Speaking in too many tongues

Linguists are divided in their ideas about the origin of language.

Human Language and Our Reptilian Brain: The Subcortical Bases of Speech, Syntax, and Thought
by Philip Lieberman
Harvard University Press: 2000. 240 pp. $39.95, £26.50

Massimo Piattelli-Palmarini

FROM LEWIS CARROLL'S *ALICE THROUGH THE LOOKING-GLASS*

"But wait a bit," the Oysters cried, "Before we have our chat."

Reminiscing about the beginnings of her career, the distinguished psychologist Eleanor Rosch once wrote: "I wanted my new field to be empirical, but not barbarically so." In his fifth book on the evolution of language, Philip Lieberman wants his field to be empirical, period. His central thesis is stated unequivocally on the second page: "Ultimately, human linguistic and cognitive ability can be traced back to the learned motor responses of mollusks." Such bluntness has to be put in the context of the success of Steven Pinker's 1994 book on language evolution, *The Language Instinct* (William Morrow), one of the best things to have happened in the dissemination of ideas in linguistics and cognitive science. Professor Lieberman probably felt obliged to write the ultimate anti-Pinker.

His thorn, from Pinker's rose, is that nearly half a century ago, at the Research Laboratory of Electronics at MIT, Noam Chomsky opened a new avenue into the study of language. Linguistic inquiry was to be part of the natural sciences, with a privileged link to biology. It would therefore welcome the inevitable consequence that linguistic hypotheses and explanations would be open to refutation or corroboration by data from a variety of domains — from traumatic speech impairments to congenital language deficits, from sign languages to the spontaneous creolization of pidgins, and much beyond. This new study of language was expected to open a privileged window on the workings of the human mind.

And many of us think it did. But an all-important proviso existed then, and persists today: the study of language is ultimately a biological science, but it must be conducted at a suitably abstract level of analysis. The symbolic representations and transformations that constitute a person's knowledge of their mother tongue must be investigated by amassing a huge variety of phonological, morphological, syntactic and semantic facts, from as many languages as possible. The brain scientists will have to know exactly what they are expected to find the neural bases of.

Lieberman totally neglects this proviso. To him, linguistics is applied evolutionary biology. "In time, 'biological-linguists' working in an evolutionary framework will lead the way to new insights on the nature of language."

He claims to be in a position to offer a new kind of linguistics, but never attempts to tackle even one of the problems that have absorbed hundreds of linguists over the past several decades. He dismisses all their hard work at a single stroke, radically misquoting as his ally Ray Jackendoff, one of the most productive researchers in the field.

Jackendoff's idea, in the passage Lieberman refers to, was that any five-year-old child knows things about their mother tongue that certified linguists have been striving to understand for decades, so far with only limited success. This fact is explicitly presented by Jackendoff as the "paradox of language acquisition", which leads to the inevitable conclusion that "the human brain contains a genetically determined specialization for language" (from *Patterns in the Mind: Language and Human Nature*, Harvester/Wheatsheaf, 1993).

Admittedly, Jackendoff also candidly confesses to the limited success of his discipline. (What major scientific discipline will not admit that quite a lot is yet to be discovered?) Lieberman, using indirect discourse, drastically denatures this act of modesty: "Candid exponents of the algorithmic approach introduced by Chomsky such as Ray Jackendoff admit they cannot even describe the sentences of any human language." Such token of unfairness has a reason: those who believe language to be a practical ability, a skill based on a variety of other skills, mobilizing huge, distributed functional complexes in the brain, have no truck with an "algorithmic approach".

In Lieberman's conception there is nothing specific about language. Syntax is merely the outcome of general patterns of motor control acting on the phonatory apparatus. The book deals at length with the transient linguistic impairments provoked by high-altitude hypoxia near the top of Mount Everest, or in hypobaric chambers. Who would deny that there are circumstances in which motor impairments and speech impairments occur together? The observation of drunkards would have been equally telling, although less exotic.

In a rather long quote, which appears twice, Lieberman endorses the idea that "thought is mental movement without motion". J. B. Watson's old behaviourist idea that syntactic comprehension consists of silent phonetic rehearsal (literally talking to oneself) is rediscovered, and occurs on so many pages that I could not even begin to list them.

I have just bemoaned Lieberman's liberal use of passages from authors in the other camp. The book also contains a few glaring factual mistakes that a good copy editor should have amended. But don't let me be misunderstood: although Lieberman is highly selective in his citations, he also correctly summons quotes and data from authors in his own camp. The idea that language is only a special chapter of general intelligence, coming out through sophisticated, but still generic, motor schemata, is very old and still popular. Lieberman has no shortage of real

allies, in philosophy, anthropology, artificial intelligence, evolutionary psychology and the neurosciences. He can, and does, summon plenty of academically certified witnesses for the defence. None of them cares a jot about the problems, data and theories of Lieberman's so-called "algorithmic" linguistics. But indifference to, and ignorance of, linguistic research can too quickly turn into hasty indictments: "No evidence exists that ... the neural machinery regulating language differs fundamentally from that regulating other aspects of behavior. ... The search for the Universal Grammar is perhaps best regarded as a search for a holy grail."

But a central consideration must be taken into account. Lieberman has an endowed chair in a major university, and the monograph is part of a prestigious series from a prestigious publisher. Its very existence attests to a deeply unsatisfactory situation in large sections of this domain. Rosch's proviso has been too often neglected. The Liebermans of this world jettison *en bloc* the results of the real study of real languages, freely overgeneralizing from what they think they can observe in the brain, and in molluscs. And the other camp is not overly interested in reading about the alleged neuro-evolutionary bases of linguistic phenomena and mechanisms that they *know* cannot be right. With a few comforting exceptions, the long-sought, deep dialogue between linguistics and the neurosciences has yet to come. ■

Massimo Piattelli-Palmarini is in the Department of Linguistics, University of Arizona, Tucson, Arizona 85721-0025, USA.

Celebrating blurry boundaries

The Extended Organism: The Physiology of Animal-Built Structures
by J. Scott Turner
Harvard University Press: 2000. 235 pp. $47.50, £32.95

Steven Vogel

The snail's shell is an integral part of the snail, but the shell of the hermit crab is just clothing. There is no ambiguity here — the snail grows its shell, whereas the crab must shop repeatedly for empty shells that fit. Our hairs make up part of us, but the spider's web is just a structure that it builds. In this example, the distinction works less well. We may remain attached to our hairs, but the spider can (and does) reingest and recycle its fibroin, something we cannot do with our keratin.

Scott Turner begins his book by arguing that what we consider to be the outer boundaries of organisms are mainly habits derived from perceptual accidents. He goes on to assert that such habits have led to an excessively restrictive view of what constitutes an organism, and that such a view has had unfortunate consequences for physiology. He bases his argument not on history, philosophy, cognition or our predilection for sharp dichotomizations, but rather on the weight of examples. With case upon case he shows how the sharp, traditional line between organism and external world often proves at least a nuisance and how, almost as often, we tacitly ignore it. And he concludes that our outlook on how organisms function would be empowered by drawing a more encompassing line.

If applied to a less eclectic field, or if it were the account of a less eclectic scientist, Turner's case-by-case approach might be tedious. But few readers of this book will fail to be fascinated by the examples. Turner's tales of the subtle ways organisms capitalize on the opportunities afforded them by their physical and chemical surroundings provide more than ample reason to read the book. Although no area of biology brings into its purview more diverse elements of the physical sciences than physiology, few physiological accounts consider both the present range of non-biological factors and the full range of plants, animals and microorganisms in the way that Turner does.

On the physical (or mathematical) side, one encounters diffusion, fractals, redox potentials, acoustics, thermodynamics and chemical kinetics, hydrostatics and dynamics, convective and radiative heat transfer, soil mechanics, surface tension, climatology and control systems — each with clear explanations adequate for their concomitant biological stories.

The biological side is no less diverse. One learns about bioconvection and the way biological and physical factors interact to produce large-scale order in populations of swimming microorganisms; about plastrons and the other external bubble-lungs used by aquatic but air-breathing insects and spiders; about the way gall midges manipulate the surface temperatures of solar-heated leaves; and about the thermoregulatory tricks of the aerial bee colonies and subterranean termite colonies that operate communally built ventilation systems.

WOLFGANG KAEHLER/CORBIS

Community life: termite colonies operate communally built ventilation systems.

Turner gives particular attention to two general topics, each providing a set of elaborate cases where physiology must take account of "external" structures. Burrowing appears in multidimensional splendour, from its palaeontology to such things as the mechanics of digging, electron acceptors at different depths and in different substrata, the necessary sensitivity of earthworms to soil-water potential, and the use of burrows as feeding devices. The latter focuses on how lugworms — as cleverly adapted as they are consummately ugly — cultivate microorganisms in their burrows, and provides a splendid mix of zoology, microbiology, physical chemistry and fluid mechanics.

The other general topic is animal acoustics and the way external structures help small animals produce loud sounds whose characteristics are attuned to their functional roles, such as the cricket that improves the emission of its song by cutting a hole in a leaf that then serves as a baffle. The acoustic account then returns to burrows, specifically those of mole crickets and the way in which the shape of these residences allows them to work like different musical instruments — and to the feedback schemes by which mole crickets, like musicians, listen and retune.

Turner's views are less a radical revision than a reminder or rejoinder. Indeed, the argument might be pressed still farther. One