Distributed Cognition

1. In the last video lecture we explored how virtual agency is distributed across networks of actants. The virtual self is likewise a network of personae, partial selves over an array of media platforms. This networked self, while individual, is also not autonomous as the literate self aspires to be, but is both empowered by as well as entangled in an array of resources and allies that it can enlist and in turn be enlisted by. Rather than independent, the virtual networked self is interdependent. In this lecture we shall explore how this same network ontology applies to what literacy had identified as the defining characteristic of humanity, cognition.
2. The distribution of cognition across a network of allies and resources disrupts traditional understandings of the mind-body relationship. Treating cognition, like agency, as a network effect is at odds with both objective scientific materialism and subjective transcendental idealism as well as with Cartesian dualism. (1,2) Neither identifying cognition with neurological activity in the brain or (3,4) with mental activity in an immaterial mind or (5,6) as the product of some interaction between the two is adequate for understanding how virtual technologies, such as computers and the internet enhances and extends our cognition. Indeed for Bruno Latour "we have never been modern." (7) His Actant Network Theory (ANT) argues that technology has been enhancing and extending cognition beyond the brain and our individual minds since the beginning of our species. More recently ANT has in turn inspired related ontologies that further deconstruct the modern subject-object dichotomy.(8) Object Oriented Ontology (OOO), founded by Graham Harmon, argues that even material objects themselves are not as mechanistically determined or as algorithmically predictable as modern materialism, and contemporary naturalism, assume. Materialism, OOO argues, is itself an abstraction, disembedding objects from their surrounding environment, as if they could be understood as "things in themselves", independent of their particular context. Echoing Latour, OOO argues that not only is subjectivity not autonomous, but materiality has a "vibrancy" or "life" of its own as well. Objects are not ***merely*** resources, value-neutral raw material, but have an inherent value that transcends any use to which we might put them. (9) Jane Bennet, has identified her related view as "Vibrant Materialism." (10) Neither the third-person orientation of the scientific method nor (11) the first-person orientation of

transcendental subjectivity, Bennet advocates for (12) a second-person alterity orientation to reality. Even inorganic metals and minerals are neither passive objects nor "brute" matter but vibrant beings calling for our attentive respect.

3. Reality is neither (1) a machine nor (2) an organism but (3) a society calling for a "political" approach inclusive of all beings whatsoever, from quarks to quasars. Material things are not to be modeled on colliding billiard balls, but are better approached as participants recruited and enlisted into a political ecology of networked processes. (4) Even intelligence ought not to be restricted to conscious subjects, any more than agency generally. Rather cognition, like agency, is a network effect, and reality as a whole is comprised not of substances, whether they be subjects or objects or some mixture of both, but rather reality as a whole should be approached as a network of networks, dynamic and smart. Virtual ontology is then neither a transcendental idealism nor a scientific materialism nor a Cartesian dualism but rather what one might call (5) an inverted Neoplatonism, all things participating, each in its own characteristic style, in an evolving vibrant or shimmering intelligence, more bottom-up than top-down.
4. As they say, however, the devil is in the details. So let us drill down to specifics: Distributed cognition can be divided into three classes:
    a. Embodied cognition in which one looks at how cognition extends beyond the brain to include other parts of the body, especially our sensory organs and our muscles.
    b. Embedded cognition in which objects in our immediate environment are also enlisted in cognitive activity that is best attributed to the network as a whole, rather than restricted to the firing of neurons in the brain.
    c. Extended cognition in which resources and allies are enlisted beyond the immediate environment to the internet as a whole.
5. With regards to embodied cognition, the first consideration is the role of the sensory organs in cognition. (1) The senses are not simply (2) passive sensors. Rather (3) sensations are attentive and attention is selective. For example hearing, let alone listening, is not simply a matter of registering sounds. Sounds can go unnoticed, and sounds can be discriminated, that is foregrounded against background ambient noise, that is other sounds one does not intend to attend to. People with hearing aids on the other

hand can have a difficult time listening to a conversation in a party situation where multiple conversations are occurring over one another. To track any given conversation in such a setting one's hearing must be directed—one must not simply hear but listen to the intended speaker.

6. So too human behavior is not simply monitored mechanical activity.
7. Take the example of a potter throwing a pot or a (1) basketball player making a shot. Attention is not on the hands but through the hands onto the pot or the hoop. Learning these skills is not a matter of "book learning" but the fruit of years of practice. For it is not only the mind or the brain but also the hands and the overall body that is doing the learning. Even if one could download a pottery or a basketball shooting program instantly into the brain, that would not enable one to be a potter or basketball shooter without training the muscles that need to be so precisely coordinated to perform these feats. They too are necessary participants in the overall activity.
8. Embedded cognition enlists resources and allies in the immediate environment to perform cognitive activities. For example I can multiply any set of four digit numbers, but not in my head. To do so I must also avail myself of pencil and paper. They too are necessary components of my cognitive activity.
9. The new field of "cognitive archeology" studies ancient artifacts to infer the intentional cognitive abilities of our early human ancestors. They also speculate on how such artifacts may scaffold cognitive behaviors. (1) For example, it is argued that the evolution of counting likely began by the use of (2, 3, 4, 5) fingers to determine how many objects were present. Before the evolution of the spoken word, it may well have been that humans could no more count without using their fingers anymore than I can multiply large numbers together without the use of some external medium. The fact that nearly all numbering systems are base ten suggest that fingers lie at their origin to be latter offloaded to the voice and then to marks on bone or some other material medium.
10. Analogous to the social construction of technology, which looks at how users play with a given technology to find new uses for it, embedded cognition involves using objects in the immediate environment to think with. (1) Civilization just is the transformation of human environments to make human life, including human cognition easier.

11. A speed bump reminds me to slow down, in fact it punishes my car if I don't, leading to a safer environment for kids at play. (1) I place my car keys in the same spot every night, so that I do not have to remember every morning where I put them. I use the geography of my home to help me remember where they are. (2) Or a cook may measure out and arrange recipe ingredients on a counter so that he or she does not need to consult the recipe again while cooking. Reading the instructions have been off-loaded to bowls on the counter.
12. It can come as a surprise to modern, literate thinkers to remember that solitary reasoning in one's own brain alone is itself actually a product of literacy. In oral culture, reasoning is always embedded. (1) Storytellers use props suited to the understanding of the particular audience immediately present before them. (2) Dialogue is an even more dramatic example of the embedded character of oral cognition. Dialogue involves two or more speakers present face to face before each other talking some common thought. Genuine dialogue requires that each interlocutor be prepared to learn from the other. Thus each contributes to the cognitive activity whose agency is to be attributed to the immediate relationship in which both are embedded. (3) Problem solving through brainstorming within a team is another example of embedded cognition where cognitive activity is most appropriately attributed to the team as a group than to any given member.
13. Finally, extended cognition further distributes cognition beyond the immediate environment to the world beyond, both material and virtual. Writing revolutionized cognition by affording humans a medium for offloading memory onto an external device. Libraries enable researchers to draw upon thought from around the world and down through the ages.
14. While the role of texts in cognition has always been known, its significance had been largely overlooked and unrecognized until the rise of the computer. Once activities, clearly recognized as cognitive when done by human computers, began to be automated and exponentially accelerated by cybernetic computers, the question of whether computers could one day think became unavoidable. Computers may never become conscious, but computers are machines to think with, indeed machines on which we are shifting an increasing percentage of the cognitive load in our own thinking.

15. Indeed as our cognitive activity becomes ever more thickly entangled with computers and with the networking of a virtually indenumerable array of computers over the internet, the very distinction between human and machine is increasingly breaking down. (1) We are becoming what Norbert Wiener in the fifties coined “cybernetic organisms”, or “cyborgs.” Indeed the co-evolution of human beings with their technologies from the beginning (1) suggests that in some sense humans have always been cyborgs.
16. And as the internet extends increasingly beyond humans and their devices to automated systems and networks of things, cognition is becoming global and our world a smart planet. As our technologies continue to evolve at an ever accelerated rate, the cosmos is, if not waking up, at least learning, becoming a vibrant, shimmering network of interconnected intelligence.