Book review

Evolving pragmatics

W. Tecumseh Fitch*

Speaking Our Minds: Why Human Communication is Different, and how Language Evolved to Make it Special
Thomas C. Scott-Phillips
(Palgrave-Macmillan, New York; 2015)

Perhaps the most famous sentence in linguistics is Noam Chomsky's "colorless green ideas sleep furiously," illustrating that an English utterance might be perfectly well-formed syntactically but semantically meaningless (or at least deeply problematic). This sentence helped inaugurate a renewed focus on syntax as a core factor in language [1] — a focus at variance with linguistic practice at the time in the 1950s. Today, the importance of syntax is well accepted both in linguistics and in related fields, including psychology and biology.

Also famous, if less so, are variants of the following exchange:

Susan: "I'm leaving you."
John: "Who is he?"

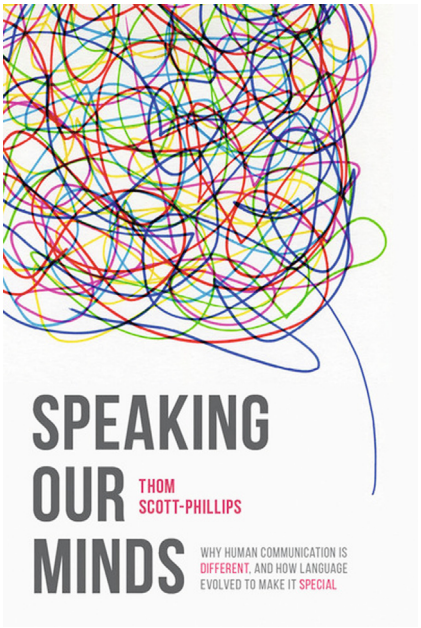
To any English-speaking adult, this exchange makes sense, because we can follow John's thought process: if Susan is leaving she must have found another lover (the 'he' in question inferred by John). The process by which we infer such 'missing pieces' of information, using a vast store of real-world knowledge to fill in gaps in actual utterances, is termed 'pragmatics', and is the topic of an excellent and important new book on language evolution by Thom Scott-Phillips.

A hypothetical alien with perfect command of English syntax and semantics, but no grasp of pragmatics or human relationships, might argue that John's response is a *non sequitur* and completely irrelevant to Susan's initial utterance. Similarly, a young child who understands the words might still fail to understand the meaning behind them. Thus, the exchange above illustrates the centrality of pragmatics in our everyday use of language, and shows that to understand how language works and is used, syntax and word meaning are often not enough.

But in this stimulating new book, Scott-Phillips makes a much bolder claim than this, suggesting that language as we know it, with complex syntax, ambiguous words, and confusing semantics, would not even be *possible* if our species did not possess a richly developed pragmatic capacity — a capacity that appears to be lacking in other species. If he is correct, it adds a new and alarming evolutionary problem to the already-long list of problems that any successful model of human language evolution must solve: how could a pragmatically grounded language like ours evolve from the 'code-based' communication systems we know from other animals? Scott-Phillips argues that it couldn't, and therefore that human language did not evolve from communication systems like those of other primates. Rather, he suggests that our species first had to develop an entirely new system for communication, which he terms 'ostensive/inferential,' that is both more conceptually fundamental and evolutionarily prior to modern language.

Although it may seem intuitive that human language must have evolved as a continuation and extension of the pre-existing vocal communication system of our last common ancestor with chimpanzees, Scott-Phillips is not the first to reject this presupposition. Indeed, in the rich jungle of ideas that is the language evolution literature, many thinkers have suggested that the gulf between human language and other primates' vocal communication is so great that no possible continuous path could gradually connect the two by successive minor variants. Rather, they suggest that the cognitive capacities for language initially evolved from some other quite different precursor (e.g., gesture, social intelligence, toolmaking…) and was applied to vocal utterances only later — a form of exaptation rather than continuous adaptation.

Despite this company, Scott-Phillips' model is more radical



than most, because he argues that ostensive/inferential communication is unknown among non-human animals. Indeed, this absence explains why only our species has a rich, learned, extensible language: only we have the pragmatic cognitive capacities upon which language is built. Here, I will argue that he goes too far (see below), but before I should explain why this argument makes logical sense.

Scott-Phillips starts, like his conceptual predecessor Dan Sperber [2], by distinguishing pragmatic/inferential communication from a different conception of communication that they term 'the code model', making reference to Claude Shannon's famous work in information theory [3]. In the code model, a message is unambiguously encoded into a signal that, after reception, is decoded into the original message. If all goes well, the original meaning of the sender is now duplicated in the mind of the receiver (although Shannon's model did not concern meaning, only messages, like strings of letters). Based on the famous vervet alarm call story, where vervet monkeys supposedly produce three clearly different messages unambiguously encoding the presence of three different predators [4,5], Scott-Phillips suggests that the code model accurately captures

animal communication — but not human language. To understand why, we need to examine what is involved in normal pragmatically informed human communication.

First, note that our pragmatic capacity has two key components. The first is *ostension*: we purposely produce utterances, gestures and other signs *in order to inform* others about our intended message. If the hostess walks by with a coffee pot and, making eye contact, I silently proffer my empty mug, this expresses my desire just as eloquently as the sentence "please give me more coffee" (perhaps more successfully, in a loud environment). When carefully unpacked, such a gesture has a surprisingly complex set of prerequisites and sequelae. I want coffee (my private desire) and want the hostess to know this (I intend to inform her of my desire). But in raising my mug, perhaps in a somewhat exaggerated or 'ostentatious' fashion, I also intend that she should recognize my intention to communicate, or in some unconscious sense to recognize that my gesture is a *signal to her* (as opposed to me closely examining my mug, proposing a toast, or making some random supplication to the coffee gods). The technical phrase here is 'signaling signalhood', and this key component of ostensive signaling underlies all of our everyday communication, whether linguistic or not. I agree with Scott-Phillips that this component is absent from at least most animal communication.

The second key component of human pragmatic competence, *inference*, is in the mind of the receiver, rather than the signaler: when the hostess observes my upheld mug and supplicating expression, she recognizes it as a signal of coffee-need and a request that she assuage it. This too requires the enlistment of a wealth of real-world knowledge (e.g., this is a restaurant, some patrons like to drink multiple mugs of coffee and are entitled to do so, that part of her job is supplying coffee, etc.) and using this knowledge to fill in the many blanks left by my gesture. Once I've signaled signalhood to the hostess, it almost automatically engages her mostly unconscious but nonetheless crucial chain of cognitive processing. And, if I'm lucky, I get some more coffee. But clearly, 'mug raising' is not an encoded conventional signal meaning 'more coffee please' except in this particular situation.

Scott-Phillips clearly recognizes that both of these processes, ostension and inference, play key roles in human communication. It is thus somewhat unfortunate that, after defining them early in the book, he then proceeds to use the term 'ostensive communication' to denote both components. This is unfortunate because, although I think he is correct that ostensive communication is rare in nonhuman animals, he is wrong about inference. Current research in animal communication, particularly research on baboon vocal communication by Dorothy Cheney, Robert Seyfarth and their colleagues, makes abundantly clear that inference is a central component of primate communication [6].

For example, researchers can create artificial 'conversations' between baboons, and then play them back from hidden speakers to observe listeners' responses. Because they live in small, close-knit groups, each baboon can recognize the others by their voice, and thus easily identify who made each component call. If they hear a dominant female produce a threat, and a subordinate produce a submissive squeak, they barely respond. If, however, a *subordinate* female makes the threat, and the typically dominant female responds *submissively*, this gets their attention at least briefly. And if the latter synthetic exchange occurs between a female from a subordinate *family*, this attracts clear and sustained interest, because baboon matrilines themselves have a clear dominance hierarchy, with females in one family all dominant to all the females in another family [7].

All of the knowledge that is indicated by such experiments — of individual identity and family membership, and of both individual and family dominance relations — exists in the mind of the listener, not 'out in the world'. This knowledge is clearly brought to bear, in an inferential, but presumably unconscious, process when baboons listen to their conspecifics' grunts and squeaks. This and similar playback experiments make it clear that other primates have, and thus presumably our pre-human ancestors had, a rich pragmatic engine through which they filter and interpret the signals of their own kind. The code model captures none of this complexity, and is thus incomplete for these animals as well as for humans.

Indeed, Seyfarth and Cheney have recently argued that this pragmatic competence on the part of listeners provided a crucial evolutionary precursor, not only of human pragmatic competence but of linguistic syntax and semantics as well [8]. Thus, although all parties agree about the importance of ostension in the evolution of language, Scott-Phillips overstates the gulf in inference capabilities between humans and other animals.

Scott-Phillips is definitely correct that the ostensive signaling of signalhood is central to both human language usage and other types of human communication, and that this component of pragmatics seems so natural to us that it is easy to overlook its complexity. But I am not convinced that, when turning to other species, the fields are quite as barren as he believes. Consider the 'play bow', a stylized body posture that often initiates play among canids, and is familiar to anyone who has watched two dogs play in a park. A dog intent on playing with another will lower its chest to the ground, keeping its hindquarters up and wagging its tail, and draw its mouth corners back into a smile-like expression [9]. This stereotypical posture is adopted before play in all canids, and appears early in development, so presumably has a strong innate component. Nonetheless, it does not seem far-fetched to imagine that play bows are voluntarily produced by playful dogs to inform recipients of their playful intentions [10]. While this behavior does not tick all the boxes to count as full human-like ostension, it seems to me to bear enough family resemblance to warrant further thought.

To summarize, this is an excellent book, and I think everyone who is

interested in the biology and evolution of human language should read it. Although serious, it is entertainingly written and short enough to fit into two evenings of reading. Scott-Phillips deftly reveals some of the misconceptions that keep us from seeing the central importance of ostensive and inferential processes, and helps steer the reader to understand the cognitive complexity of these abilities. Although I think that by overstating the gulf between human and animal pragmatic abilities he makes the problem of their evolution seem harder than necessary, he nonetheless puts his finger on a clear, and mostly neglected, problem in language evolution. The complexity of human pragmatics, both ostension and inference, remain poorly recognised and understood. Perhaps this book can help do for pragmatics what Chomsky's "colorless green ideas" sentence helped do for syntax fifty years ago.

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Department of Cognitive Biology, Faculty of Life Sciences, University of Vienna, 14 Althanstrasse, A-1090 Vienna, Austria.
*E-mail: tecumseh.fitch@univie.ac.at

Q & A

Anindya Dutta

Anindya Dutta started out to be a physician, earning his MBBS degree from Christian Medical College, Vellore, India. After a year of residency in medicine he sought out lab research at the Indian Institute of Chemical Biology in Kolkata. Recognizing the need for more formal training in basic research, he went to Rockefeller University in New York City to do his PhD with one of the pioneers of retroviruses and oncogenes, Dr. Hidesaburo Hanafusa. A postdoctoral fellowship with Dr. Bruce Stillman at Cold Spring Harbor Laboratory introduced him to the cell cycle, following which he did a short residency in Anatomic Pathology at Brigham and Women's Hospital, Harvard Medical School. Dr. Ramzi Cotran, the chair of Brigham's Pathology department, was legendary for his ability to nurture research. He, along with Dr. Peter Howley (Chair of Pathology at Harvard), promoted Anindya to Assistant Professor of Pathology and head of his own lab. In 2003, another very effective chair, Dr. Joyce Hamlin, wooed him to the University of Virginia, where he has been ever since, eventually succeeding Dr. Hamlin as Chair of Biochemistry and Molecular Genetics in 2011.

Please take a few minutes to describe your career path. I grew up in a town called Kulti in the iron and coal belt of India. My father had found himself on the wrong side of the religious divide that accompanied the Partition of British India, and so moved to the Indian state of West Bengal from East Pakistan (now Bangladesh). He managed to get a degree in engineering after migrating as a refugee. Education was highly valued in our home, and as the eldest son of the family I was expected to become a professional who could make a living, either an engineer or a doctor. Contentious left-wing politics in my state, however, completely paralyzed the higher education institutions and I had strong motivation to get out of West Bengal. Luckily for me, I got into CMC, Vellore, in a town that was a two-and-a-half day train journey from my home. CMC became a home away from home, and drove into its students' heads that we had to do something excellent with our lives and careers. The medical school produced not only great physicians but also a significant amount of research. Two fellow students, both now scientists of some repute (Ashok Venkitaraman at Cambridge and Shiv Pillai at Harvard), inspired me to check out basic research after finishing medical school. I fell in love with the discipline, and so here I am after a PhD, postdoctoral fellowship and a few years of internship/residency, running a basic science lab in a town probably smaller than the one I grew up in.

How do you describe your area of research? I have been continuously interested in the basic science of cell proliferation and cancer and have become engrossed in a variety of topics. I started out (during my PhD) studying regulation of gene expression by tyrosine kinase oncogenes. During my postdoctoral fellowship I was introduced to the cell cycle and DNA replication, so I established my lab in that area, working on p21and CDKs, on human DNA replication initiation factors and control of replication and re-replication. I continue to have an active program in this area, having worked on the genomics of replication initiation and replication timing, on the regulation of various factors involved in genome stability by CRL4/Cdt2 ubiquitin ligase and now on the way in which replication and repair factors (their overexpression or loss)

