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Royal Netherlands Academy of Arts and Sciences — Koninklijke Nederlandse Akademie van Wetenschappen

The Dr A.H. Heineken Prize for Cognitive Science 2006

The work of Professor John R. Anderson presented by Professor Jacqueline J. Meulman, Chairperson of the Jury of the Dr A.H. Heineken Prize for Cognitive Science

Prize citation: for 'his ground-breaking theory of human cognition'

Professor Anderson,

The jury of the Dr A.H. Heineken Prize for Cognitive Science 2006 has unanimously decided to award this year's prize to Professor John R. Anderson, Richard King Mellon Professor of Psychology and Computer Science at Carnegie Mellon University, Pittsburgh, Pennsylvania. John Anderson was the first to develop a formal theory of human cognition, the ACT-R theory, an integrative theory of the computational operations underlying human thought processes and intelligent behaviour. Professor Anderson's work has had an enormous influence on both theory and experimental studies in many different areas, including cognitive psychology, artificial intelligence, neurocognition, empirical economics and decision-making, behavioural and evolutionary biology, and in a number of applied fields, such as cognitive ergonomics and computer-aided tutoring systems for learning mathematics and computer skills. Most recently, Professor Anderson has begun to explore the neural basis of cognition, seeking the brain mechanisms that underlie the abstract computational operations identified in his cognitive theory.

John R. Anderson was born in Vancouver, Canada. He obtained his B.A. at the University of British Columbia in 1968 and received the Gold Medal of the Governor-General of British Columbia. He obtained his Ph.D at Stanford University in 1972. After leaving Stanford, he held positions at Yale University, the University of Michigan, and again at Yale. He then accepted a position at Carnegie Mellon University, first as Professor of Psychology and, in 1983, as Professor of Psychology and Computer Science. In 2002 he obtained the Richard King Mellon Chair of Psychology and Computer Science, the most prestigious Chair that Carnegie Mellon has to offer. Professor Anderson's work forms the foundation of Carnegie Mellon's reputation as one of the world's leading centres for research into human learning and the development of cutting-edge education technology.

John Anderson is a fellow of both the National Academy of Sciences and the American Academy of Arts and Sciences. He is a Past President of the Cognitive Science Society and a member of the National Research Council on Sciences of Learning, the National Research Council on Learning and Instruction, and the Advisory Panel of the Office of Naval Research on Virtual Environment Training Technology. He is an Associate Editor of *Cognitive Science* and the only person to have served on its editorial board continuously since its foundation in 1977.

As mentioned earlier, Professor Anderson is receiving the Dr A.H. Heineken Prize for Cognitive Science for his work on ACT-R. ACT stands for Adaptive Control of Thought, and the R, which was added later, for Rational. His theoretical work, which began with a model of how we search our memory for information, evolved throughout the first ten years of his career into a complete theory of learning, memory and problem-solving. Crucial to this work are methods for learning systems of condition-action rules that allow the initial formation and gradual strengthening of problem-solving skills. In 1990, Allan Newell called ACT 'the first unified theory of cognition'. ACT-R evolved into a system that can perform

the full range of human cognitive tasks, capturing in great detail the way we perceive, think about, and act in the world. One important feature of ACT-R that distinguishes it from other theories in the field is that it allows researchers to collect quantitative measures that can be compared directly with the quantitative measures obtained from human participants. ACT-R research has united scholars from very different disciplines in a worldwide research community that strives to understand how people organise knowledge and produce intelligent behaviour.

John Anderson is not afraid to put the cat among the pigeons. In a joint paper, John Anderson, Lynne Reder and Herbert Simon criticise particular fashionable programmes of educational reform that misapply cognitive psychology, and I quote:

> '… In many recent publications in mathematics education, much of what is described reflects two movements, "situated learning" and "constructivism", which have been gaining influence on thinking about education and educational research. In our view, some of the central educational recommendations of these movements have questionable psychological foundations. … We see that influential schools have arisen, claiming a basis in cognitive psychology, but which have almost no grounding in cognitive theory and at least as little grounding in empirical fact. This is particularly grievous because we think information-processing psychology has a lot to offer to mathematics education. … The evidence for such information-processing approaches to education, however incomplete, is enormously stronger than the evidence for the opposite approaches … that are currently dominating discussions of mathematics education.'

John R. Anderson has received many honours, including the Early Career Award of the American Psychological Association in 1978, a Research Scientist Award from the National Institute of Mental Health in 1989, and the Distinguished Scientific Career Award from the American Psychological Association in 1994. In 2004, he received the David E. Rumelhart Award for Contributions to the Formal Analysis of Human Cognition, and in 2005 the Howard Crosby Warren Medal for Outstanding Achievements in Experimental Psychology. Today, the Dr A.H. Heineken Prize for Cognitive Science 2006 has been added to this impressive list.