Laudatio Prof. Stanislas Dehaene

Your Royal Highness,
Members of the Board of the Heineken Foundation and the Alfred Heineken Fondsen Foundation,
in particular their Chairwoman, Mrs De Carvalho,
Ladies and Gentlemen,

Dear professor Dehaene,

The Jury of the Dr. A.H. Heineken Prize for Cognitive Science has unanimously decided to award the 2008 prize to Professor Stanislas Dehaene, Professor of Experimental Cognitive Psychology at the Collège de France, and Director at INSERM, the Institut National de la Santé et de la Recherche Médicale, both in Paris, France. The jury considers Professor Dehaene to be one of the most original researchers in cognitive science because of his capacity to integrate experimental, clinical, neuroscientific, and developmental psychological approaches in studying the organisation of human cognition. The tremendous success of this integrative endeavour has made him one of the most influential cognitive scientists of today. His unique and elegant approach combines the modelling of cognition and the introduction of highly original research paradigms. This, added to the measurement of brain activity that allows us to chart the neurobiological mechanisms and processes underlying human cognition, constitutes a major step towards a truly integrative cognition science.

Stanislas Dehaene began his training as a mathematician, obtaining his Master's degree in Applied Mathematics and Computer Science from the Université de Paris VI in 1985. He then turned his interests to neuroscience and psychology, specifically to computational neuronal models of human cognition. He obtained his PhD in Experimental Psychology and Cognitive Science in 1989 at the École des Hautes Études en Sciences Sociales (EHESS). After receiving his doctorate, Doctor Dehaene became a research scientist at INSERM in the Laboratoire de Sciences Cognitives et Psycholinguistique. From 1992 to 1994, he spent two years at the University of Oregon's Institute of Cognitive and Decision Sciences. Subsequently, returning to France, he established a very productive research group. In 2005 he became Professor of Experimental Cognitive Psychology at the prestigious Collège de France. Professor Dehaene is a member of the French Académie des Sciences. He is also past president of the Association for the Scientific Study of Consciousness. And he is—or has been in recent years—a member of the editorial boards of prominent scientific journals such as *PLoS (Public Library of Science) Biology*, *Neuroimage*, *Cognition*, and *Cognitive Neuropsychology*.

Stanislas Dehaene has been awarded the 2008 Dr. A.H. Heineken Prize for Cognitive Science for his exceptional work on numerical cognition, the neural basis of reading, and the neural correlates of consciousness. He has shown different parts of the brain to be associated with different types of numerical calculations. Multiplication, for example, is a linguistically mediated calculation that is associated with the frontal lobe, while operations on quantities use what Dehaene has identified as the "number sense". This number sense is associated with a part of the parietal lobe of the brain. The dissociation between these mathematical tasks was later demonstrated by EEG and neuroimaging studies. But Dehaene relies not only on experimental results. He was also involved in anthropological field studies of an Amazonian Indigene Group, the Mundurukú, whose language was found to lack words for numbers greater than five. Dehaene's research showed that, by using their number sense, the Mundurukú are able to compare and estimate quantities considerably larger than five. They are, however, unable to perform exact calculations with numbers greater than five, as these rely on language-based operations..

In the study of consciousness, Dehaene proposed what has become known as the global neuronal workspace hypothesis, introducing a taxonomy that distinguishes between subliminal, preconscious and conscious perception and processing. The pivotal idea here is that two factors are needed for conscious access: the input stimulus must have enough strength and it must also receive top-down attention. The neural mechanisms determining the threshold for conscious access correspond to a relatively late activation of distributed cortical areas, including the prefrontal cortex on the one hand and a reactivation of posterior perceptual areas on the other.

Professor Dehaene has also been very successful in popularising his scientific work. He has authored several books, most notably his monograph *The Number Sense,* produced various television documentaries and, last but not least, developed a computer program called "The number race" to help dyscalculic children who have problems with various mathematical tasks. He also has very outspoken ideas about math education. As he said in a recent interview in the *New Yorker* (and I quote): *"The idea that all children are different, and that they need to discover things their own way—I don't buy that at all,"* [he said]. *"I believe there is one brain organisation, we see it in babies, we see it in adults. Basically, with a few variations, we're all travelling on the same road."*

Professor Dehaene has received many honours, including the James McDonnell Centennial Fellowship, the Louis D. Prize of the Institut de France, the Gold Medal of the Association Arts-Sciences-Lettres, the Liliane Bettencourt Prize for Life Sciences, and the Prix Jean Rostand for the French version of the book *The Number Sense.* Today we honour him with the 2008 Dr. A.H. Heineken Prize for Cognitive Science, and on behalf of the Royal Netherlands Academy of Arts and Sciences, it is my great pleasure to congratulate Stanislas Dehaene on this honour.

Professor Jacqueline J. Meulman,
Chair of the Jury of the Dr. A.H. Heineken Prize for Cognitive Science 2008