On "Radical post-cognitivism: new approaches to intelligence and the mind" the inaugural lecture of Professor Mark Bishop

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On the 13th March, Professor Mark Bishop gave his inaugural lecture to a full lecture theatre at Goldsmiths, University of London. Entitled "Radical post-cognitivism: new approaches to intelligence and the mind"; described as the "integration of a lifetime's work", the theme was how the underlying assumptions of Cognitive Science have changed during Bishop's career, and how he sees it developing in the future. The core argument was that much contemporary Cognitive Science research tacitly assumes intelligence is the result of computations upon conceptual representations; a philosophical stance that is at least questionable given many longstanding critiques [2].

Bishop identified three avenues by which Computationalism came to pervade Cognitive Science: (i) explicitly, that cognition was taken to be defined as computation upon representations; (ii) implicitly, that cognition could be defined as computation upon vectors of real numbers and (iii) descriptively, through confusion of accurate computational models of neurons with "an ontological claim about the reality of what neurons do". "We can describe the operation of brain neurons mathematically, computationally, but that's no reason to believe that *brain neurons really do compute*."

The current state of the art of AI was addressed with a video of IBM's Watson and a live demonstration of Apple's Siri, which both seamlessly integrate natural language processing, voice recognition and information retrieval to a degree that many would have considered unfeasible only a few years ago, especially without extensive user calibration. Bishop noted that

these undeniable successes utilised an approach that was not inspired by, or attempting to recreate, human intelligence. As such, contemporary artificial intelligence was shown to have successful applications, but was limited in its explanatory power.

Bishop continued by identifying weaknesses in a computational account of mind, firstly the human mind was suggested to be capable of insights unreachable through logical inference. This argument, citing John Lucas, Roger Penrose, and Kurt Gödel, showed there exists logical statements that a human can see to be true but a computational process could never prove to be true. Bishop subsequently questioned the very notion of computation, claiming that the criteria for assigning computational properties to a process are "observer relative". This claim was fortified with reference to his earlier work on John Searle's Chinese Room argument which criticises the notion that computation could ever lead to understanding and Bishop's own "Dancing with Pixies" argument which aims to demonstrate that a strong computational theory of mind implies panpsychism [5].

The other branch of computationalism, that mental processes manipulate representations, was considered next. An entertaining demonstration of inattentional blindness (including a few extra surprises for anyone who had previously "seen the gorilla") the success of which questions whether the human mind actually processes a camera-like representation of the visual scene. Subsequently, the homuncular argument which claims that explaining vision with representations begs the question as the representations themselves require a observer. Bishop cited Dennett's "content/vehicle distinction" clarifying he was not denying the existence of patterns of neural activity that appeared to represent the outside world, but that their existence was not sufficient evidence that they were being exploited as such by the mind.

As an introduction to an alternative to computationalism, Bishop described the operation of a centrifugal (or "Watt") Governor, as an example of adaptive real-time behaviour, without objective representations. This led to a discussion of swarm intelligence, where intelligent behaviour can appear to emerge without the existence of a central executive controller or any encoding of a global goal. The application of this approach was further demonstrated with a discussion of the success of Bishop's implementations of Stochastic Diffusion Search [1].

This led to Bishop's concluding claim, that artificial intelligence and cognitive science are finally parting ways, artificial intelligence applying computational techniques on "big data" to real problem solving, but at the expense of providing insights on big questions about mind. Cognitive sci-

ence can continue to address these questions, but to do so requires a change of tack to align itself more with philosophers such as the phenomenologists Maurice Merleau-Ponty, Humberto Maturana and Francisco Varela who emphasise the role of the body, environment and action. Bishop encapsulated this emphasis in the phrase "My brain, in my body, in our world."

On these grounds Bishop identified the "four E's" defining characteristics for a new era of cognitive science, that research should recognise the extent to which they are: Ecological, accounting for the environment; Embodied, concerning the physical presence of a system; Embedded, concerning the system's relation to the environment; Enactive, concerning the role of action.

References

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