

# Speaking of learning

How do we acquire our marvellous facility for expressing ourselves in words?

*Pathways to Language: From Fetus to Adolescent*  
by Kyra Karmiloff and Annette Karmiloff-Smith  
Harvard University Press: 2001. 272 pp.  
\$27.95, £19.50  
Massimo Piattelli-Palmarini

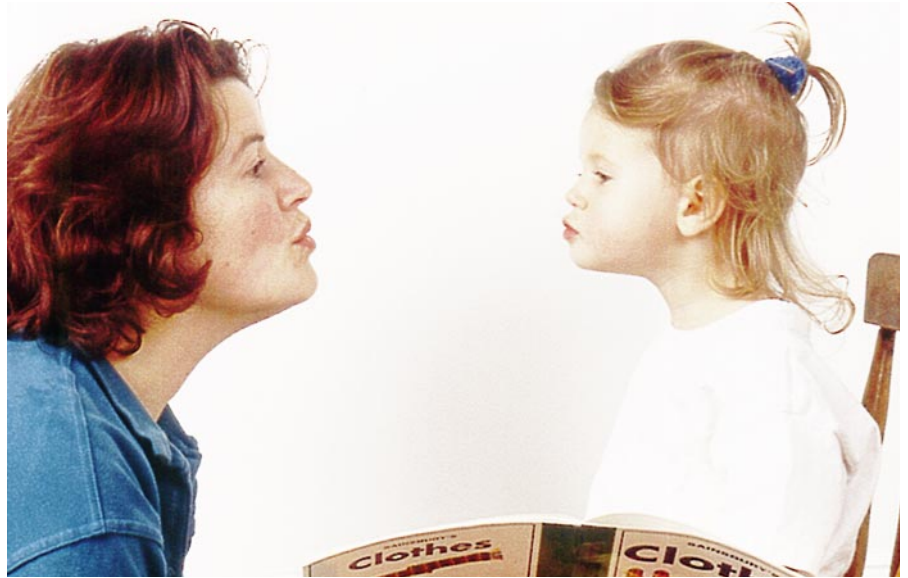
For most people, their greatest intellectual feat is the acquisition of their native language. The virtual universality of individual success should not mask the awesome complexity of the task. Any five-year-old can tell the difference between "It rains, but it does not snow" and "It rains, but it does not matter", instantly spotting the elusive words to which the impersonal pronouns refer. There are countless examples of subtle and complex linguistic expressions that are rapidly mastered by small children, in any language or dialect.

Linguists and developmental psychologists have bravely accepted the challenge of explaining how this tremendous feat is achieved. Some have also written extended accounts for the educated but non-scientific public. Semi-popular books on children's acquisition of language already constitute a whole literary genre. In this embarrassment of riches, what can Kyra Karmiloff and Annette Karmiloff-Smith offer that is new? The answer — a not altogether appealing one — is their own peculiar view of how children master their mother tongue so well, in so short a time.

Annette and her daughter Kyra, both professional child psychologists, deliver a downbeat message formed of an eclectic embrace of many theories and levels of analysis, and a distrust of theorizing, that is entirely devoid of the excitement generated by the newer theories of language. Given that this book is intended for the general public, their message should be received with reservations as to both its content and style.

After dutifully detailing the marvel of language acquisition, the authors look at the main current theories in such areas as linguistics, psycholinguistics, developmental psychology and sociolinguistics. These topics are treated competently and concisely, if somewhat tediously. The authors then discuss the art of storytelling, in excruciating detail, describing it as "a milestone" of late language development.

Readers who have been excited, puzzled and at times outraged by the novel facts and explanations in Steven Pinker's *The Language Instinct* (William Morrow, 1994) are now presented, for the price of an occasional yawn, with sedate alternative interpretations of the same stunning data.



**Mother tongue: natural ability suggests the existence of language-learning modules in the brain.**

For instance, children with Williams syndrome have a barely measurable general intelligence and require constant parental care, yet they have an exquisite mastery of syntax and vocabulary. They are, however, unable to understand even the most immediate implications of their admirably constructed sentences. Karmiloff-Smith has for years strongly opposed any separation of language from general intelligence, and her book tries to dampen our amazement at this phenomenon. Errors of syntax are evident in such children if you probe more deeply, the authors say. Moreover, good auditory memory, rather than a separate and intact grammar module, may account for such observations. The authors suggest similar explanations — invoking auditory defects, for example — for other language disorders. One of these, the well-known syndrome called specific language impairment, is, as its name suggests, generally considered to be quite specific to language, though not by the present authors.

Other examples of disorders that imply the existence of a specific module for language learning are similarly turned on their heads. According to the authors, the causes are at least partially environmental, not narrowly genetic, and what is compromised in all these deficits is a lot more than just language. The disappointing message is that no clear-cut case can be made for the idea that linguistic capacities are specific and autonomous. And further, no conclusions from studying Williams syndrome or other pathological cases can be applied to the patterns of linguistic development in normal children. Moreover, the authors are keen to stress that

linguistic deficits in affected children may be partly a result of an unwitting, anomalous linguistic input from their parents.

After an excursion into the main laboratory techniques for investigating children's acquisition of their mother tongue, we are finally ready to receive the central message: no extant theory can, by itself, explain the process of language acquisition; only the combined force of all the disparate theories can do it justice. This is a bit like saying that the complexity of chemical reactions can only be explained by a combination of the quantum theory of chemical bonds and the theory of phlogiston.

Not surprisingly, this programmatic embrace of diverse theories and the pallid combination of so many factors cannot hold the reader's interest. I do not advocate the triumph of entertainment and elegance over scientific truth, but this is a book intended for a wide circulation. Few general readers will enjoy such a massive dose of disillusionment, even if it were — but it is not — scientifically well supported. An unrelenting pull towards common sense, back to granny's basic ideas of how children learn language, and the watering down into a generic, socio-pragmatic wash of many novel hypotheses that have revolutionized the whole field of linguistics needlessly spoil the fun. Pinker's linguistic crime stories are allegedly explained away. All that remains is an amalgam of mundane observations and general cognitive mechanisms that have been known for years, slightly pepped up.

Karmiloff-Smith is known to distrust those in her profession whom she considers

to be arid formalists and unbridled theory-builders. She and her daughter tell us that Noam Chomsky, Steven Pinker and hordes of other innatist, structure-oriented investigators have got it all wrong: "This type of reasoning imposes the theory onto the data, rather than letting the data constrain the theory, as good science would dictate." One might retort that few scientific revolutions would have been possible if physicists, chemists and biologists had followed this austere and stultifying precept. And we would surely not have had the so-called cognitive revolution, which was largely spurred on by daring theoretical leaps into the ultimate nature of language, the human mind and the modular organization of natural intelligence. The same can indeed be said for the discovery of innate components of the language faculty that starkly separate a child's linguistic capabilities from general intelligence, social conventions and the practical uses of language.

The authors neither totally reject nor endorse these new ideas; they just keep preaching prudence, prudence, prudence. Several passages advise researchers in the field to proceed with the utmost caution in theorizing about children and language acquisition. As a result, we have a book that appears condescending and uniquely optimized for the training of graduate students intending to work in this field — provided they agree with the authors' ultra-cautious approach. ■

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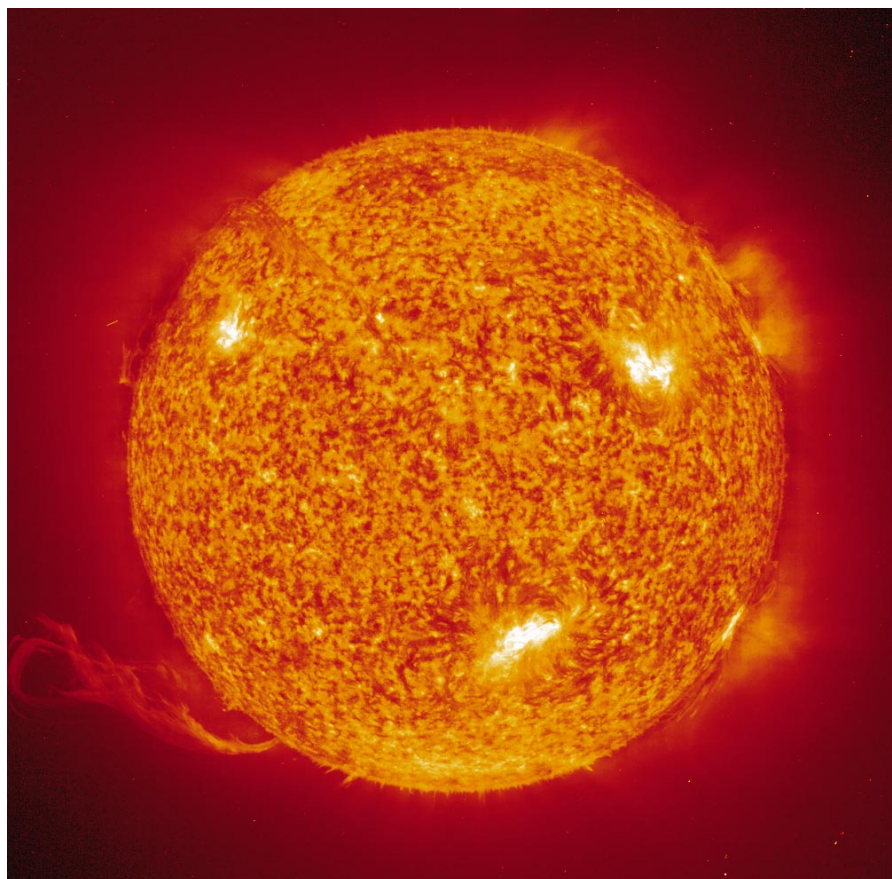
## The birth of matter

*The Magic Furnace: The Search for the Origins of Atoms*  
by Marcus Chown

*Oxford University Press: 2001. 240 pp. \$25*

*Hans A. Bethe*

*The Magic Furnace* tells the story of the discovery of the birth of atoms inside stars. Is it a good book? When I was about halfway through, I was doubtful. But the second half, which discusses the build-up of atomic nuclei, is very good. Marcus Chown is happiest when recounting the personal stories of scientists and their achievements. The account of Gustav Kirchhoff's discovery that each element has a characteristic spectrum, and his identification of the elements in the spectrum of sunlight, makes enjoyable reading. And the book reaches its climax with the work of Fred Hoyle and Willy Fowler, who discovered that some atoms were formed in the Big Bang



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**Fiery origins: atoms continue to be forged in the hot interiors of stars.**

and others continue to be formed in stars.

The trouble with the first half of the book is that the author does not distinguish clearly enough between new and important findings and those that are well known. Thus, in discussing Arthur Eddington's work on stars, Chown writes the "gas is to generate a high pressure"; it has been known since Robert Boyle's time (1662) that gas *has* a pressure proportional to its density and temperature. Eddington would not have started his work on stars had he not known this.

Chown describes the carbon–nitrogen cycle and the proton–proton chain, in which hydrogen is converted to helium. But although he tells us that the carbon–nitrogen cycle is sensitive to temperature, we are not told that the temperature at the centre of a star (which can be as much as 40 million degrees kelvin) depends on the material that makes up its bulk. Only much later does the author tell us that stellar material is not like the material on Earth, but is predominantly hydrogen; this reduces the computed central temperature of the Sun from 40 to 13 million degrees kelvin.

*The Magic Furnace* ends with an informative account of how atoms are made in the extremely hot material in the Big Bang, and in the less hot interiors of stars. It explains why the Big Bang made only helium, and why there is about 25% (by weight) of helium in the Universe. We discover why

there is an abundance of atoms up to the atomic weight of iron, but fewer of those of higher atomic weight, and how the latter are formed in stars by the addition of neutrons to existing nuclei, one by one. And finally we are told how the atoms created in stars escape into the interstellar medium to form new stars. ■

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## Geometry down the centuries

*Euclid's Window: The Story of Geometry from Parallel Lines to Hyperspace*

by Leonard Mlodinow

*Free Press: 2001. 306 pp. \$26*

*Jeremy Gray*

As its subtitle suggests, *Euclid's Window* aims to take the general reader from elementary ideas of euclidean geometry to Einstein's theory of general relativity and beyond, in this case to the theory of superstrings and their generalizations. Leonard Mlodinow takes a chronological route, describing the mathematics as he goes. So we read a bit