21A.850J / STS.484J The Anthropology of Cybercultures
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Student A

The transition that Helmreich proposes from an “aesthetic of critique” to an “aesthetic of conversation” called my attention, as did the more generous light under which he visits the subject of his earlier ethnographic work: the community around what he calls “classic” artificial life in the Santa Fe Institute in the late nineties. Helmreich’s survey paper has the purpose of intervening the context of an ongoing conversation between scientists and humanists around the subject of artificial life. In fact, he seems concerned with the *declaration* of this very context by going over texts from “history of science, literary theory, anthropology and art criticism” (p.189), arguing that the once clearly marked boundary between the scientific and humanistic perspectives on artificial life has begun to evolve into a ground for cross-disciplinary discussion.

More specifically I was interested in Helmreich’s revisiting of Chris Langton’s account of the origins of artificial life, this time to recognize the novelty of the way he framed the subject -he actually uses the words “field-founding” and “invitingly expansive” to describe it (p.192)- and perhaps to place it within a more nuanced and broader cultural context. Despite his will to articulate a dialogue his view on the subject isn’t fundamentally different from the one in "Silicon Second Nature": that the claims of neutrality of a community of scientists who see themselves as gods are worthy subjects of discussion and debate remains eloquently as part of the argument (but perhaps not at its center). Even though he gives Langton credit for starting a conversation, and for providing a ground for critical discussion on the shifting meanings of life, he insists on the cultural trait of the supposedly neutral assumptions taken by AL scientists and uses Riskin’s nuanced look at AL histories to show how some of Langton’s are based on a fundamentally “unchanged quest for creating life”. The piece, therefore, feels less like an “amendment” than as a constructive re-positioning of his own work in a larger context where the subject of study is no longer looked at through the lens of the ethnographer focusing in a single community, but as a complex, rich dialogue spanning different spheres of knowledge and culture.

At the end I couldn’t avoid the –perhaps wrong- impression that the very enjoyable ‘Life is a verb’ is a piece by an author who felt indebted to his subject. The fact that the paper was published in the 'Artificial Life' journal is consistent with the piece's aim at building the mentioned cross-disciplinary dialogue and resonates with aspects of Fujimura’s search for cross-disciplinary bridges in systems biology:

“The point I will develop is that such traces of continuity [of whole-istic, or organismic approaches to biology] will show that systems biology includes a host of approaches that bring different traditions of research, different epistemologies, and different ontologies to the subject of organic systems.” (p.199)

Perhaps more relevant, in what seems to be a striking similarity to the artificial life endeavour –as accounted for by Helmreich- Fujimura describes the hybrid nature of systems biology research, in which there is ‘wet lab’ research, concerned with the experiments on living biological materials, and ‘dry lab’ research, which refers to the

analysis of biological information using computation and simulation not only as a modeling tool but also as a source of empirical evidence:

“Computational simulation is a major emphasis of systems biology. Experiments include introducing perturbations into simulated systems to see what happens under different conditions.” (p.203)

The fact that at the very formulation of the research program for systems biology Kitano attributes computational models the ability to channel both pragmatic modeling and theoretical exploration in biology, implies that –at least to a certain extent- the systems biology and the Artificial Life endeavors share a fundamental, and perhaps problematic, premise of an “ethos of empiricism towards artificial worlds” (Helmreich, 189).

In Kitano’s scientific practice of systems biology the computational medium for simulation and analysis of biological data makes explicit commitments to a command-control and mechanistic analogy (as blunt as cars and airplanes) that permeates the models and language to conceptualize living beings. Like Helmreich’s piece, Fujimura avoids pointing a finger at the problematic implications of these commitments, and proposes a study of their production instead, a search for what is “lost in translation” (p.220). She suggests DST (developmental systems theory) as an alternative perspective that may provide a richer ontological plateau from which to discuss biology, and celebrates its acknowledgment of genes as more than data units (a sort of gene-situatedness), but acknowledges its failure to bridge its very suggestive theoretical framework to a consistent research program, one that can be generously funded, gain legitimacy in institutions, and perhaps become the new “buzz word” in biology.

Student B

I generally agree with Helmreich's point of view: rather than aiming for and evaluating on a direct translation of human life as an imperative, I see the current development in the ALife field as a back-and-forth dialog with other fields like art, entertainment and business, employing one to understand or articulate the other. And this sentiment of mine is not based on academic knowledge but on general life experience.

For example, when I first encountered the term "emergent behavior" of AI swarm agents from Michael Crighton's book Prey, I thought it was clever that such term was defined and used in AI, but the concept itself didn't surprise me -- I would have noticed something comparable in my previous training in art and design. Conversely, it doesn't shock me with novelty when I see an art or design piece that is based on a similar concept.

As someone with no prior knowledge of the AI/ALife field however, I found Helmreich's article difficult to follow, mostly because it was a condensed review of other people's work that I am not familiar with. This could have been a great lecture (online or offline!) when accompanied by more audiovisual references and hyperlinks.

Come to think of it, one reason why I want more pictures is because... I think if I take a quick glance at a picture or video of each work referenced in this article, I'd know what it is about, that I'd get the gist of it, just by seeing a picture. In order to follow Helmreich's logic, I have to have an impression of each example, and visuals would have been the most effective.

Take Nexi for an example. When I just hear "MDS (mobile, dextrous, social)" I have no idea what Nexi will be like. In fact, when I see the official blurb on the Personal Robots group website that starts with "We are developing a team of 4 small mobile humanoid robots..." I start getting a fairly incorrect idea of what Nexi might be like -- maximum 2-foot-tall upright robots with wheels and long arms that collide with each other and tilt heads to listen to each other. But then once I see a picture of it or better yet in case of Nexi, watch the video, I immediately realize that it's far from what I considered "small" or "social."

I am not sure if this desire to glance at the previous AI work to follow Helmreich's logic falls into the "I know it when I see it" phenomenon mentioned on page 191, but there is a lot to be reckoned immediately by examining the external image of a given work.

Response to Fujimura's article to follow.

Student C – Nadya Peek

Ecology has been a really popular term in my environment lately. 3 of the groups at the media lab have ecology in their name: Ecology Media, Information Ecology, Design Ecology. In a variety of northern European countries the term ecological is used interchangeably with words like green, sustainable, environmentally friendly, organic. What we call organic food in the US is called biological food in the Netherlands. As soon as we get bogged down in the semantics of the various words, it becomes a completely different discussion that maybe has little to nothing to do with the original topic. Having dictionary definitions in articles therefore always makes me a little suspicious.

I enjoyed Helmreich's paper though, as it ambles through compelling works from art, science and technology in their attempts to recreate life. Christopher Langton's distinction between life-as-we-know-it and life-as-it-could-be is exactly what seems to be starting to blur. H2.0 is a popular buzzword at the Media lab, as Ed Boyden adds wetware and Hugh Herr adds hardware to willing bodies. However, the dialogue between 'history of science, literary theory, anthropology and art criticism' and 'artificial life' and its agenda of the redefinition of terms like agent, emergence and life seems to be exactly this argument over semantics I'm not so fond of. The purpose and possibilities of creating life as any researcher sees it lays with the designs and intents of that researcher, and not with a updated definition of terms. I think that Helmreich is trying to frame a space where engineers can attempt to create some sort of life and humanists can consider engineering and its narrative. The space is being inhabited by the 5 examples he gives, and he makes it wide enough for many other inhabitants working with possible considerations of life.

Fujumura signals biological systems and engineered systems converging into a symbiotic interaction, but thinks that the convergence oscillates around the 'machine-living organism border'. Fujimura wants to know what is being lost in translation each time that border is being crossed, and for this examines systems biology and developmental systems theory. The more complex questions and problems that are arising because of the masses of information that are becoming available in biology clearly do need different approaches.

People like calling the use of computer science and mathematics techniques in biology, economics or physics 'interdisciplinary', which bothers me to some extent. If a well defined search algorithm or optimisation technique that was developed in artificial intelligence is being used in biology, that is merely a good application for the algorithm. However, to some extent the ideal implementation of the algorithm also takes a lot of the context into account, and this blurs who is designing for whom. If systems biologists start reconfiguring computer science to be able to deal with the problems they are encountering, then I think you can speak of interdisciplinary work. Simultaneously I think that a lot of the analogy-inspired names used in artificial intelligence are misleading: genetic algorithms, neural nets, these names make it easy to conflate the biological with the computational. That is not to say I do not think these fields are converging. As the problems in computation and biology become more complex, and fields start borrowing problem solutions from each other, it becomes increasingly useful to have knowledge of both fields.

I would disagree with any hint that considered the computational problems in biology fields as indicating more cyborg-ness. However, as systems biology continues and we are able to engineer and produce more specific drugs, more acceptable artificial organs and more fine tuned limbs and digits, it would be interesting to consider how much of it is machine, and how much is human, and whether or not we are happy with the way things are advancing and the control we have over the machine.

With regards to the example we were supposed to bring about wetware computing, I offer the sort of obvious (sorry :() example of Tom Knight's work at CSAIL. His BioBrick parts are DNA sequences structured in such a way that they can be stacked together and incorporated into some cell which will then perform the encoded action. I think they mainly want to do things for nanoscale fabrication, but maybe they want to make creatures at some point too.

Student D – Yiftach Nagar

Even though Fujimura (2005) does not mention Anthony Giddens' structuration theory (1984), my internal structuration sympathetic string resonated strongly with almost every paragraph of her paper. Her description of how system biology theorists try to constitute new metaphors, a new biology of the body, drawing images from other fields and how ideas and metaphors travel across disciplinary and semiotic borders, and how they get changed in translation, reminded me of Giddens' description of how social structures are shaping human action – enabling and at the same time constraining it, and then in return

are being shaped back by those very same human actions, in an ever perpetuating spiral dialectic. Her writing kept kindling thoughts about metaphors, and their role in structuring and facilitating streams of ideas and discussions that eventually constitute what we call scientific schools of thought and disciplines of scientific practice – thoughts that evoked with our readings and discussion of "cybernetics" (especially: Bowker, 1993).

I appreciate the way she traces the dialectic created with the moves of metaphors across disciplines and how (if I understand her correctly), human-made artifacts (machines) - in which metaphors, ideas and social structures are embedded and inscribed - serve as the vessels, carrying and transmitting those ideas and metaphors, or at least some shades of the original ideas and structures in this dialectic process. I know far too little about Latour's work (1991, 1992) on the sociology of artifacts, but I'll risk offering that Fujimura's paper enhances his view by examining relationship along time (in a manner reminiscent of the way structuration theory builds on and enhances social constructivism).

For Fujimura, the border between organism and machine, which "has been crossed multiple times in both directions" is but one example of such crossing – and so I think we can say her interest is in the sociology of metaphors: how they are socially constructed, and how they enable and constrain thought. How they help form ideas in one discipline, inscribing meaning and constituting structures that traverse borders and form new, modified metaphors. By pointing to the border-crossing as the place where meanings are translated, distorted, transformed, added, deleted and lost, her essay provokes thought of the power of language and its role in building human knowledge, as well as thoughts about the tension between the desire of some groups to use holistic disciplines/metaphors to bridge across disciplinary borders, and the inevitable specialization of fields as human knowledge is accumulated (or rather I should say: as ~~human~~ knowledge**s are** accumulated). Thinking about that tension, I was reminded of a paper by Beth Bechky, describing the attempts of communities of practice to share meaning across their borders (Bechky, 2003). I think that the use of metaphors borrowed from other fields – even if they are somewhat modified and distorted in translation – can be useful (and, eventually, I think usefulness is a good criterion to judge it by). But I also think that trying to negotiate shared meanings across disciplinary borders can be a very problematic/expensive/painful process with low chances of succeeding. I've been witnessing one such attempt recently by following the mailing lists of WSRI.

Final words from Marshal McLuhan:

"Each of man's artefacts is in fact a kind of word, a metaphor that translates experience from one form into another… …It makes no difference whatever whether considers as artefacts or as media things of a tangible 'hardware' nature such as bowls and clubs or forks and spoons, or tools and devices and engines, railways, spacecraft, radios, computers, and so on; or things of a 'software' nature such as theories or laws of science, philosophical systems, remedies or even the diseases in medicine, forms or styles in painting or poetry or drama or music, and so on. All are equally artefacts, all equally human, all equally susceptible to analysis, all equally verbal in structure." (McLuhan & McLuhan, 1988).

------ side notes: ----

1. A recent working paper published by Rob Laubacher and Tom Malone (my advisor) uses the metaphors of… genes and genome… to talk about collective-intelligence. I need to re-read Fujimura more deeply and then look at that working paper again. I'm sure it will put things in a new perspective.

2. Ashamed to admit: I couldn't really relate to Helmreich's paper. I didn't really understand it. Something must have gotten lost in translation.

References

Bechky, B. A. (2003). Sharing Meaning Across Occupational Communities: The Transformation of Understanding on a Production Floor. *Organization Science, 14*(3), 312.

Bowker, G. C. (1993). How to be Universal: Some Cybernetic Strategies. *Social Studies of Science*, *23*, 107-127.

Fujimura, J. H. (2005). Postgenomic futures: translations across the machine-nature border in systems biology. *New Genetics and Society*, *24*(2), 195-226.

Giddens, A. (1984). *The constitution of society*: Polity Press Cambridge [Eng.

Latour, B. (1991). Technology is society made durable. *A Sociology of Monsters: Essays on Power, Technology and Domination*, 103-131.

Latour, B. (1992). Where are the missing masses? The sociology of a few mundane artifacts. *Shaping Technology/Building Society: Studies in Sociotechnical Change*, 225-258.

McLuhan, M., & McLuhan, E. (1988). *Laws of Media: The New Science*: University of Toronto Press.

Student E

Reading these papers reminded me of Jenny Sabin's work - an artist now teaching in an architecture department - Jenny's projects link abstract biological concepts to material productions of simulation and representation. A slightly different take on bio-informatics, but it's still about the links between nature, abstract concepts, computation/simulation and material realities. Here are some project examples:

Website

In several projects, she has been weaving cloth on Jacquard looms to create representations of complex biological data sets. The common binary language between weaving and data makes it possible to translate between the two - potentially gaining in the process (interesting to compare to the discussions around translation and boundaries in the articles). Body Blanket is a translation of data from a body while undergoing FMRI scans.

She has also been working with a biologist Peter Lloyd Jones on a project called Branching Morphogenesis, "an investigation of the relationship within branching structures formed by interacting vascular cells" (SIGGRAPH 2008 Catalog) In this project, parametric modeling techniques from architecture and design were moved into a biological realm.

This work led to a translation back into a large-scale material installation composed of thousands of zip-ties currently being shown at Ars Electronica in Linz, Austria which has an exhibit called Biolab showing at the moment. From Sabin's website: "The installation materializes five slices in time that capture the force network exerted by interacting vascular cells upon their matrix environment."

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Here are some thoughts on Fujimara's descriptions of metaphors in biology as a "….series of /movements back and forth across the machine-living organism border/." (p.196)

She asks: "…whether systems biology as it is currently developing owes more to mechanistic ontologies of cybernetic systems than to von Bertalanffy's holistic ontologies." (p.199) In light of this question, I was intrigued by her description of the relationship between modeling and simulation versus wet lab experimentation in systems biology. In Fujimara's description, systems biologists collaborate with molecular biologists to test their results against what seems to be the "real world." The hypotheses that emerge "bottom-up" through "data mining" (p.205) lead to targeted wet lab experiments which saves time and money. What is translated back to the simulators? What are the constraints on simulation (especially if "mechanical analogies and cybernetic systems dominate" in systems biology (p.206))? Fujimara begins to answer this question at the end when she says, "/Translations can distort, transform, delete, and add./" (p.220), but that sentence left me wondering what those things are. Her discussion of DST starts to describe these elements by bringing in more elements (beyond genes and environment) or multiplicities of understanding.

[As an aside I can't help thinking about CAD/CAM processes in design, architecture where similarly perfect models sometimes do not lead to perfectly constructed buildings because of the idiosyncrasies of "nature" on site.]

Student F

I agree with Lansing [p.190] that to implement A-life appropriately, one should not only simulate how the life-as-it-should-be but instead the life-as-it-could-be, to investigate other possibilities of human behavior rather than to pursue its resemblance. Otherwise, there is no significance information that we can afford from simulation in the A-life. Lansing's argument also correlated with Whitelaw's in his metacreative endeavor [p.193] and Kelty-Landecker's in their premise of L-System [p.192] that it's not about product or

code but instead, it’s about the process, a ‘verb’ that trying to find other kind of life than it was when it began.

Both thoughtful discourses by Helmreich in linguistic and Fujimura in biology, express interesting promises in the field of bioinformatics. However, following Doyle’s argument [p.191], I think the question should be: When is the right time to stop playing in digital dimension and get start connecting it its physical relation? How is that simulation in physical dimension can always be real-time connected and reproduced the evolution from its digital version. For example, how is the process of when our body gets sick could always be alerted or cured automatically? Or when we get angry, our digital emotion machine can calm us down?

System Biology, hopefully I'm wrong, utilized only to confirm wet lab experiment, which is more costly and time consuming [p.203] instead of literally integrating both the dry and wet lab constantly. In fact, it considered merely as a substitution of wet lab disadvantages which is mostly about memory / database / calculation capacity [p.203-206] and could not really reflect the true complexities of real biological system (Kirschner, 1999). And sadly, when it come to simulate the related environment that develop the way organism behave, as proposed in Development System Theory, it become too complex too handle (p.217).

I hope it’s only a matter of technical issue of the equipment and not about the essence of the complexity itself. ‘Cause, if I’m not mistakenly got Doyle’s preposition, I guess the ideal representation system of bioinformatics is the one that represent the essence of life as it stand seamlessly in-between the relation of A-life and Physical life.

Student G

Finally, pulling together this week's readings with last week's discussion about the close ties between robots and the US military --
Kitchener, Gary. “Pentagon plans cyber-insert army.” *BBC News*, March 16, 2006.
Harvard Microrobotics Lab