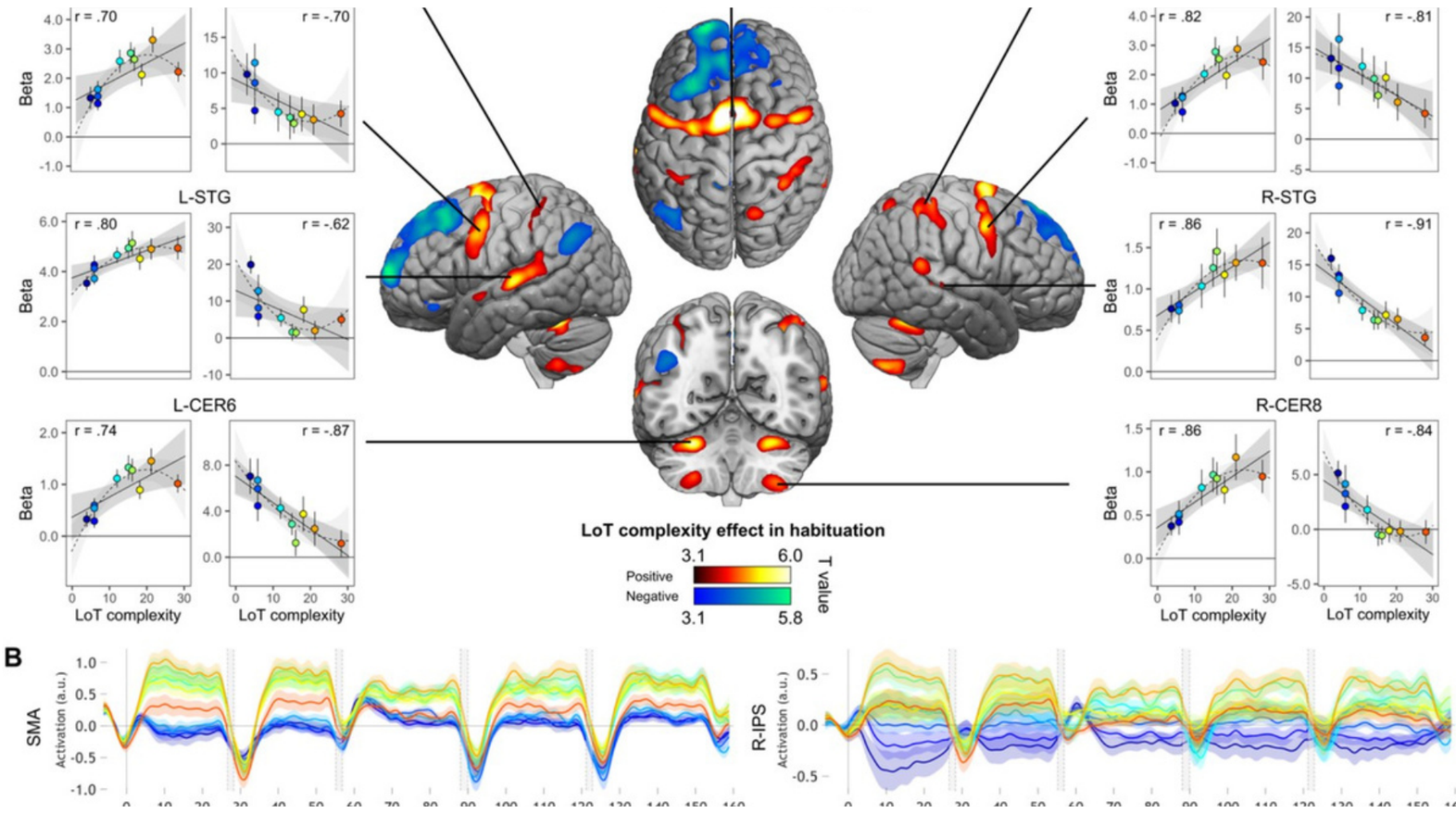
PADOVA neuroscience CENTER

2 MAY 2024, 3:00 PM
SALA SEMINARI VIMM

PNC DISTINGUISHED LECTURES

A talk by Stanislas Dehaene
(INSERM Unit 562 "Cognitive Neuroimaging" & Collège de France)

UNDERSTANDING THE NEURAL CODE FOR SYMBOLS AND LANGUAGES: A CHALLENGE FOR HUMAN COGNITIVE NEUROSCIENCE



Cognition is distinctly different in humans compared to other animals. A unique feature of our species is natural language, but in this talk, I will argue that a competence for symbols and languages drives many other cognitive domains, such as our unique abilities for geometry, mathematics, or music. Even the mere perception of a square or a zig-zag is driven by minimal description length (MDL) and thus involves a search for the shortest “mental program” that captures the observed data in an internal “language of geometry”.

Behavioral and brain-imaging experiments indicate that the perception of geometric shapes is poorly captured by current convolutional neural network models of the ventral visual pathway, but involves a symbolic geometrical description within the dorsal parieto-prefrontal network. I will argue that existing connectionist models do not suffice to account for even elementary human perceptual data, and that neural codes for symbols and syntax remain to be discovered.

Stanislas Dehaene is director of INSERM Unit 562, "Cognitive Neuroimaging” and professor at the Collège de France.

As a cognitive neuroscientist, his research focuses on numerical cognition, the neural basis of reading, and the neural correlates of consciousness. His main scientific contributions include the study of the organization of the cerebral system for number processing.

He was the first to demonstrate that subliminal presentations of words can yield detectable cortical activations in fMRI, and has used these data to support an original theory of conscious and nonconscious processing in the human brain. He also studied the neural networks of reading and demonstrated the crucial role of the left occipito-temporal region in word recognition (the visual word form area).