Biologically Inspired Cognitive Architectures II:
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Investigating the Acquisition and Control-Structure of the Human Mind

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Abstract

A novel analytical methodology has proven fruitful in developing a functional identification of consciousness with operable mental control structure in human higher brain function. Two operational homologies (one associated with language, the other tool use) derived from mammalian instrumental behavioral competence are identified, each exadaptively accessible: one a specialization of attentive search to (conventional, linguistic) internalized symbolic lexicon; the second being a *combination* – a co-parallel activation – of symbolically specialized attention with the original external 'spotlight' in order to support (deliberative, choice-making) navigational tasking. The mechanism by which consciousness becomes articulated to support the specialized control requirements of *three* cognitive performance levels is described, in particular for the case of the social bipedal hominid. A single articulated template model is posed to intervene between the incoherent neuronal and the coherently conscious mental level of higher brain operation. This *cognitive system theory* logic lends itself to an explanation of the exadaptive acquisition of a cognitively objectifiable self-model from within subjective experience, and a plausible heuristic for the systematic building of self-aware mental repertoire is discovered.

Five Mysteries of Higher Brain Function

Q1. *What is consciousness, and how does it reside in the brain?* A1. Consciousness operates to deliver certain specialized forms of attention over cognitive events in the brain, cognitive events being identified with qualified storage of investment-quality 'imagery' in *three* distinctive contexts: *perceptual*, *mental-reflective*, and *tasking*.

Q2. *How does consciousness exert its control over cognitive events?* A2. Attention is directable across a field of play, originally encompassing the general senses: vision; audition; olfaction/taste; exteroception (touch/temperature/ pain); kinesthesis/proprioception; endoception (internal chemo-sense). Specialisation of attention to incoming (audition) or outgoing (utterance) symbolic library fields, and co-parallel internalized/external attention affords two cognitively specialized modes of control of basic behavior.

Q3. *When is conscious control exerted over cognitive events?* A3. Hesitation to directly act is won from prior experience in a similar context, allowing new modes of behavioral enaction to be canvassed: (i) retro-active – awaiting further input to crystallize a response; or (ii) pro-active – riffling through available alternative enactions. These distinct control stances are denoted, respectively, self-control stance and SELF-control stance.

Q4. *How can an objective, unified self-model possibly arise from within purely subjective experience?* A4. The cognitive dimension of behavior works to build commitment to a particular enaction. Atop the activation barrier to release of this enactable, controlled stance-taking is adopted to resolve evident hesitancy to act. Experience of stance-taking allows subjective control over stance-taking itself to be won, providing *authorized ownership* of the control function which (in its reversibly operational form) *unifies* control stance experience into a balanced *stance of control-taking*, i.e. as a *known* capability. This control dimension, orthogonal to *both* the work-activation dimension of enaction commitment and the percept-action dimension of cognitive progress, instantiates *control events* interspersed into routine cognitive process cycles.

Q5. *How does a bare self-model become populated with qualified-ready-to-enact (mental) repertoire?* A5. The satisficing heuristic (generating progress from paralysis) in pro-active SELF-control, is to reject first-to-mind in favor of next-found (any) better alternative. The deliberately rejected action is image-stored (a *fourth* kind of investment storage) for possible later use. So experience builds the mental repertoire for subsequent intelligent performance.

The *cognitive system theory*[1] generating these insights is documented at http://homepage.mac.com/blinkcentral.

[1] Introduced at WMSCI 2009 (Orlando FL, Jul 11-13: Proceedings, p267-72) www.iiis.org/CDs2008/CD2009SCI/SCI2009/PapersPdf/S159DA.pdf