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The Anthropology of Computing
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Today's topic ARTIFICIAL INTELLIGENCE and the beginning of presentations!

ARTIFICIAL INTELLIGENCE AND THE CONSTRUCTION OF COGNITION AND GENDER
Lecture 6. October 25

Let me begin by finishing up a few points from Edwards.

Constructing Artificial Intelligence

"AI established a fully symmetrical relation between biological and artificial minds through its concept of 'physical symbol systems.' Instead of modeling brains in computer <u>hardware</u> — the central goal of cybernetics — AI sought to mimic minds in <u>software</u>" (p. 239).
FROM VON NEUMANN TO TURING

"From the EDVAC on, programs themselves were coded as binary numbers and stored in memory along with the data" (p. 246).

intelligence *as* software

"Newell and Simon [RAND people] … began to displace the cybernetic computer-brain analogy with the even more comprehensive computer-mind metaphor of artificial intelligence. The two metaphors shared concepts of coding and information. But where the cyberneticians' ideal systems were weakly structured, self-organizing, and engaged with the environment, AI systems were highly structured, manipulating pre-encoded and pre-organized knowledge *rather* than building it through sensory encounters. Instead of feedback, reflex and neural networks, the AI theorists thought in terms of instructions, languages, goals, and logical operations. The physical machine became little more than an arbitrary vehicle for the interactions of pre∞ information" (p. 252).

AI had developed a new approach: "Instead of General Problem Solvers, researchers constructed simple microworlds" (p. 294) e.g. SHRDLU. <u>Knowledge Representation</u>.

> The program/mind started to contain its own world: **the mind became a closed world**.

Let me show you an excerpt from a film that I think well illustrates this transition: *2001*, another Kubrick film.

Here, we see the HAL computer, which is both a disembodied mind and coextensive with the closed world of the spacecraft, which he (and why is it a *HE*?) oversees, manages.

This is the kind of machine Alan Turing had in mind when he wrote

Turing, Alan. 1950. Computing Machinery and Intelligence. Mind 59(236): pp. 433-460. Online: www.abelard.org/turpap/turpap.htm

What are digital computers (and discrete state machines)?

What does Turing mean when he says that digital computers are <u>universal</u>?

What is Turing Test? How does Imitation game answer question "Can a Machine Think?"

> by <u>rephrasing</u> it as: "Are there imaginable digital computers which would do well in the imitation game?'"

"It is played with three people, a man (A), a woman (B), and an interrogator (C) who may be of either sex. The interrogator stays in a room apart from the other two. The object of the game for the interrogator is to determine which of the other two is the man and which is the woman. He knows them by labels X and Y, and at the end of the game he says either 'X is A and Y is B' or 'X is B and Y is A'. The interrogator is allowed to put questions to A and B thus: C: Will X please tell me the length of his or her hair?

Now suppose X is actually A, then A must answer. It is A's object in the game to try and cause C to make the wrong identification. His answer might therefore be

'My hair is shingled, and the longest strands, are about nine inches long.'

In order that tones of voice may not help the interrogator the answers should be written, or better still, typewritten. The ideal arrangement is to have a teleprinter communicating between the two rooms. Alternatively the question and answers can be repeated by an intermediary. The object of the game for the third player (B) is to help the interrogator. The best strategy for her is probably to give truthful answers. She can add such things as 'I am the woman, don't listen to him!' to her answers, but it will avail nothing as the man can make similar remarks.

We now ask the question, 'What will happen when a machine takes the part of A in this game?' Will the interrogator decide wrongly as often when the game is played like this as he does when the game is played between a man and a woman? These questions replace our original, 'Can machines think?'"

This effectively phrases the question as "Can a machine effectively cross-dress as a woman?"

But of course Turing asks later on,

"Is it true that by modifying this computer to have an adequate storage, suitably increasing its <u>speed</u> of action, and providing it with an appropriate programme, [digital computer] C can be made to play satisfactorily the part of A in the imitation game, the part of B being taken by a man?'

a computer (A as C), a man (B), and an interrogator (C)

What happened to the woman? Does gender matter here?

Turns the question into one of a *disembodied mind*.

SPEED! action in real time
Can a machine think, for Turing?

> yes, if we adequately change our definition of thinking: "I believe that at the end of the century the use of words and general educated opinion will have altered so much that one will be able to speak of machines thinking without expecting to be contradicted" (p. 2107).

Turing considers objections: what did you think of these? Your own paragraphs?

Turing outlines the case in his favor (learning machines).

What do you think the implications of Turing's view have been?

> intelligence is disembodied, linguistic, logical

DO we now think that machines think?

> pop culture:
> *Blade Runner* (triple Turing test?);
> <u>interrogation scene at beginning of film</u>
> HAL in *2001*
> Deep Blue versus Kasparov

Adam, Alison. 1998. Artificial Knowing: Gender and the Thinking Machine. New York: Routledge, pp. 34-68.

In this book, Alison Adam takes us forward in time from Turing, and gives us a tour of the more recent history of Artificial Intelligence, exploring some of the work that built on Turing's abstract notion of <u>disembodied intelligence</u>. And, throughout the book, the argument is that <u>gender</u> is a crucial variable in how intelligence is theorized and modeled in AI — basically defined as the attempt to model or create a mind *in silico*.

So, a slightly different context than Edwards, but with some similar arguments about gender. Adam argues that calculative, disembodied rationality — think of HAL — has been the signature model of intelligence for AI.

The symbolic AI of Newell and Simon of the RAND corporation:

> as based on rational decision making (bounded rationality) based on appropriate representation. links to "<u>Cartesian</u> ideal of true knowledge as purely mental, and where that knowledge is assumed to be separable from the body, in a meaningful way, and without question" (p. 37).

This led to the next moment in AI, when, as Edwards showed us last time, the "worlds" the computer was supposed to represent were folded into the program itself.
BLOCKS WORLDS, also "micro-worlds" (these were also <u>closed worlds</u> for Edwards).

Expert Systems

representing common-sense; question is "what gets chosen for representation in an expert system and how that connects to what is understood to be expert knowledge in the first place" (p. 42). problem is that expertise is supposed to be monolithic — which leaves out contests over meaning, discipline. e.g. a medical diagnostic expert system (like ones that have existed for migraines) codify one doctor's experience as matching any patients experience.

Adam argues that this is a place where gender can slip in. And recall Edwards's argument about gender, in the context of <u>microworlds</u>:

> For men, to whom power is an icon of identity and an index of success, a microworld can become a challenging arena for an adult quest for power and control. … Human relationships can be vague, shifting, irrational, emotional, and difficult to control. With a "hard" formalized system of known rules, operating within the separate reality of a microworld, one can have complexity and security at once: the score can always be calculated; sudden changes of emotional origin do not occur. Things make sense in a way human intersubjectivity cannot (1996: p. 172).

Adam notes that philosophical debates about AI often treat it as one thing, one practice. They often don't look at actual machines. This makes both the AI theory and its philosophical critique monolithic).

<u>Searle</u>'s Chinese Room? (there is no intentionality) (strong and weak AI?)

<u>Dennett</u>'s response? (the intentional stance) "he asserts that we are imposing the intentionality of our own way of life on the computer and we have been endowed with that intentionality, in the first place, by a process of natural selection" (p. 55). <u>What do you think Dennett's position on the Turing test would be</u>?

is this good enough for you? *DEEP BLUE intelligent?*

Dreyfus's critique of AI? knowing *that* versus knowing *how*. it's about <u>embodiment</u>.

So, what are the philosophical issues at stake here, as Adam sees them?

> <u>Representation</u> (requires an individualist view of knowing, which is then mistaken for a universal way of knowing -- compare <u>Descartes</u>)
>
> <u>Intentionality</u>
>
> <u>Agency</u>
>
> <u>Culture</u>. What is the role of culture here? Well, it is often deleted in symbolic representations, microworlds, scripts, expert systems. How?
>
> culture is not homogeneous
>
> cultural worlds contain differences of power. whose knowledge is it?

culture is not only about representations, but about tacit knowledge: "knowing how"

So, how does <u>GENDER</u> figure into the way AI has been imagined and critiqued?

What IS gender?

an analytic category that describes sets of characteristics and dispositions, often believed to connect to "natural" sex difference (sex/gender), used to distinguish between "<u>men</u>" and "<u>women</u>." Such characteristics are nonetheless never the exclusive property of one gender or the other. They change and are structured over history and look different in different national, racial, sexual, class formations.

feminism is then the commitment to examine how these structures work, and often function to sustain social inequality between women and men.

So, when we examine the "<u>knowing subject</u>" in AI, we might well ask — WHO is this subject? How does gender figure in? How does AI mirror contemporary cultural notions about gender and rationality?

Given that women have long been considered less rational than men (in political philosophy at least since Locke, which was the ideological reason they could not own property for a long time; and in political practice still [women didn't get the vote in the US till 1920, France 1945; women have not been considered serious contenders for the presidency of the US]), and that some of this is because they have been considered "more embodied" than men, how does this affect how "rational" machines are built and might be gendered?

How is the ideal man thought of? <u>autonomous, individual, independent, reasonable</u>. feminism points out that this image depends on hidden labor of women, and also that it's not true, that men have bodies too.

So, a certain kind of masculine position is taken as the norm and women's experience is seen as deficient or as laden with supplementary features. This happens in the selection of "gender-neutral" medical subjects, sociological subjects, etc.

Forsythe, Diana E. 2001. Engineering Knowledge: The Construction of Knowledge in Artificial Intelligence. In Studying Those Who Study Us: An Anthropologist in the World of Artificial Intelligence. Stanford: Stanford University Press, pp. 35-58.

Diana Forsythe was an anthropologist who worked in industrial and academic AI labs.

This article is based on fieldwork she conducted among people building expert systems, computer programs that are supposed to encode expert knowledge and channel it into programmed procedures — algorithms — that can be used to substitute for the decision-making of a human expert. These were popular projects in the 1970s and 1980s and to some extent into the 1990s. (for medical diagnosis, mineral prospecting, etc.)

As a cultural anthropologist, Forsythe is interested in meaning, and the relationship between belief and practice, culture and technology. This article targets major differences between her informants' notions of knowledge and her anthropological view. So let's talk about that:

What is *knowledge* for the people Forsythe worked with?

> it's universalistic

> it's located in people's heads rather than in the world, in relationships

> knowledge is reified, formalized, codified, equated with simple information (not in need of interpretation)("information transfer" (p. 459))

> when asked to codify a piece of common-sense, they introspect and then identify their own introspection with a universal assumption (I am the world)

> they identify the structure of programs with the structure of the mind

> interviewing is not really a skill, but simple extraction

> thought and action are isomorphic

> def: page 465

what are some *problems* with this for Forsythe?

> common-sense is located, based on situation and identity

> what does she mean by 'deletion' of the social?

what is the technical effect on expert systems of knowledge engineers' notions of knowledge?

> systems are static, brittle, narrow (no analogies)

what are the political ramifications of their view of knowledge?

> installing a particular expertise in the world, one that purports to be socially universal, but comes from a particular POV. what is "deleting the social."

>> go back to Edwards and Igloo White

what positions on 'objectivity' do you think Forsythe and her informants would take?

> knowledge is always enmeshed in an interpretive frame

what do you think the role of computer <u>as a technology and a medium</u> is here? can you make connections to Edwards?

Halberstam, Judith. 1991. Automating Gender: Postmodern Feminism in the Age of the Intelligent Machine. Feminist Studies 17(3): pp. 439-460.

I think Halberstam seriously complicates Adam's argument — first by adding a dimension of sexuality that is absent from Adam, and second by showing us thinking about CYBERNETICS and definitions of THINKING have actually changed and can change the way we think about and inhabit gender.

So, gender is not simply PROJECTED onto machines, but also becomes something different once it is put through a machine. Gender is the input into Turing's thinking machine, but the gender that comes out — as it were — as output looks different at the end than at the beginning. "GENDER IS AN AUTOMATED CONSTRUCT" (p. 457).

> In a world of cyborgs, differences between male and female, machine and human may not always line up or be so neat. This is what Adam misses: contradictions and transformations in gender REMEMBER THE LIBERAL ANXIETY?

An example on how programming practice can reprogram gender, building on Turkle's notion of the Second Self (1984) {people have come to project desires and fantasies about themselves into the computer [title puns on de Beauvior's Second Sex]}

> Sherry Turkle argues that an aesthetic of "hard mastery," in which programmers seek to completely comprehend and structure programs, is giving way to one of "soft mastery," in which people encounter and appreciate computers as dynamically changing systems only partially available to complete understanding. You can't understand the whole thing anymore.

> So, she argues, the masculinist imperatives of standard Artificial Intelligence - rationality, objectivity, disinterestedness, and control — yield to what are commonly characterized as more "biological" programming techniques — neural nets, genetic algorithms.

> This shift follows changes in technologies, from the modernist top-down logics of IBMs to the bottom-up, user-friendly opacities of computers like Macintoshes. Turkle argues that new modes of computing are more appealing to women, who have traditionally been trained to value negotiation, relationship, and attachment (see Gilligan 1982).

> But this is only part of the story. Many men see themselves as refiguring their masculinity as they work with modes of computation that mimic "nature." In a conversation with two younger heterosexual men about how their gendered subjectivity might be implicated in their science, they told me that Artificial Life allowed them to express and work with a side of themselves that was more intuitive, perhaps more stereotypically "feminine."

Anyway, back to Halberstam. What is her analysis of the Turing test?

> "Turing's point in introducing the sexual guessing game was to show that imitation makes even the most stable of distinctions (i.e. gender) unstable" (p. 443).

But this also shows that intelligence and gender are BOTH imitative systems, and "the boundaries between female and male are as unclear and as unstable as the boundary between human and machine intelligence" (p. 443).

When Turing asked, "What will happen when the machine takes the part of A in this game? Will the interrogator decide wrongly as often when the game is played like this as he does when the game is played between a man and a woman?" (1950:2100), he effectively posed the question: "'Can a machine gendered male successfully enact being a woman?' or 'Can a "male" machine be a convincing transvestite?'" (1992b:7

both gender and intelligence are technologies. what does she mean by that?

link to Haraway's cyborg? the unified subject is dead (has always been dead, or a fiction) "gender" has always been an artificiality.

"As the technology changes, social relations change; as social relations change, the technology is altered."

"cyborgs are us" (p. 458)