Annette Dionne Karmiloff-Smith

18 July 1938 – 19 December 2016

elected Fellow of the British Academy 1993

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Biographical Memoirs of Fellows of the British Academy, XVII, 29–34
Posted 18 June 2018.

ANNETTE KARMILOFF-SMITH

What is the origin of the unique and complex behaviours that our species are capable of? How do nature and nurture interact? Is human cognition—our memory, language, numerical abilities—organised into distinct modules? When developmental disorders occur, do they arise from selective damage to domain-specific modules? These age-old questions have puzzled—and often deeply divided—scientists for hundreds of years. Over the course of more than four decades, Annette Karmiloff-Smith's research provided key insights that challenged the traditional answers, leading to new insights into how genetic and environmental factors interact to give rise both to typical as well as atypical outcomes.

Annette Karmiloff-Smith was born in London in 1938. Her parents were Isaac Smith (a tailor and shop owner) and Doris Ellen Smith (née Findlay, an administrator with the Lea Valley Authority). She attended Edmonton County Grammar School from 1949 to 1954, and the Institut Français, London, from 1954 to 1957. Her childhood was somewhat marred by the family's fluctuating fortunes due to her father's successful tailoring business being lost through his heavy gambling during their summer holidays in Nice. Because she loved languages, Karmiloff-Smith decided to work as a simultaneous translator for the United Nations, based in Geneva. However, this proved to be less intellectually stimulating than she had hoped, and she was annoyed by having to translate points of view that she did not agree with. While browsing in a Geneva bookstore, Karmiloff-Smith recognised the famous child psychologist Jean Piaget from book covers and followed him to audit his lectures. She found his research fascinating, and subsequently studied with him, first gaining a bachelor's degree (1970) and then a doctorate (1977) from the University of Geneva.

Piaget was a founding figure of developmental psychology, and his theories dominated the field during most of the twentieth century. While Karmiloff-Smith respected those theories, she was not afraid of challenging them. Nonetheless, throughout her career Karmiloff-Smith's work was deeply influenced by Piagetian thinking in several ways. Like Piaget, she believed that the key to development was to understand the mechanisms that underlie the trajectory of changes across developmental time which give rise to increasing complexity in behaviour, and she modernised this view by helping to establish the 'neuroconstructivist' approach to human development—perhaps most clearly articulated in the co-authored volume *Rethinking Innateness* (1996).[1] Furthermore, like Piaget, Karmiloff-Smith believed that the study of development is inherently an interdisciplinary enterprise requiring input from many disciplines including philosophy, linguistics, genetics and cognitive and developmental neuroscience—all fields to which she contributed. Finally, like Piaget she

[1] J. L. Elman, E. A. Bates, M. H. Johnson, A. Karmiloff-Smith, D. Parisi and K. Plunkett, *Rethinking Innateness* (Cambridge, MA, 1996).

believed in the scientific value of observation (as a key supplement to experiments); one of her early contributions was to pioneer a radically different research strategy for understanding development, the so-called 'microgenetic' approach. This involved observing developmental change at a fine grain of temporal analysis. The method has now become standard in the field.

While Karmiloff-Smith's thinking was deeply embedded in the Piagetian tradition, she saw it as important to question, and even criticise, aspects of the theories articulated in his many books. It is perhaps unfortunate that at the time the Piagetian School was under attack from a number of prominent 'anti-Piagetians', who demonstrated apparently precocious infant and toddler abilities earlier than Piagetian stage theory had predicted. These attacks led to a closing of ranks within Geneva around defending a precise and literal interpretation of Piaget's statements. As Karmiloff-Smith was a student of Piaget who questioned elements of the theory, it was inevitable that conflict with her mentors would arise. Her filed correspondence reveals angry exchanges over a mysteriously withdrawn conference abstract on the limits of the Piagetian account of language acquisition, a position that Karmiloff-Smith later articulated in the 1979 book based on her PhD thesis—*A Functional Approach to Child Language*.[2] The preface to her 1992 book *Beyond Modularity* alludes to these troubled years and her uncomfortable position straddling the divide between the Piagetian School and its critics.[3] Over more recent years, as Piaget's contribution to the field began to be seen more as foundational, rather than literal gospel, Karmiloff-Smith was welcomed back to Geneva and her visits increased. It is unfortunate that her terminal illness prevented her delivering a lecture at a major tribute conference to Piaget in the summer of 2016. Her correspondence and working notes from this period are now lodged with the Piaget Archives in Geneva.

While Karmiloff-Smith's unique position within developmental psychology may have been awkward both with her mentors and 'anti-Piagetians' alike, for those outside the immediate field this was an attraction as it offered a potential synthesis. After brief appointments at the Max-Planck Institute for Psycholinguistics, Nijmegen, and the University of Sussex, in 1982 Karmiloff-Smith found a natural home at the newly created Medical Research Council Cognitive Development Unit in London led by John Morton. Morton encouraged a diversity of views, often debated in heated Tuesday morning theoretical discussions. On the closure of the Unit in 1998, she moved to become Head of her own Neurocognitive Development Unit at the Institute

[2] A. Karmiloff-Smith, *A Functional Approach to Child Language: a Study of Determiners and Reference* (Cambridge, 1979).

[3] A. Karmiloff-Smith, *Beyond Modularity: a Developmental Perspective on Cognitive Science* (Cambridge, MA, 1992).

of Child Health in London, during which she strengthened further her interests in neurodevelopmental disorders. After her official retirement from this role in 2003, she enjoyed equally productive years as a Professorial Research Fellow at the Centre for Brain and Cognitive Development, Birkbeck, University of London, a position she held until her death in December 2016.

Karmiloff-Smith's early work was in the area of language development, bringing her into contact with a wide range of scientists—including linguists, cognitive psychologists and developmentalists—who were proposing that the human cognitive system was organised into modules that were potentially innately present from birth. This proposal was hotly debated within all these fields. Karmiloff-Smith entered the debate and proposed what was a fresh and compelling theory that on the one hand did not require innate modules, but which on the other accounted for behaviours that seemed to implicate modular organisation. These ideas were the core of her book *Beyond Modularity*. Karmiloff-Smith explained how modularisation—as a process—might result over the course of development as a result of internal cognitive changes that yielded successively more refined and more modularised knowledge representations (a process she called 'representational redescription'). Thus, modularisation of knowledge need not be innate, but instead is a result of learning and development.

In more recent years, Karmiloff-Smith turned her attention to developmental disorders, both because of their public health importance and as potential windows into the mechanisms that underlie human cognitive development in typical as well as atypical populations. She argued that developmental disorders should not be understood as 'normal minus something broken', but as developmental trajectories that take very different paths from the typical. When one sees what appears to be the same behaviour in both typical and atypical populations, that behaviour may actually be supported by processes that are quite different in the atypically developing individuals than in the typical cases. Karmiloff-Smith's work in this area involved individuals with Down's syndrome, Fragile X syndrome and Williams syndrome, among others. Her findings dramatically reshaped our thinking about both typical and atypical cognitive development.

Most recently, Karmiloff-Smith moved into an area that appears at first to be an odd focus for a developmentalist: Alzheimer's Disease (AD). She pointed to an intriguing phenomenon: by later age most individuals with Down's syndrome have brains that (on autopsy) have the signature characteristics of AD, even though not all of them have the cognitive deficits typical of this form of dementia. The question she asked is what protective factor in these individuals inhibits the behavioural and cognitive effects that are otherwise associated with the brain characteristics of AD. At the time of her death, she was pursuing a fascinating set of hypotheses, working with a broad team of neurologists, geneticists, gerontologists and other specialists to address this question.

Karmiloff-Smith was a generous scientist, mentoring many students and postdocs and inspiring young academics with her zest for science. She was accessible, warm and funny and wonderfully loyal and supportive to her many friends. She was also an excellent communicator, writing books for the general public (*Everything Your Baby Would Ask, If Only He or She Could Talk*),[4] giving talks at festivals (Sunday Times Festival of Education, 2015) and appearing on radio and TV (*The Life Scientific*, BBC Radio 4). She also received many honours over the course of her lifetime. She was elected a Fellow of the British Academy (1993), Academy of Medical Sciences (1999) and Academia Europa (1991). In 2002, she was the first female to receive the European Latsis Prize, in addition to a Doctorat Honoris Causa from the University of Louvain, and in 2004 she was made a CBE in recognition of her contributions to cognitive development.

Annette Karmiloff-Smith served on the British Academy's Communications and Activities Committee and its successor, the Events and Prizes Committee, from 2007 to 2013. In 2001, she gave a lecture at the British Academy to mark the centenary of the British Psychological Society,[5] which turned out to be the first in the highly successful series of annual lectures that have been jointly organised by the two bodies ever since.

Her first marriage to economist Igor Karmiloff, with whom she had two daughters, ended in divorce. She subsequently had a long and happy partnership with Mark Johnson, a professor of cognitive neuroscience, whom she married in 2001. She is survived by her husband, her daughters, Yara and Kyra Karmiloff, brothers Stephen, Peter and Paul, and grandchildren Alexander, Nicholas, Misha, Tatyana, Dylan, Joden and Liliana.

Annette Dionne Karmiloff-Smith, developmental cognitive neuroscientist, born 18 July 1938, died 19 December 2016.

Note on the authors: Jeffrey Elman is Distinguished Professor of Cognitive Science at the University of California, San Diego. Lorraine K. Tyler is Professor of Cognitive Neuroscience at the University of Cambridge; she was elected a Fellow of the British Academy in 1995. Mark H. Johnson is Professor of Experimental Psychology (1931) and Head of the Department of Psychology at the University of Cambridge; he was elected a Fellow of the British Academy in 2011.

[4] K. Karmiloff and A. Karmiloff-Smith, *Everything Your Baby Would Ask, If Only He or She Could Talk* (London, 1998).

[5] A. Karmiloff-Smith, 'Elementary, my dear Watson, the clue is in the genes . . . or is it?', *Proceedings of the British Academy*, 117 (2002), 525–43.