

Machine Consciousness

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*Perhaps the first question concerning machine consciousness is whether consciousness itself is metaphysical or relational.³ The first implies that it is associated to some structure or process that extends beyond the ordinary material world. Examples include Henri Bergson's *élan vital*, Sri Aurobindo's hierarchical beings (including the human), and the closely related levels of being (or vehicles) described in Vedanta philosophy. If anything like these are the case then the only hope for machine consciousness would be the construction of a device that offers an appropriate home or "nest" for the more subtle elements of the consciousness being. At present it would seem that our best candidate is the already familiar biological organism.*

On the other hand if consciousness is relational, that is, if it is the result of certain critical architectural configurations of matter or energy, then it is reasonable to ask what these configurations might be. This amounts to a functionalist approach to the problem of consciousness. William James, for example, asserted that experience, a close relative of consciousness, occurs when two aspects of this (pluralistic) universe stand in a relationship such that one "knows" the other. In more contemporary terms a number of modern theorists have suggested that consciousness is somehow related to information. The latter meets David Chalmers' portrayal for "something extra" in the physical world that accounts for the appearance of consciousness.

Drawing on the importance of information, but not relying on it in a purely functional sense, Liane Gabora takes a panpsychist view that consciousness may be everywhere, but evolutionary survival requires that it must be warped in such a way that each organism values its own subjectivity over that of others. This idea is consistent with David Chalmers' double aspect theory of information, but suggests that the consciousness is a function of the degree to which information is locally amplified. Self-organizing and self-referencing dynamics both in the biology and informational dynamics of the nervous system create an autocatalytic closure by trapping, amplifying, and integrating information. The first two phases of this process are analogous to how light is captured by a cut diamond. The effect may be magnified in humans by second order closure via distributed memories woven into conceptual cognitive networks.

Tom Ziemke has recently suggested similar self-organizational dynamics as the key to the development of a sense of self in computational systems, and

thus a potential direction of development toward the creation of machine self-awareness if not consciousness itself.

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³ Actually, the first question probably should address the meaning of the word "consciousness," but to do so would lead in a different direction. We note only that there are significant differences in what the term means to different people. Most important for this discussion is that some essentially view it as intelligent thought or behavior, while others essentially view it as subjectivity.