NYUx - Theories of Media and Technology
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Research 1 - Reflexive Cybernetic Objects

INTRODUCTION

In my curation, I noticed the idea of self-referentiality, developed in the second wave of cybernetics. I noted the blurring of subject / object boundaries that can be associated with this, and also the idea of "virtuality", which I understand as a notion of information flows in the world being somewhat distinct from the physical bodies in which they are expressed. I decided that I would focus on reflexive systems that nevertheless involve the human body and mind in some way: so perhaps looked at systems which inform human judgement or perception in some way.

From the six objects I chose last time (Steam regulator, mirror, tape recorder, mirror neuron, "cookie reinforcement" (a processing sketch using reinforcement learning I'd made) and Pablo Veron's shoulder (synecdoche for communication in tango dance), I decided to focus on the latter three. On the first three: the steam regulator is only reflexive in a limited sense, and the mirror and tape recorder are artefacts that record, but are not in themselves systems.

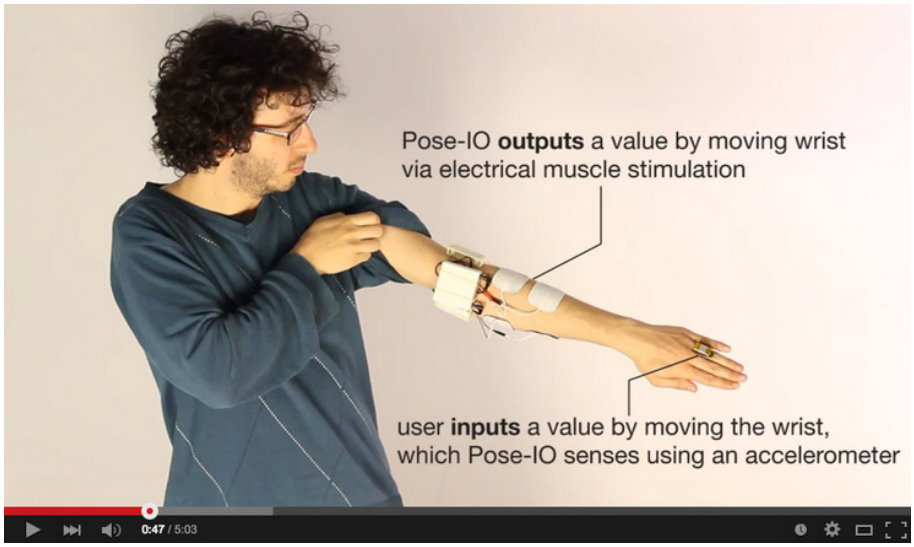
On the latter three: there's a connection between the mirror neuron and the failings of the cookie monster's interactions with Kermit the frog, who was intended as a user-controlled agent who would train the cookie monster. My idea is that if my cookie monster had a sort of mirror neuron, he would be able to learn in the same way to respond from movement where he is pushed by Kermit and movement where he moves himself. (This may be a sort of reverse mirror neuron process)....

Pablo Veron's shoulder is taken as indicative of two kinds of porcess that I take to be at play in tango: an action-perception loop in one's own movement (monitoring and adjusting the position of the body); and a "conversational" type look in relation to one's partner, where the partner's movement is in reponse to one's own, and in turn one's own movement is in reponse to the partner.

This notion of coversation is developed in second wave of cybernetics as I understand it, based on my limited reading so far. I came across an interesting analyis of the heater/thermostat relation which is a classic of cybernetics (c.f. also the steam regulator): we can argue that, just as the thermostat controls the heater in response to increased temperature, so the heater can be seen as a system that controls the thermostat in the same way. A comparison is made to the human body: where normally we think of the brain as controlling the muscles, we can reverse this, such that the muscles are used to control (program??) the brain. Examples such as ballet teachers physically moving their students' bodies come to mind, and also some physiotherapy techniques.

This can possibly be linked to to a notion of simulacra, or multiple drafts or imitations of something.... if ideas are communicated in reflexive loops, with multiple copying, there's a question about authenticity or evolution involved: is the "copy" a development, an evolution? Is it inferior to the original?

Text 1: Proprioceptive Interaction



PoseIO is a human-computer interaction project which creates a cybernetic-style sense-action loop using the sense of proprioception, rather than the more usual senses used (vision, hearing, possibly touch). It combines a wrist mounted accelerometer, able to monitor and digitize the movements of the user's wrist, and an arm mounted apparatus which is able to invoke motion in the user's arm, as seen in the image above. This is interesting, because in some sense it internalises the representation of computation within the user's body: the user understands the computer's output by reading the position of their own body!

The article explains three experimental applicaitons developed to test the system. One symetric applicaiton was the control a video, where the computer essentially users the users' hand as a progress meter. There's an interesting interaction here: the computer indicates the current position of the film by angling the user's wrist appropriately: but the user can overrule this, and adjust the video's position, by providing more force to "overrule" the computer. Thus a feedback loop provides two way communication.

This is interesting, because a similar dynamic can exist in tango, were a leader gives out information to the follower on a proposed step, and the follower executes it, bu the follower can also feedback information on speed and dynamics... which the leader can accept or overrule.

Other variations included an implementation of the "pong" game with the users two hands and an immaginary ball, and a game of "slaps".

The articles concludes that the prototype is interesting, enjoyable and not dangerous to use, and provides interesting scope for "eyes free" interactive systems.

REFERENCE

Pedro Lopes, Alexandra Ion, Willi Mueller, Daniel Hoffmann, Patrik Jonell, and Patrick Baudisch. 2015. Proprioceptive Interaction. In Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems (CHI '15). Association for Computing Machinery, New York, NY, USA, 939–948. DOI:https://doi.org/10.1145/2702123.2702461

LINKS

Overview: https://hpi.de/baudisch/projects/proprioceptive.html
Demo video: https://www.youtube.com/watch?v=KMxIfj7zhlw.
Article: http://plopes.org/wp-content/uploads/papers/2015-CHI-ProprioceptiveInteraction-Lopes.pdf

Text 2: Geoffrey Brake-Brockman's cybernetic installations

Geoggrey Brake-Brockman is an artist whose work consists in cybernetic installations. He tries to make humans and machines play together, and creates machines which have emotional states. He relates the notion of setting up "preconditions" for emergence: the creation of unexpected behaviours.

One of the most interesting ideas in his presentaiton is that of "Simulacra", which he identifies with Baudrillard. These are simulations which are layered, where "one thing pretends to be another thing, which in turn is a copy of something else". He relates that "as this stack deepens, the idea of the original loses validity", and that in the artist's interpretation, "the order becomes reverisible", something he calls "the inverse Pinnochio Effect". He also relates an indea of hte artworks having internal complexity, which is to some extent hidden; combined with having just enough of an invitation to triggerinteraction and human engagement.

This notion of bhaviour emeging from interaction is to some extent what I was trying to get at - and failed to do - with the "cookie reinforecemnt" idea.

The notion of simulacra seems to me relevent to conversation in general, where ideas are passed between people and interated. This is a different means of understanding information flow that the earlier transfer of information idea which I explored in discussion board.

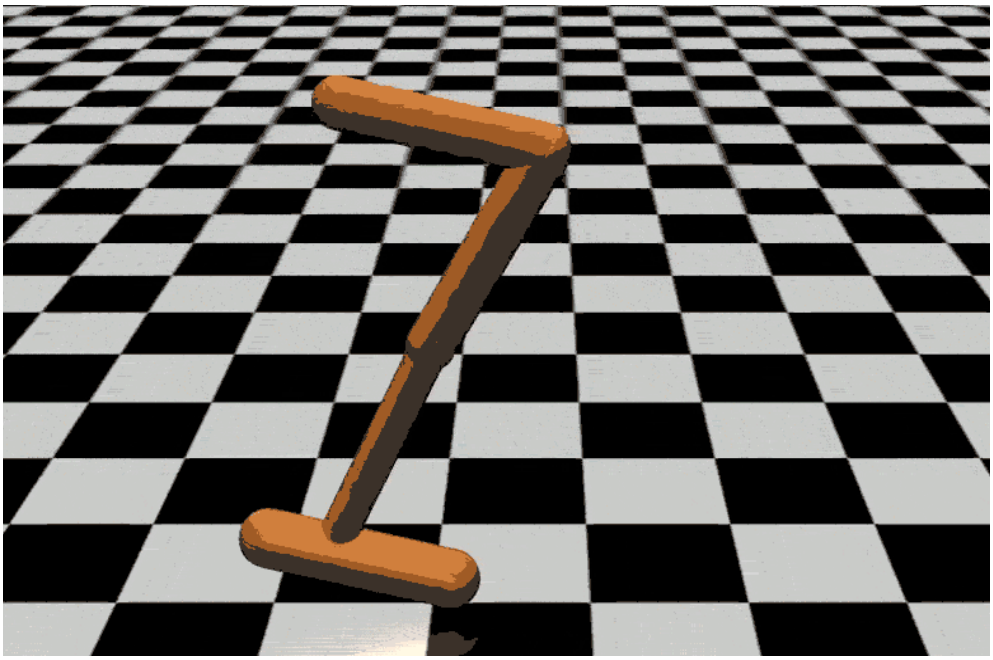
REFERENCE

Nikolov, N., 2020. These Cybernetic Sculptures Need Human Interaction To Come Alive.. [online] Mashable. Available at: <https://mashable.com/video/cybernetics-artist-geoffrey-drake-brockman/?europe=true> [Accessed 8 November 2020].

LINKS

Interview at https://mashable.com/video/cybernetics-artist-geoffrey-drake-brockman/?europe=true
Artist's website at http://www.drake-brockman.com.au/

Text 3: Deep Reinforcement learning from human preferences



Very briefly: this article relates how human supervision can be used to enhance artificial reinforcement learning systems, using human judement to tell a computer simulation when it is doing well. It relates that relatively little human interaction is needed.

Perhaps the reverse is also possible: where a human behaviour is rewarded or not, depending on its quality, as assessed somehow.....

[sorry, not time to write more!]

REFERENCE

Christiano, Paul & Leike, Jan & Brown, Tom & Martic, Miljan & Legg, Shane & Amodei, Dario. (2017). Deep reinforcement learning from human preferences. Available at https://arxiv.org/pdf/1706.03741.pdf (accessed 8th November 2020)

LINKS

Article: https://arxiv.org/pdf/1706.03741.pdf
Blog post: https://deepmind.com/blog/article/learning-through-human-feedback