusually careful and thoroughgoing example of a widely-held view about the nature of human language – "a paradigm example of a futile tendency in modern speculation about language and mind". The implication was that, if readers agreed that Skinner was wrong about language, they would have to agree that almost everyone else then writing about the subject was wrong too, leaving only Chomsky and those who supported him as having ideas worth taking seriously. But this is like arguing that, because Islamic State with its public beheadings and stonings is clearly barbaric, anyone else who aims to conduct his life in accordance with religious tenets must be dismissed as beyond the pale.

In practice, those who come to linguistics nowadays, as students or as general readers, are introduced to Skinner's stimulus–response model of language behaviour only so that they can then be told that the Chomskyans showed it was wrong. Without that, I doubt whether a picture of language akin to the Skinner model would ever occur to many people. The idea of language behaviour as F-creative is being put forward as a means of curing a problem which people don't have.

But the "cure" is not just redundant, it is damaging. The problem with describing language behaviour as "creative", and meaning by that F-creative, is that it gets in the way of thinking about whether language behaviour might be E-creative.

People routinely agree, of course, in seeing the activity of literary composition as E-creative. But the creativity there is at a different level from what linguists are commonly concerned with, and linguistic theory has little to say about it. Many linguists might happily accept that a given English-language novel has assembled English prose in such a way as to express something about human feelings, human relationships, or other topics in a fashion unlike anything found in previous novels – the novelist has been genuinely E-creative. But generative linguists would nevertheless expect that each of the individual sentences in the novel, as specimens of English syntax, will be drawn from a fixed (though infinitely numerous) range of grammatical sentences defined by the novelist's linguistic competence – the novelist's syntactic behaviour will be only F-creative. Chomsky's *Syntactic Structures* began, after a brief introduction, by saying:

> I will consider a *language* to be a set (finite or infinite) of sentences, each finite in length and constructed out of a finite set of elements. All natural languages in their spoken or written form are languages in this sense ... The fundamental aim in the linguistic analysis of a language L is to separate the *grammatical* sequences which are the sentences of L from the *ungrammatical* sequences which are not sentences of L and to study the structure of the grammatical sequences.

This passage expresses very clearly the idea that human languages are *not* E-creative, though they are F-creative (the material omitted and indicated here by an elision mark includes a statement that a natural language has infinitely many sentences). If the syntax of a human language were E-creative, there could be no particular set of word-sequences which would count as the complete set of grammatical sentences of that language. Any attempt to identify such a set would quickly be refuted by the occurrence of sentences having novel structures. A "generative grammar" is a system of rules which generates "all and only" the grammatical sentences of a language, as an algebraic equation may generate the set of points comprising a circle or some other curve. It is central to the generative approach to syntax to hold that a person's linguistic competence defines a fixed class of grammatical sequences, implying that it is not E-creative. A person may produce utterances which fall outside that class, as "performance errors", and from time to time the grammar of a language alters – historical language-change occurs. But these are complicating factors overlaid on languages or idiolects which are basically F- but not E-creative.

In my experience as a teacher of linguistics during the 1970s–80s, quite a common reaction on the part of students or other newcomers to generative linguistics was to say something along the lines "It's too rigid – real-life usage is often more unpredictable and creative than that". And the standard response by an orthodox generative linguist would be along the lines "Well, you can't fault Chomskyan linguistics for failing to recognize the creative aspect of language behaviour – Chomsky is the very man who has drawn attention to the creativity of language use".

I doubt whether such a response ever fully satisfied the enquirer, but if the enquirer was an undergraduate he would probably reflect that he needed the teacher to award him marks towards a degree and accordingly would learn to stop pressing this objection. From our point of view, the two people are simply talking past one another. The objector is complaining that generative linguistics fails to recognize that language behaviour is E-creative, the orthodox respondent is explaining that Chomsky has emphasized that language behaviour is F-creative. But both use the word "creative", so neither appreciates that the objection has not been addressed.

This equivocal use of an ordinary English word has in practice done a great deal, I believe, to deflect criticism which might otherwise have made it very difficult for generative linguistics to win converts and achieve the standing it has enjoyed in recent decades. Because, if one explicitly asks "Are human languages syntactically E-creative?", it is hard to assert confidently that the answer is no.

Personally, I believe that the answer is yes. Anna Babarczy and I have pointed out (Sampson and Babarczy 2014) that the concept of "starred sentence" (or "ill-formed word-sequence") seems to have been alien to those who discussed grammar, even formally, before Chomsky. We argued, at length and by reference to concrete data, that the idea of separating the possible sequences over the vocabulary of a human language into a class of grammatical sentences and a complementary class of starred sentences does not make sense. Putting words together in novel syntactic structures, and making sense of novel structures that we hear or read, are normal parts of the activity of using a human language. Sometimes – often – we may say or write sentences which conform perfectly to grammatical patterns that could be abstracted from language examples we have encountered in the past, but those utterances have no special privileged status with respect to our linguistic competence. The more innovative examples are not to be classed as "performance errors".

Others have eloquently expressed essentially the same point of view. John Taylor (2012: 285) writes:

> speakers are by no means restricted by the generalizations that they (may) have made over the data. A robust finding from our investigation is that speakers are happy to go beyond the generalizations and the instances that they sanction. Speakers, in other words, are prone to *innovate* with respect to previous usage, using words in ways not already sanctioned by previous experience, extending the usage range of idioms and constructions ...

If someone believes that syntax in some human language truly is F- but not E-creative, he should presumably expect linguists to be able to make progress in developing a scientific theory of the syntax of that language. Such a theory would be what generative linguists call a "grammar" of the language, and in the early years of

generative linguistics they did indeed see defining the grammars of human languages as a plausible goal for the discipline, as suggested in the above quotation from *Syntactic Structures*. In the domain of scientific theorizing of course one does not expect to hit on the perfect, watertight theory immediately – a science proceeds by progressive refinement, whereby a theory that succeeds in accounting for much of the available data nevertheless has exceptions and in due course is replaced by a theory which improves on its predecessor in terms of data coverage, only eventually to be replaced in its turn. But in a successful science there is a sense of converging towards the truth, even if the truth is never perfectly attained.

Is this the pattern we find in the enterprise of developing generative grammars for English and other human languages? Notoriously, it is not. As David Graddol (2004) put it, "No one has ever successfully produced a comprehensive and accurate grammar of any language". It is not just that the grammars which have been produced are not perfectly watertight: there is little sense of convergence towards the ultimate goal. Indeed, after some years, generative linguists tacitly recognized this by abandoning the attempt to produce comprehensive grammars; the latest serious examples I know of were, for English, that of Stockwell et al. (1973), and for French that discussed by Gross (1979). More recent generative linguists have sometimes ceased even to pretend that the goal was realistic. Cedric Boeckx (2006: 217) writes: "The idea expressed in Chomsky (1957) that it is possible to bifurcate the set of sentences into the grammatical and ungrammatical and define theoretical adequacy on the basis of that distinction was quickly abandoned".

If one bears the distinction between E- and F-creativity in mind, the lesson one might draw from this experience is that human languages are indeed syntactically E-creative. Successive attempts to develop accurate generative grammars of a human language could not define increasingly close approximations to the set of all and only the grammatical sentences of the language, because there is no such set to be defined.

Perhaps surprisingly, that is not the lesson which most generative linguists seem to have drawn. Many of them continue to discuss formal grammar rules, but commonly they write papers arguing for or against particular rules which might be appropriate to define specific constructions or to account for specific sets of example sentences in a language. In other words, they debate the nature of fragments of an overall structure of grammar rules which many if not all of them now recognize can never exist. It would be for the generative linguists to say how this activity makes sense. If one believes in grammatical E-creativity, it smacks of the work of the Academy of Lagado.

One reasonable way in which someone might argue against grammatical E-creativity would be by suggesting that *nothing* in human life is genuinely E-creative: "E-creativity" is a hypothetical concept with no application to reality, and if we have no good scientific theories about the arts, that is only because they are too complicated

or we have not tried hard enough.

I am not sure how many people would find this point of view plausible, but Noam Chomsky seems to hold it. He has argued (1976: 24–5, 125) that the ranges of artistic styles, scientific hypotheses, and so forth available to humanity are rigidly limited – so limited that in some of these areas we may already have exhausted all the possibilities. For Chomsky, this idea links to his theories about the genetic determination of human cognitive systems. But even people who do not go along with those ideas might nevertheless argue that a human being is a material entity of finite complexity, so there must necessarily be *some* definable limits on the diversity of outputs that entity is potentially capable of producing.

This is an aprioristic, philosophical kind of objection to the concept of E-creativity, whereas most people who see domains such as the arts as E-creative do so because of the empirical fact that unexpected new things have continued to appear in these domains for centuries past and further innovations seem to keep on coming. To the aprioristic point, the best reply is that plenty of highly-regarded thinkers have argued philosophically in favour of the reality of E-creativity. According to W.W. Bartley (1978: 676):

> The chief ideas of Popper's philosophy all relate to the basic theme that something can come from nothing. Scientific theories introduce new forms into the universe and cannot be reduced to observations: there is no such thing as scientific induction. The future is not contained in the present or the past. There is indeterminism in physics; and there is indeterminism in history, *ipso facto*, and also because new scientific ideas affect history and thus the course of the physical universe. There is genuine emergence in biology. Value cannot be reduced to fact. Mind cannot be reduced to matter. Descriptive and argumentative levels of language cannot be reduced to expressive and signal levels. Consciousness is the spearhead of evolution, and the products of consciousness are not determined.

Popper saw not just the human mind but even Nature as E-creative ("genuine emergence in biology"), and the E-creativity of biological evolution was the main point of Henri Bergson's most widely-read work, *L'Evolution créatrice* (1907). Others again argue for E-creativity in domains not mentioned in the Bartley quotation. An area of human life where continuing original innovation is a matter of great practical significance is economics: I have pointed out (Sampson 2014) that rejecting the concept of E-creativity would contradict an assumption which is explicitly crucial to a central component of current economic theory.

Anyone is free to argue that the idea of E-creativity is untenable, but they cannot do so merely by saying, dismissively, that its untenability is self-evident: others see it as clearly applicable. And if the arts, economic life, and even biological evolution are E-

creative phenomena, why would one reject the idea that human syntactic behaviour is also E-creative?

Generative linguists do not explicitly reject that idea. They never consider it, because it is concealed from them by the concept of F-creativity.

My aim in this article has not been to establish convincingly that grammar is indeed E-creative. That would be too large an enterprise to undertake in a few pages. My aim, rather, has been to make the point that E-creativity and F-creativity are two different ideas, and that linguists' use of "creative" to mean F-creative has functioned so as to eliminate from consideration the question whether human language might be E-creative. If readers allow themselves to face that question explicitly, I believe many of them may find themselves inclined to share my answer to it.

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