

The self 'out there'

Igor Aleksander

Despite sounding like the mother of all oxymorons, the concept of a conscious machine is gaining credibility. Certainly, no actual machine could be described as being conscious. But neurologists and engineers are developing ever more accurate models of the specific chemical and electrical activity in living brains that is necessary for a specific conscious sensation to arise. As this understanding is mechanistic, it raises the serious possibility that an implementation of such models could give rise to machines that are driven by the same mechanisms, and hence are 'conscious' in a non-biological way.

What features does consciousness have in

living organisms? First, to be even minimally conscious, any organism must be aware of its presence in an external world with which it can interact with respect to its needs. This favours the creation (by evolution or design) of successful mechanisms that support this interaction. Few would deny that in natural organisms this sensation is uniquely tied to the electrochemical activity of groups of neurons, which in higher organisms form a brain. This activity is unique in the sense that two distinct sensations cannot be due to the same brain activity without evoking ghostly intermediaries.

Second, what we imagine and recall involves resonances between neural layers, stimulating activity that originated during perception. So imagination 'feels' like a recall of perception even if the exact perception had never taken place. What makes consciousness so puzzling is that the neural activity responsible for both perception and imagination provides a sensation of being an observer (the self) in an 'out-there' world. This sensation depends not only on sensory neural activity but also on virtually unconscious exploratory motor neural activity due to conscious curiosity or to unconscious habit, instinct or reflex.

Take the oculomotor system, for example, which has evolved to allow the eyes to move rapidly towards tiny changes in the field of view, to follow moving objects, to converge if something comes nearer, and even to move rapidly towards a perceived sound. It also interacts with memory to check hypotheses about partially seen objects and to predict their unseen parts. So the neural activity that supports conscious sensation not only involves sensory signals such as those generated by incident light on the retina or vibratory stimulation of the cochlea, but is clearly dependent on signals from the parts of the body that move the eyes and the head, and signals from touch. There is much evidence in neurology (for example in the work of Carlo Galletti, which began in 1989) that cells in various cortical areas only process sensory information as indexed by muscular action, creating inner representations of events that take place 'out there'. Some of this supporting unconscious neural activity is what Christof Koch and Francis Crick call "the zombie within".

The key step in accepting that a machine can be conscious is to realize that when humans describe their sense of consciousness (including its strong qualitative content, sometimes called 'qualia'), they are describing neural activity that has 'out-there' properties, and that there is no real barrier to machines doing the same. Such thinking is

Artificial consciousness

Are we nearing a time when sensation can be mechanistically explained outside biology?

reflected in philosophy too: 'out-thereness' is the term used by Max Velmans to describe the 'reflexive' nature of consciousness. Work by Jack Cowan and colleagues at the University of Chicago has shown that appropriate computer models of the human visual system can give accurate predictions of the hallucinatory sensations reported by drug users. This puts paid to criticisms that sensation cannot be mechanistically explained except through biology.

Another criticism is that even if 'out-there' mechanisms were transferred into a robot, it would only become a well-behaved, unconscious zombie because it would still lack 'ingredient X', which turns the zombie into a conscious organism. The conscious-machine concept calls for a fair argument. The machine constructor will attempt to demonstrate that ingredient X is not necessary, whereas the detractor will have to prove that it is, which has not yet been done.

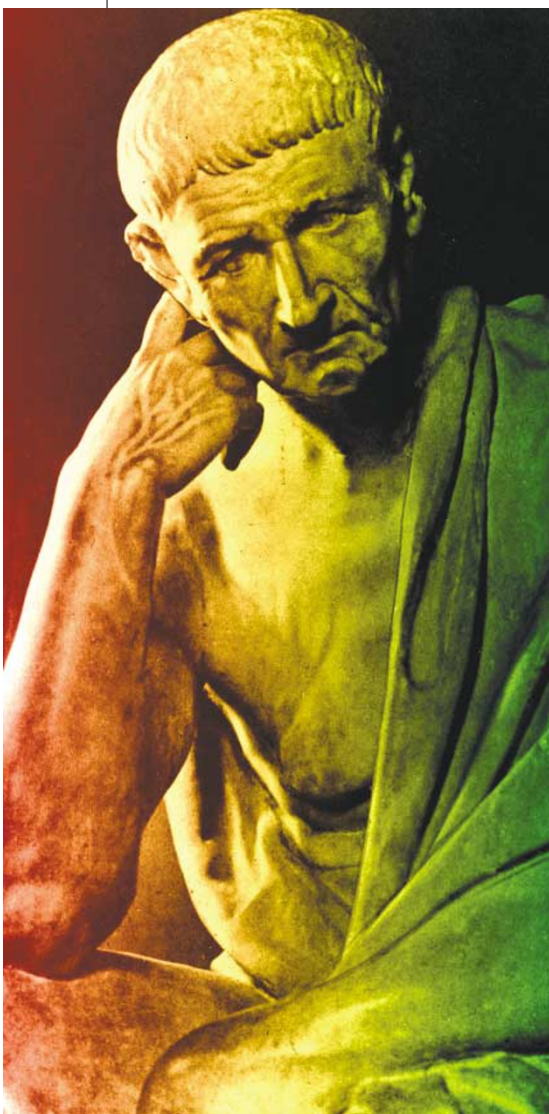
Of course, any robot constructed with the features I have described might be able to perceive and imagine itself in a visual world. More speculatively, emotion, desire, ambition, joy and depression, which also have a neural basis, would become candidates for being transferred into engineered artefacts. As far as the conscious robot goes, it is not our emotion, desire and so on that would be transferred to it — rather, it would have a non-biological neural structure, only developing emotions that would be appropriate to its own existence. It would share with living beings the evolutionary, emergent, depictive and interactive mechanisms that make us conscious. ■

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FURTHER READING

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