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Rigid strings and flaky snowflakes

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Christina Behme, *Evaluating Cartesian Linguistics: from historical antecedents to computational modeling* (Potsdam Linguistic Investigations, vol. 12). Frankfurt am Main: Peter Lang, 2014.

1. A philosopher contemplates Chomsky

Christina Behme, although now living in Canada, was born and educated in the former East Germany, where compulsory classes in dialectical materialism perhaps immunized her against accepting spurious intellectual authority just because those around her defer to it. A philosopher with particular interest in language, CB (as I shall refer to her) in this book takes apart the "Chomsky phenomenon" from a philosophical point of view.[1]

CB's initial concern, as her title indicates, is Chomsky's claim (in *Cartesian Linguistics*, Chomsky, 1966, and elsewhere) to be using the data of linguistics to revive Descartes' rationalist account of human cognition, long out of favour in the English-speaking world. CB tells us that Chomsky has got Descartes wrong in a number of ways, and that *Cartesian Linguistics* is mistaken in treating Descartes as the intellectual forerunner of the "Port-Royal" group of philosophers of language. She even (p. 211) quotes a remark about language by David Hume (standardly seen as well to the empiricist end of the empiricism v. rationalism spectrum) which sounds much more "Chomskyan" than anything written by Descartes – who, as Chomsky recognized, was not very interested in language.

If that were all that CB's book were about, it might not seem too relevant to many linguists' interests. After all, *Cartesian Linguistics* was demolished long ago by the linguist Hans Aarsleff (1970), and anyway that book stands somewhat apart from the main body of Chomsky's writings. Getting Descartes right is not a priority for most linguists. But CB's critique of Chomsky as a Cartesian leads her on to examine the intellectual soundness of Chomsky's academic oeuvre as a whole, and in consequence the bulk of

[1] I am grateful to Gerald Gazdar for comments on a draft of this paper. I take full responsibility for any flaws it may contain. Address for correspondence: tsampsgr@unisa.ac.za.

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the book has very significant implications for almost any linguist. Chomsky, after all, has long been seen, and still is seen by many, as someone who has "revolutionized the scientific study of language" and has "spoken with unrivalled authority on all aspects of grammatical theory" (Lyons, 1991, p. 9) – as well as, more generally and grandly, someone "who will be for future generations what Galileo, Descartes, Newton, Mozart, or Picasso have been for ours" (Barsky, 1997, p. 3). So if, as CB tells us (p. 214), Chomsky's work has "resulted in a huge amount of very technical literature but not necessarily in a better understanding of grammar", and his "promise to provide mathematically precise descriptions of linguistic phenomena has never been fulfilled", then most linguists will surely need to take a view on that for themselves.

2. Lang falls short

This review article will be broadly positive about CB's book, but I should begin by saying that in some respects she has not been well served by her publisher. The book contains many misprints, not all of which are obvious and easily corrected, and there are a number of cases where publications cited by author and date in the body of the book are not listed among the detailed references at the back. Very unusually for an English-language monograph, there is no index; and, although CB supports her arguments by citing specific points drawn from hundreds of published sources, which are often long books, other than in the cases of Chomsky's and Descartes' writings hardly any page references are given. Both of these latter issues make it difficult for readers to check the context of quotations and assess CB's arguments for themselves. (Probably the author should take much of the blame for the lack of page references, but some publishers would have saved the author from herself by insisting on fuller citations.)

Furthermore, CB always quotes Descartes in an English translation. In philosophical writing, small wording details are often crucial. Even if CB wanted to be kind to victims of current schooling standards by quoting Descartes in English, it would have been better to include page references to the standard Adam and Tannery edition of Descartes' own prose.

These points are certainly regrettable, but they are not fatal flaws. The book is well worth reading despite these drawbacks.

3. Chomsky's ideas

Chomsky's writings on language are very numerous, and, to many readers, often rather confusing. In order to understand the task that CB has set herself, we need to begin by asking what the intellectual contributions are which have led Chomsky to be seen as the pre-eminent master of linguistics.

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There are four main ideas, which came to the fore roughly in the following order (though they are heavily interrelated, and I lay no great stress on the issue of chronological sequence):

A: The "Chomsky hierarchy". Formal languages, as classes of well-formed strings, are definable by formal grammars of various categories, and a number of the grammar categories are related to one another hierarchically: e.g., the class of languages definable by "context-free phrase-structure grammars" is a proper subset of the class definable by "context-sensitive phrase-structure grammars". So it seems to be a meaningful and perhaps interesting question where on this hierarchy the grammars of human languages lie.

B: Transformational grammar. Contrary to what appeared to be assumed by many linguists who approached the subject before Chomsky, adequate grammars of human languages need to contain, in addition to structure-defining "phrase-structure rules", also structure-changing rules which Chomsky called "transformations". Within academic linguistics, at least during the early decades of Chomsky's fame, *B* was the aspect of his thought that was seen as central, so that for instance undergraduate courses tended to focus on it. (Not having been a teacher of linguistics for twenty-five years myself, I am not too sure what undergraduates are taught about Chomsky today.)

C: Language universals and innate ideas. All human languages, Chomsky claimed, share many deep structural properties which are contingent (one can easily imagine language-like systems which have different properties, but no human groups use such languages). The respects in which human languages differ from one another are so trivial, relative to the linguistic universals, that a Martian visiting Earth would see the human race as all speaking a single language, though with minor dialect differences (e.g., Chomsky, 1991, p. 26; 2009b). Furthermore, the evidence available to an individual child about his elders' language typically lacks data allowing these structural universals to be inferred from observation (the "stimulus" is "impoverished"); the fact that children do all grow up as competent speakers can only be explained by postulating that our genetic inheritance includes a detailed blueprint for human language structure, just as it includes detailed information controlling the development of our complex human anatomy.

For Chomsky, language is in this way a particularly clear case of a more general thesis, that human cognition is largely determined by innate structuring, which controls and limits the range of ideas, theories, or even artistic styles which Mankind can create, just as genetics uncontroversially controls our anatomical development (e.g., Chomsky, 1976, pp. 9–11, 24–26, 124–125; 2009a, pp. 184–185).

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Even if I were placed in a precipitous mountain environment where the ability to fly would greatly improve my survival chances, I could not grow a pair of wings, because my genetics does not allow for that possibility. Likewise, if the correct scientific theory of some phenomenon happens not to be a theory allowed by our cognitive genetics, then we will never be able to understand that phenomenon. It is this thesis which Chomsky links to Descartes' theory of innate ideas, the route via which CB approaches Chomsky's oeuvre.

Aspect *C* of Chomsky's thought has had immense impact on the intellectual world far beyond the discipline of linguistics. Chomsky is asserting that the cognitive life of human beings, which many of us see as the core of our selves, is controlled in a way fundamentally different from what thinkers at least in the English-speaking world have traditionally supposed. Any reflective person who believes that Chomsky has good reason to make this assertion is likely to find it intensely significant.

D: The snowflake analogy. In recent years Chomsky has argued that the main structural features of human languages are not only common to all languages but are a matter of "(virtual) conceptual necessity" (see, e.g., Chomsky, 2005, p. 10, or references in Postal, 2003). An analogy he has taken to using is that "Language is something like a snowflake, assuming its particular form by virtue of laws of nature … once the basic mode of construction is available" (in Berwick & Chomsky, 2011; cf. Chomsky, 2007, p. 20). Individual snowflakes are actually very diverse in their detailed shapes, but at a gross level they all share a common pattern, hexagonal and symmetrical; and they share this pattern not, obviously, because they contain complex chromosome-like machinery which includes something like a hexagonal blueprint, but because from the physical chemistry of water molecules and the laws of physics it follows necessarily that ice crystals will grow that way. Chomsky's suggestion is that, likewise, if we understood clearly the constraints (notably, "principles of computational efficiency") which any language has to resolve, we would see that the panoply of structural linguistic universals, which seem *prima facie* so contingent and surprising, in reality just have to be that way.

4. The ideas assessed

These are the ideas about language which have made Chomsky famous; how solid are they? Let me take them one by one.

A. I know that the existence of a hierarchy of formal grammar- and language-types, classically set out in Hopcroft and Ullman (1969), is soundly established mathematically, and that this hierarchy has had considerable significance for the field of computer science, in connexion with compiler design.

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But I do not know that it ought to be called the "Chomsky hierarchy". The main reason for that name is probably that the hierarchy was drawn to the attention of non-technical readers through Chomsky's *Syntactic Structures* (1957). That book, though, discussed the hierarchy only sketchily and informally, referring for fuller information to a manuscript by Chomsky, *The Logical Structure of Linguistic Theory*, which was not published until 1975.[2] Chomsky (1975) is a long book full of algebraic notation which may look impressive to the mathematically naïve, but which when carefully examined turns out to be mathematically semi-literate, containing various expressions which are meaningless, or say something other than what the author evidently wants to say, or at best choose a gratuitously obscure way of saying something which a competent mathematician would express straightforwardly (Sampson [1979] 2001, pp. 153–156). It is very hard to see how the same individual could have been responsible for the sound maths of the "Chomsky hierarchy" and the lamentable maths of *The Logical Structure of Linguistic Theory*.

In his early career Chomsky collaborated with Marcel-Paul Schützenberger (see, e.g., the opening line of Schützenberger, 1963; Chomsky & Schützenberger, 1967). Schützenberger was a distinguished pure mathematician, and although based in Paris was affiliated during part of that time with the IBM research centre in New York State, where compiler design was an important topic. Neither Chomsky nor Schützenberger, so far as I know, have ever specified the division of labour in their collaboration, but the best guess must be that Schützenberger was responsible for the maths of the "Chomsky hierarchy", so-called, and Chomsky was responsible for drawing links between the abstract hierarchy and human language. Chomsky (1959) cited unpublished work by Schützenberger. By the time of Chomsky (1963), which unlike *Syntactic Structures* did spell out the mathematics of the hierarchy, almost every theorem was explicitly attributed to publications by Schützenberger or other writers.[3]

But if Chomsky's contribution was to relate the categories of the abstract formal-language hierarchy to aspects of human language (an issue of no

[2] On the un-rigorous nature of *Syntactic Structures* see Pullum (2011).

[3] Incidentally, Schützenberger's influence on Chomsky seems to have extended beyond providing a mathematical framework for discussing formal grammar. Readers of Chomsky have often been puzzled by passages in which he dismisses Darwinian evolution as a serious biological theory, without ever – so far as I have seen – explaining clearly what he sees as wrong with Darwinism. Schützenberger, on the other hand, has presented objections to Darwinism (e.g., Schützenberger, 1996), which, whether ultimately convincing or not, are explicit and well argued. Chomsky's obscure objections seem to chime with Schützenberger's clear ones, so I take it that the former are echoes of the latter.

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mathematical or computer-science interest), that was the least valuable aspect of the collaboration. No-one before Chomsky suggested that human languages can usefully be treated as formal languages, i.e., fixed sets of sentences, and indeed they cannot be: the concept of a "starred sentence" or "ill-formed string", which is indispensable in formal language theory, is more or less alien to human languages. There is no particular rigid class of strings of English words which comprises "all and only" the well-formed sentences of English, because putting words together in new patterns is a normal part of the activity of speaking or writing English (Sampson & Babarczy, 2014). As John Taylor (2012, p. 285) has put it:

> 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 sanctioned by previous experience …

Already before the end of the 1960s, Hopcroft and Ullman (1969, p. 8) noted that hopes of linking human languages to the formal-language hierarchy had not borne fruit. What was valuable under heading *A* may not have had much to do with Chomsky, and what Chomsky does seem to have been responsible for is a seriously misleading model of human language. Even loyal generative linguists no longer seem to believe that they might one day be able to construct grammars which succeed in defining "all and only" the sentences of some language.

B. There are two main problems about "transformational grammar". First, whereas the point of the "Chomsky hierarchy" was to define classes of language which are proper subsets of more inclusive classes (e.g., some languages can be defined by context-free grammars, but many cannot be), such exploration as there has been of the generative power of transformational grammar suggests that it is capable of defining ANY definable language, in other words it fails to make a falsifiable claim. Second, much of the persuasive force of Chomsky's *Syntactic Structures* stemmed from the fact that his "Affix Hopping" rule (there called "Auxiliary Transformation", Chomsky, 1957, p. 113, but "Affix Hopping" became the usual term) seemed very successful in reducing an apparently messy aspect of English syntax to neat simplicity, as scientific laws should do. But the concept "transformational rule" was defined too informally in *Syntactic Structures* to enable readers to check that Affix Hopping was the kind of rule allowed by Chomsky's theory of transformational grammar. Later, when a more explicit formalization of that theory was published, it turned out that Affix Hopping was NOT a valid transformation (Sampson [1979] 2001,

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pp. 152–153). In other words, what linguistics departments internationally had been teaching as one of the best arguments for Chomsky's theory was in reality a standing refutation of the theory.

It is true, of course, that respectable areas of science have often begun as ideas which were intuitively appealing but vague, and were only later sharpened up into substantial, consistent, and falsifiable theories. But it would be very hard to defend Chomsky's grammatical research programme in that way. Its high point of apparent non-vagueness probably came with the technical-looking "X-bar theory" of the 1970s–1980s; Kornai and Pullum (1990) showed how empty that theory was in reality. I am not aware that anyone since has even purported to develop a more contentful descendant of transformational grammar.

C. To most of us who are reasonably familiar with a few of the world's many languages, the idea that they are all so similar that anyone could think of them as essentially the same language seems bizarre; on the contrary, they feel exceedingly diverse. (Admittedly I claim no insight into what our world might look like through Martian eyes.) Point *C* depends very much on identifying some explicit list of properties which are universally shared and yet non-trivial (in the sense that there is no logical reason why any system usable as a language would necessarily have to be that way). Chomsky and some of his followers have made large claims about the size of this list, for instance Neil Smith (1999, p. 42) wrote that "A glance at any textbook shows that half a century of research in generative syntax has uncovered innumerable such examples". But if one presses for specifics, it is not easy to pin them down. Evans and Levinson (2009) have compared this aspect of the linguistics literature with the facts of human languages, and they conclude that "there are vanishingly few universals of language … diversity can be found at almost every level of linguistic organization".

One might naturally expect that a linguist for whom the idea of languages sharing universal properties was important would frequently refer in his writings to features of different languages. Non-Chomskyans who write about general linguistics commonly do stud their writings with examples cited from languages other than English, whether because they make particularly clear illustrations of some general point or because they seem *prima facie* to contradict some general statement and hence require explanation. There are strikingly few examples in Chomsky's writings taken from languages other than English.[4] Presumably it is easier to believe in the similarity of all languages if you only ever consider one of them.

[4] In the area of grammar rather than phonology, the only exceptions I can think of are a one-word German example, and an example quoted from a French grammarian, in Chomsky (1965, pp. 170–174 and 233–234 n. 35).

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What is true is that in recent centuries many languages have been remoulded to make them structurally more equivalent to the languages of European civilization. This has led to a situation in which, if one is familiar only with major present-day "standard languages", one might well get the impression that all human languages are just alternative means of clothing the same range of thoughts in speech-sound. But that has nothing to do with genetics. It is a consequence of the cultural dominance of the West in this period. A human group which aspired to the status of independent nationhood would simply not be taken seriously in the twenty-first century if it were not capable of rendering complex official documentation such as the United Nations Charter into its own language, and since languages are very adaptable things, non-European languages have often been structurally Europeanized. But if one turns to colloquial non-European languages spoken far from centres of power (e.g., Gil, 2001), or languages of influential non-European societies before the period of Western dominance (e.g., Sampson & Babarczy, 2014, pp. 13–19), in some cases they are very different from European languages in terms of the logic of the thoughts they encode. (See also Calvet, 1998, p. 106; Deutscher, 2000.) We cannot conclude, because in the last hundred or two hundred years many people all over the world have learned to become rather like us, that being like us is the only pattern biologically available to humanity. (Cf. Henrich, Heine, & Norenzayan, 2010; Sampson & Babarczy, 2014, pp. 296–319.)

As for "poverty of the stimulus": what exactly are the features of language which everyone gets right although most people hear no relevant evidence while learning to speak their mother tongue? Almost all the repeated discussions of this idea, by Chomsky and by his followers over decades, have focused on the same single example, which relates to the English rule for question-formation. Chomsky (e.g., 1976, pp. 30–33) offers two alternative hypotheses which a child might entertain about the nature of this rule, and he says that if the choice between them were to be determined by experience, the child would need to hear a specific, rather complex kind of question. This specific question-type, Chomsky believes, is so rare that in practice few children will ever hear an instance. But children all do acquire the correct rule, so the choice must have been determined by innate linguistic knowledge.

The statement about rarity is a factual claim, but Chomsky has never cited evidence. He just said things like "you can go over a vast amount of data of experience without ever finding such a case" (Piattelli-Palmarini, 1980, p. 115); "It is quite possible for a person to go through life without having heard any relevant examples that would choose between the two principles" (Chomsky, 1972, p. 30); the belief that each child hears relevant evidence "strains credulity" (Chomsky, 1976, p. 213). To be fair, when Chomsky made those statements it was not very easy to check what range of grammatical structures occur in casual chat such as young children are exposed to (which

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would have made some of us cautious about venturing any frequency predictions). But we have good data sources nowadays. Using such a source, I calculated (Sampson, 2002; 2005, pp. 79–81) that a child in an English-speaking environment could expect to hear the allegedly rare question-type not just once in a lifetime, but AT LEAST once every ten days or so on average – quite possibly much more often. The "stimulus" for language-acquisition is not impoverished, it is very rich.

D. The first thing to say about *D* is that, if the snowflake analogy is right, it thoroughly undercuts *C*. If complex properties of some aspect of human behaviour have to be as they are as a matter of conceptual necessity, then there is no reason to postulate complex genetically inherited cognitive machinery determining those behaviour patterns. Even if human groups everywhere are wont to say that three plus four is seven (in whatever words they use for counting), we are not tempted to search for a specific 3 + 4 = 7 gene in the nucleotide sequences of the human genome. In other words, if his recent snowflake idea were correct, Chomsky would be refuting everything in his earlier writing that led him to be seen as a serious thinker beyond the narrow discipline of linguistics. Even some generative linguists (e.g., Culicover, 1999, p. 138) have noticed this odd development.

But anyway, what is snowflake-like about real-life human languages? In some Australian languages, a speaker has to use an entirely separate vocabulary, not one-to-one equivalent to his usual vocabulary, when in the presence of his mother-in-law. In Biblical Hebrew, prefixing the word for "and" to a verb in either of the two "tenses" changes its meaning to the other tense, so "and + I went" means "and I shall go", and *vice versa*.[5] In Classical Chinese, active verbs need not have subjects (not even "understood subjects"). How do things like these square with "(virtual) conceptual necessity"? They don't.[6]

Perhaps the kindest thing one can say about *D* is that, when Chomsky began writing about snowflakes, he was already an old man. Every such passage I have seen has been extremely vague, and if they say anything specific it seems quite wrong.

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[5] OK, this is a conventional oversimplification (see, e.g., contributions by Robert Longacre and by Alviero Niccacci to Bergen, 1994), but the full truth is no more snowflake-like than this.

[6] Tree structure is important for the syntax of (probably) every human language, and I have explained elsewhere (Sampson, 1980, pp. 133–165; 2005, pp. 137–166) that this is a natural consequence of the very general fact that languages are gradually evolved cultural institutions. So one might perhaps see the centrality of tree structure in syntax as analogous to the hexagonality of snowflakes. But to say that a particular language has a syntax based on tree structures is to say very little. The rest of what there is to say about that language is not some minor details akin to dialectal idiosyncrasies: it is virtually everything that makes the language what it is.

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Chomsky is of course known not just for his theories about language and cognition but well-known also, perhaps better known, for his comments on current affairs. Chomsky's activities as a citizen may be logically independent of his linguistics, but as subsidiary indications of the quality of the man's mind we are entitled to take into account things like: his intemperate political positions, which according to W. D. Rubinstein (1981) and Werner Cohn (1988) have repeatedly included support for neo-Nazi groups; the eccentric way in which he responded to an invitation from the then editor of *Language* with a tirade denouncing that august and blameless journal for its "scandalous … lies" (Hill, 2007, p. 636); or the fact that while levelling broadside after broadside against American capitalism as supremely evil, Chomsky himself uses tax-avoidance devices, five-figure speaking fees, and the like to ensure that a generous share of the good things which American society offers to its wealthy men comes the Chomsky family's way (Schweizer, 2005, pp. 16–38).[7]

Does the material in this section add up to the profile of an intellectual giant? Clearly not. It is the profile of a clown.

But the bigger clowns, perhaps, are the members of the linguistics profession who allowed Chomsky to lead them by the nose for decades. I include myself here: as an undergraduate I had the good fortune to be taught by a group of eminent and deeply serious scholars of sinology, and for years after graduation it was just unimaginable to me that an academic with an international reputation in any subject, affiliated to a world-class institution, might have as little real achievement to his name as we have seen here. I took Chomsky at his own valuation. (In my case the light did eventually dawn; and in my defence, much less evidence was available than later emerged. It was ten years after I graduated, for instance, when *The Logical Structure of Linguistic Theory* was published and proved to be by no means the calibre of work which I and, I believe, many others had imagined it to be.)

5. Chomsky and Galileo

All four aspects of Chomsky's work described above are covered in CB's book, but, naturally for a young scholar, she devotes more attention to the later aspects of Chomsky's work (*C* and *D*) than to earlier aspects. She puts special effort into criticizing Chomsky's appeals to the "Galilean style" in science. As evidence against his account of human language has piled up, Chomsky has recently (e.g., 2002, pp. 98–102) taken to defending his approach by referring to a highly controversial historical analysis by Paul Feyerabend (1975) of

[7] For links to numerous severe online critiques of Chomsky's role as commentator on public affairs, see Paul Bogdanor's webpage "The Chomsky Hoax" <www.paulbogdanor.com/chomskyhoax.html> (last accessed 14 February 2015).

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Galileo's astronomical thinking. According to Feyerabend's account (which Chomsky evidently takes as gospel), at the time when Galileo adopted the theory that the Earth goes round the Sun, the objective evidence available to him actually pointed the other way, in favour of the traditional idea that the Earth is the still centre. Galileo opted for the heliocentric theory against the evidence, because he "just knew" (my paraphrase) that it was right; and we can see (Feyerabend said) that it was good that he did so – that is how science advanced. The moral Feyerabend drew is that we should encourage an "anything goes" approach to science, and Chomsky appeals to this in dismissing the weight of linguistic counter-evidence because, in effect, he "just knows" that his ideas are correct. As Chomsky puts it, "it is the abstract systems that you are constructing that are really the truth; the array of phenomena is some distortion of the truth". Some of Chomsky's followers have been taking this entirely seriously, for instance Robert Fiengo (2006, p. 471) asks "Why should we expect Chomsky to follow normal scientific practice …?"

If generally accepted, Feyerabend's prescription would spell the end of any ambition by society to increase the total of human knowledge. The elderly lady down the street, who is convinced that her neighbour is poisoning her by directing death rays at her teapot, would merit a Nobel Prize as much as an Einstein would. But, in the first place, there has been a chorus of replies to Feyerabend arguing that his account of Galileo's intellectual biography is quite wrong, and that in reality Galileo acted as a rational scientist is supposed to act. Feyerabend himself discussed Machamer (1973); CB discusses Fischer (1992). More important, even if Feyerabend were correct about Galileo, all that would mean is that Galileo was luckier than he deserved: he irrationally opted for an implausible theory that turned out to be right after all. Feyerabend wrote (1975, pp. 155–156) "it is advisable to let one's inclinations go against reason *in any circumstances*, for science may profit from it", but that is a glaring *non sequitur*: science may equally (indeed more probably) be set back by it. Galileo might have "just known" something which turned out against the odds to be true, but Chomsky certainly "just knows" many things about language which, when checkable, are wildly mistaken (the case of English complex questions was but one example).

6. Social factors

Whether Chomsky is right about the nature of human language and cognition is an easy question: he isn't. More interesting, to my mind, is the question how it could have come about that someone acquired such a towering reputation on such a flimsy basis.

To this there are many answers. Chomsky's name first became widely known when he was a leader of public opposition to the American war in

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Vietnam, at a time when reluctance to be called up to fight in that war was a chief concern of male student-age Americans. I was a graduate student in the USA myself at the time (though, as a foreigner, not subject to call-up), and it was noticeable how people's thinking slid in a quite natural way from "This man is telling the world why I shouldn't have to do what I very much don't want to do" to "This man's ideas must be good stuff". (Incidentally, on the unwisdom of US involvement in Vietnam I agreed with Chomsky. No-one manages to be wrong about absolutely everything.)

Then in due course Chomsky became an intellectual standard-bearer for the American Left in general, which meant that for a lot of people on that side of politics, even though they themselves had no special interest or competence in linguistics, it was necessary to maintain that Chomsky's professional academic work was outstandingly great, because this validated his status as a political commentator.

The fact that *The Logical Structure of Linguistic Theory* appeared in print very late, eighteen years after *Syntactic Structures*, helped Chomsky's cause. Many people who read *Syntactic Structures* and were impressed could see that it was sketchy, but any doubts this might have raised in their mind were assuaged by the knowledge that the big book existed in the background. If *Logical Structure* had already been available, some of those impressed by *Syntactic Structures* would have turned to *Logical Structure* for fuller detail, would have discovered its shortcomings, and news would have got around. As it was, by the time *Logical Structure* came out in 1975, the world had moved on and was no longer very interested in the body of ideas I labelled *A*; the focus had shifted to *B* and *C*. My impression is that very few people, even among the generative linguistics community, have actually read *The Logical Structure of Linguistic Theory*.

The huge expansion of higher education is relevant. Teaching in the better British universities in the 1960s was based largely on one-to-one discussion between undergraduate and teacher, which encouraged questioning and criticism of received ideas. Nowadays, staff–student ratios have changed to the point that teachers rarely meet individual students, and students' work is largely a matter of demonstrating that they know "what it says in the book". That has clearly made it easier for weak ideas to remain safe from being replaced by new and better ideas.

And another aspect of the changing nature of the academic profession has had large consequences for linguistics. Fifty years ago, there were no material pressures giving teachers of humanities subjects a motive to embrace any particular body of ideas, and the concept of competing to win research funding was more or less unknown. People in the "hard sciences" needed money for research, but arts dons needed little more than time to write, access to libraries, and salaries (which were guaranteed until retirement).

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If anything, arts academics derived more kudos from exploding an established body of thought than by accepting and developing it. Nowadays, obviously, things are very different. In Britain the change was formalized by the 1985 Jarratt Report, which laid down as an explicit principle that an academic's duty is to the welfare of his employing institution, rather than to the welfare of his discipline – an idea which twenty years earlier would have seemed not just novel but disgraceful. I am not aware that the USA had a Jarratt equivalent, but the general working style which Jarratt promoted in Britain already seemed normal in the USA. Under the new dispensation, university finances depend heavily on the quantity of research funding attracted from outside sponsors; discipline competes with discipline, and research group with research group within a discipline, to win shares of the limited funds available. Because this began around the time when Chomskyan linguistics had become fashionable, many research groups acquired a strong motive for resisting any ideas that threatened to undercut it: if grant referees came to believe those ideas, the groups' future funding would be at risk.

Chomskyan linguistics, with its doctrine that there exists a complex range of universals and correspondingly complex innate cognitive machinery geared specifically to the task of language acquisition, creates a domain in which it is easy to carve out topics that research assistants can be paid to explore (thus generating the "huge amount of very technical literature" to which CB refers). If Chomsky is wrong, and human languages are just different from one another, with individual children acquiring their elders' language using the same general learning techniques with which we learn whatever else life happens to throw at us, then there is much less scope to devise technical linguistic research proposals. The outside world might be neutral between these alternative models of cognition, but university managers will certainly not be. These days, an academic who fails to produce research proposals knows full well that this will be directly reflected in his promotion prospects.

The consequence of these new pressures for academia in general has been expressed bluntly by Noel Annan (Lord Annan, Vice-Chancellor of London University until 1981): "The dons had become liars" (Annan, 1999, p. 294). Paul Postal has written (2014, note 2) about how, when he has drawn public attention to examples of grievously low scholarly standards in Chomsky's writing, he has sometimes been chidden by colleagues as if the ethical failure were his own rather than Chomsky's. Once or twice I have had similar experiences. The subtext seems to be "Don't rock the boat, or there will be less money for linguistics"; the version of linguistics which has become established simply cannot be allowed to be wrong. If so, at least to a scholar of my generation that is profoundly shocking. True, we have no analogue of the Hippocratic Oath, but surely professional academics are expected to recognize truth as a higher value than money – or what is the good of us?

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Finally, it is not an original observation that nowadays we inhabit a celebrity culture. People become "famous for being famous". One of Chomsky's most loyal acolytes, Neil Smith, has actually written that "Most people *need* heroes … I am happy to admit that Chomsky is a hero for me" (Smith, 1999, p. 5). One might have thought that the academic profession is supposed to train people to see past the hype and the stardust in order soberly to evaluate the realities behind them; but academics are not insulated from trends in the wider societies they inhabit, and in a media-obsessed age it is quite possible for a giant reputation to rest on very little.

7. Taking the unserious seriously

These issues about the sociology of knowledge are not what interest CB, however. She prefers painstakingly to analyse Chomsky's pronouncements about language and cognition, and to show that one after another of them is intellectually indefensible. Indeed, she even shows that on occasion Chomsky explicitly contradicts himself. For instance, he has taken to defending himself against those who disagree with his idea that detailed language structure is innate by making assertions such as (2000, p. 66) "it is not clear what thesis is being proposed by [those] who reject what they call 'the innateness hypothesis' … I have never defended it and have no idea what it is supposed to be." (CB's p. 87 gives several similar quotations.) Yet he has also written (1976, p. 13) "Every 'theory of learning' that is worth considering incorporates an innateness hypothesis" (again CB quotes a range of similar remarks); and we are not dealing here with mere forgetfulness, or a change of mind over twenty-four years, because two pages earlier in the 2000 book just quoted Chomsky has associated himself with the idea that "properties of language and … aspects of the acquisition and use of language can be explained in terms of … assumptions about the innate structure of the language faculty". Even a Feyerabendian, I take it, would not see asserting contradictory statements as a worthwhile scientific move – or does "anything goes" go as far as that?

What motivated CB in writing her book, it seems, was the concern that if other disciplines take the measure of this scholar who is being put forward by linguists as their intellectual champion, the result may be that the discipline as a whole finds itself rejected as unserious. That perhaps understates the danger. Chomsky, after all, is not just the best-known linguist; it is common nowadays to see him described in terms such as "one of the greatest minds of the 20th Century" (in any discipline), or "arguably the most important intellectual alive".[8] If taxpayers come to understand what it takes nowadays

[8] Quoted from the *New Yorker* and the *New York Times* respectively by Kennard (2013).

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to earn accolades like that, they might well wonder whether they can afford to maintain universities, or at least their arts faculties, at all.

CB is certainly one of the good guys, and for someone interested in investigating Chomsky's thinking in detail she does an admirable job of assembling many of the issues, with crucial quotations, between two covers. At times it is noticeable that CB's expertise lies in philosophy rather than linguistics, but this proves to be only a minor hindrance – we have seen that Chomsky's writing does not rely on detailed familiarity with language data.

Nevertheless, I wonder whether CB's book will succeed in changing linguists' minds, as she clearly hopes. I do not disagree with the individual points she makes, or very few of them, but it seems to me that by taking Chomsky's writings seriously, and subjecting them at length and in a deadpan manner to close textual analysis, in practice she might just be helping to validate them. We can be sure that Chomsky or some of his supporters will produce a fog of logic-chopping replies to CB's criticisms. The average reader who lacks time or patience to follow and weigh up the arguments and counter-arguments clause by clause is likely to think "More long books about this man Chomsky – by Jove, what a mind he must have."

Chomsky has been adequately refuted before, for readers willing to entertain the possibility of his being wrong. The time for that may be past. What we do with clowns is simply laugh at them.

REFERENCES

Aarsleff, Hans (1970). The history of linguistics and Professor Chomsky. *Language*, **46**, 570–585.

Annan, Noel (1999). *The dons: mentors, eccentrics and geniuses*. London: HarperCollins.

Barsky, Robert F. (1997). *Noam Chomsky: a life of dissent*. London: MIT Press.

Bergen, Robert D. (Ed.) (1994). *Biblical Hebrew and discourse linguistics*. Dallas, TX: Summer Institute of Linguistics.

Berwick, Robert C., & Chomsky, Noam (2011). The biolinguistic program: the current state of its development. In Anna Maria di Sciullo & Cedric Boeckx (Eds.), *The biolinguistic enterprise* (pp. 19–41). Oxford: Oxford University Press. [My quotation is taken from an online prepublication version of the chapter.]

Calvet, Louis-Jean (1998). *Language wars and linguistic politics*. Oxford: Oxford University Press.

Chomsky, Noam (1957). *Syntactic structures*. The Hague: Mouton.

Chomsky, Noam (1959). On certain formal properties of grammars. *Information and Control*, 1, 91–112. Reprinted in Luce et al. (1965), vol. **2**, pp. 125–155.

Chomsky, Noam (1963). Formal properties of grammars. In R. Duncan Luce, Robert R. Bush, & Eugene Galanter (Eds.), *Handbook of mathematical psychology*, vol. **2** (pp. 323–418). New York: Wiley.

Chomsky, Noam (1965). *Aspects of the theory of syntax*. Cambridge, MA: MIT Press.

Chomsky, Noam (1966). *Cartesian linguistics: a chapter in the history of rationalist thought*. New York: Harper & Row.

Chomsky, Noam (1972). *Problems of knowledge and freedom*. London: Fontana.

Chomsky, Noam (1975). *The logical structure of linguistic theory*. New York: Plenum Press.

Chomsky, Noam (1976). *Reflections on language*. London: Temple Smith.

https://doi.org/10.1017/langcog.2015.10 Published online by Cambridge University Press

Chomsky, Noam (1991). Linguistics and cognitive science: problems and mysteries. In Asa Kasher (Ed.), *The Chomskyan turn* (pp. 26–53). Oxford: Blackwell.
Chomsky, Noam (2000). *New horizons in the study of language and mind*. Cambridge: Cambridge University Press.
Chomsky, Noam (2002). *On nature and language*. Cambridge: Cambridge University Press.
Chomsky, Noam (2005). Three factors in language design. *Linguistic Inquiry*, **36**, 1–22.
Chomsky, Noam (2007). Of minds and language. *Biolinguistics*, **1**, 9–27.
Chomsky, Noam (2009a). The mysteries of Nature: how deeply hidden? *Journal of Philosophy*, **106**, 167–200.
Chomsky, Noam (2009b). Noam Chomsky on language's great mysteries. Interview on video at <bigthink.com/videos/noam-chomsky-on-languages-great-mysteries> (recorded 18 August 2009, last accessed 17 February 2015).
Chomsky, Noam, & Schützenberger, Marcel-Paul (1967). The algebraic theory of context-free languages. In P. Braffort & D. Hirschberg (Eds.), *Computer programming and formal systems* (pp. 118–161). Amsterdam: North-Holland.
Cohn, Werner (1988). *The hidden alliances of Noam Chomsky*. New York: Americans for a Safe Israel.
Culicover, Peter W. (1999). Minimalist architectures. *Journal of Linguistics*, **35**, 137–150.
Deutscher, Guy (2000). *Syntactic change in Akkadian: the evolution of sentential complementation*. Oxford: Oxford University Press.
Evans, Nicholas, & Levinson, Stephen C. (2009). The myth of language universals: language diversity and its importance for cognitive science. *Behavioral and Brain Sciences*, **32**, 429–448.
Feyerabend, Paul (1975). *Against method: outline of an anarchistic theory of knowledge*. London: Verso.
Fiengo, Robert (2006). Review of Seuren, *Chomsky's Minimalism*. *Mind*, **115**, 469–472.
Fischer, Klaus (1992). Die Wissenschaftstheorie Galileis – oder: Contra Feyerabend. *Zeitschrift für allgemeine Wissenschaftstheorie*, **23**, 165–197.
Gil, David (2001). Escaping Eurocentrism: fieldwork as a process of unlearning. In Paul Newman & Martha Ratliff (Eds.), *Linguistic fieldwork* (pp. 102–132). Cambridge: Cambridge University Press.
Henrich, Joseph, Heine, Steven J., & Norenzayan, Ara (2010). The weirdest people in the world? *Behavioral and Brain Sciences*, **33**, 61–83.
Hill, Jane (2007). Obituary: William Oliver Bright. *Language*, **83**, 628–641.
Hopcroft, John E., & Ullman, Jeffrey D. (1969). *Formal languages and their relation to automata*. Reading, MA: Addison-Wesley.
Kennard, Matt (2013). BB interviews … Noam Chomsky. *Beyond BRICS* 15 February 2013, online: <blogs.ft.com/beyond-brics/2013/02/15/bb-interviews-noam-chomsky/> (last accessed 24 February 2015).
Kornai, András, & Pullum, Geoffrey K. (1990). The X-bar theory of phrase structure. *Language*, **66**, 24–50.
Luce, R. Duncan, Bush, Robert R., & Galanter, Eugene (Eds.) (1965). *Readings in mathematical psychology*. New York: Wiley.
Lyons, John (1991). *Chomsky*, 3rd ed. London: Fontana.
Machamer, Peter K. (1973). Feyerabend and Galileo: the interaction of theories, and the reinterpretation of experience. *Studies in the History and Philosophy of Science*, **4**, 1–46.
Piattelli-Palmarini, Massimo (Ed.) (1980). *Language and learning: the debate between Jean Piaget and Noam Chomsky*. London: Routledge & Kegan Paul.
Postal, Paul M. (2003). "(Virtually) conceptually necessary". *Journal of Linguistics*, **39**, 599–620. [A revised version is in Postal, *Skeptical linguistic essays* (pp. 323–336). Oxford: Oxford University Press, 2004.]
Postal, Paul M. (2014). Chomsky's methodological fakery. *Lingbuzz*, January 2014, online: <ling.auf.net/lingbuzz/002006> (last accessed 3 February 2015).
Pullum, Geoffrey (2011). On the mathematical foundations of *Syntactic Structures*. *Journal of Logic, Language, and Information*, **20**, 277–296.
Rubinstein, W. D. (1981). Chomsky and the neo-Nazis. *Quadrant*, October 1981, 8–14.

https://doi.org/10.1017/langcog.2015.10 Published online by Cambridge University Press

Sampson, Geoffrey (1979). What was Transformational Grammar? (Review article on Chomsky 1975.) *Lingua*, **48**, 355–378. [A version is reprinted in Sampson, *Empirical linguistics* (pp. 141–64). London: Continuum, 2001.]
Sampson, Geoffrey (1980). *Making sense*. Oxford: Oxford University Press.
Sampson, Geoffrey (2002). Exploring the richness of the stimulus. In Nancy A. Ritter (Ed.), *A review of the poverty of stimulus argument* (a special issue of *The Linguistic Review*, **19**(1/2)), 73–104.
Sampson, Geoffrey (2005). *The "language instinct" debate*, rev. ed. London: Continuum.
Sampson, Geoffrey, & Babarczy, Anna (2014). *Grammar without grammaticality*. Berlin: de Gruyter.
Schützenberger, Marcel-Paul (1963). On context-free languages and push-down automata. *Information and Control*, **6**, 246–264. [Reprinted in Luce et al. (1965), vol. **2**, pp. 204–222.]
Schützenberger, Marcel-Paul (1996). Les failles du Darwinisme. *La Recherche*, **283**, 87–90.
Schweizer, Peter (2005). *Do as I say (not as I do)*. New York: Broadway Books.
Smith, Neil (1999). *Chomsky: ideas and ideals*. Cambridge: Cambridge University Press.
Taylor, John (2012). *The mental corpus: how language is represented in the mind*. Oxford: Oxford University Press.

https://doi.org/10.1017/langcog.2015.10 Published online by Cambridge University Press