An Architecture for Dual Reasoning

Peter Carruthers

Abstract

How are dual systems of reasoning realized in the human mind–brain? What are the component mechanisms underlying System 2, in particular, and how do they connect and interact with one another? The distinctive facts about System 2, for my purposes, are that its operations are characteristically conscious, slow, and serial in nature; that it is malleable and can be influenced by instruction; and that it often operates through the application of learned rules and normative beliefs.

Two claims are crucial to my account. One is that a privileged class of perceptual states and quasi-perceptual states (images) are globally broadcast to a wide range of consumer systems, thereby becoming conscious (Baars). The other is that activated action schemata can be used to generate perceptual images of the action and its immediate effects, using, inter alia, the efferent pathways normally involved in fine-grained control of action (Kosslyn, Wolpert).

My thesis is then that System 2 processes consist of cycles of activation and mental rehearsal of action schemata (often, but by no means always, in 'inner speech'). This yields imagistic representations of action that are globally broadcast to an array of System 1 mechanisms. These then draw further inferences etc., altering the cognitive landscape for the selection of the next action schema to be rehearsed.

Since the account is action based, System 2 will be malleable in all of the ways that actions and sequences of actions are malleable. One can learn behavioral skills by imitation; likewise one can learn System 2 reasoning skills by imitation. One can acquire a skill by internalizing and being guided by a verbal instruction; likewise System 2 sequences can result from instruction. And beliefs about what ought, or ought not, to be done can have the same sort of influence on System 2 reasoning processes as they do upon actions themselves.