Distributed Agency and the Internet of Things

1. Welcome to this next video lecture in my lecture series on virtual ontology. Today we will be exploring how virtual technologies are deconstructing the literate modern ideal of the autonomous agent by distributing agency across networks of allies and resources.

2. I have been arguing in these videos that the virtual self is a networked self. (1) Bruno Latour, one of the pioneers of this approach to the self, has spent decades tracing its implications for a distributed theory of agency. (2) He has argued that as a node in a network, no subject is autonomous, no tool neutral, no object inert. Rather all are to be treated as actants contributing to an overall agency best attributable to the network as a whole.

3. Latour offers seat belt buzzers and speed bumps as examples. (1) As cars became faster, seat belts were invented to save lives in crashes. But when they were first invented, few people ordered them when they bought a new car. After all they were good drivers. They were not expecting to get into wrecks. (2) So legislation was passed to make seat belts mandatory in all cars, and public service announcements blanketed the airwaves illustrating to drivers the protection seat belts afforded in crashes. However compliance was still spotty. (3) Adding an irritating buzzer did the trick. Now people would wear their seat belt even if they dismissed it as unnecessary, just to turn off the annoying buzzer. Saving lives was now not simply the result of seat belts but distributed across a network of legislation, public service announcements, and buzzers. (4) Speed bumps similarly distributed the work of enforcing speed limits beyond policemen. People would slow down even if no policeman was present just because they did not want to be jostled or even harm their car's suspension.

4. The recent introduction of traffic cameras at intersections are an example where agency is fully delegated to a network. Cameras are triggered to take pictures of cars crossing intersections after a traffic light turns red. (1) Those pictures are then automatically mailed to the registered owner of the car, tracked through the car's license plate with the appropriate ticket. What used to be the work of many policemen is now being distributed across a network of automated equipment.

5. The industrial assembly line had already distributed its agency across a network of stations. No one worker built an entire product anymore, rather each worker on the line

added his contribution to the finished product. (1) Later robots would begin to replace factory workers, leading to an automated assembly line. Human work now consisted only in monitoring the smooth running of the machinery and ensuring quality control of the products. (2) But once connected to the internet even these monitoring functions could be delegated to an automated network. Such second order automation creates "smart" factories that call for human intervention only when they break down. (3) With no workers needing to be present on site, "smart factories" have also come to be called "dark factories", for they no longer have a need even for interior lighting. They can run continuously 24/7 with no human input or supervision.

6. "Smart" homes are a domestic version of the same concept. Internal systems can be run and monitored from afar. (1) Ambience and mood can be adjusted with an ipad. (2) Smart refrigerators, even smart kitchen shelving have entered the market where grocery lists can be created and supplies ordered over the internet at the touch of a finger. Amazon is even developing automated drone delivery systems.

7. The internet of things refers to devices that themselves continuously upload information and download commands from programs running over the internet. Computer processing and storage capacity has itself been distributed across networks online, creating what has come to be called "cloud computing". Huge server farms can coordinate thousands, even millions of networked computers.

8. On the other hand, sensors and processors are shrinking to nanometers, enabling one to connect virtually anything to anything else, and indirectly, ultimately perhaps to everything else. (1) New internet address protocols offers 3.4×10^{38} potential addresses. The ultimate goal of the virtual age is (2) global, "ubiquitous computing" integrating actual and virtual worlds into a hybrid ontology of what may be called "shimmering intelligence"

9. Thus with the internet of things distributing agency globally, the literate ontology of separate substances and autonomous individuals is being replaced with a fluid ontology of interactive smart networks of people, things and devices, each themselves to be understood as both nodes and networks in their own right.

10. As we saw with the industrial assembly line, distributed agency does not begin with the internet and the virtual self. In the words of Latour, we have never been the modern

autonomous agents literacy had inspired us to strive to become. Its rather that virtual technologies, especially the emergent internet of things, makes a network approach to agency increasingly compelling. Distributed agency is ultimately just another way to saying that humanity and technology have co-evolved, that technology has always served to enhance human agency by extending it beyond a given human being to his or her network of allies (through communication technologies) and resources from stone hand axes to computers. (1) However as archeologist Ian Hodder has recently argued, networks not only empower but also entangle. That is, technologies not only enhance and extend human agency but also constrain human action in the sense that the development of technology along one line often forecloses development along alternative paths. For example, Obamacare built upon the United States' current private insurance network, rather than scrapping what was a relatively successful program for most Americans in favor of a single payer system. And as America continues to move towards a single payer system it will likely build upon Obamacare, starting with a "public option" rather than a wholesale scrapping of private insurance. Indeed even radical proposals for immediate single payer national insurance is framed as building upon existing Medicare insurance for the elderly. That is, as "Medicare for all."

11. Disruption costs alone thus give technologies a "momentum." This hold even for technologies as "immaterial" as computer programming, as the Y2K alarm made evident. In the early days of programming, memory was precious and so year dates for entries were abbreviated to only the last two digits. As programs were updated it was easier to continue this convention then rewrite all the underlying records to a four digit year date. However as the year 2000 drew near, panic arose that all dating would be thrown into chaos, with 2001 being processed as 01, and so, far earlier than late twentieth century dates. That early decision had entangled computer programming into a convention that now had to be scrapped, requiring extensive recoding. Entanglement is effectively the temporal dimension of distributed agency.

12. A telling illustration of the significance of distributed agency throughout the history of the human species can be found in revisions currently underway in evolutionary psychology. (1) Evolutionary psychology extends Darwinian evolution's survival of the fittest to the (2) neo-Darwinian focus on the gene as the unit of selection. Hamilton

classically argued that (3) genetic propogation must be tracked not just directly through an individual's success at reproduction but must also take into account the reproductive success of (4) related kin with whom the individual shares his or her genes. In other words evolution selects behavioral traits that may involve individual sacrifice if it sufficient enhances the reproductive success of other related carriers of the same genes. Hamilton further extended this analysis to (5) "soft core" altruism towards those not related. Cooperation with others can be a win-win strategy so long as cheats acting to exploit such cooperative activity can be effectively identified and punished. (6) Hamilton insisted however that given the high potential payoff for exploiters and free riders, reciprocal altruism could not be extended to group selection of cultural developments such as religion. Rather the evolution of group benefits must be explained through the competitive advantage they ultimately provide for the genes of individual cooperators. Otherwise he argued, the mutation responsible for the group benefit could never spread through its members.

13. More recently however, network researchers such as Nicholas Christakis and James Fowler have argued that natural selection operates neither on the genes of individuals nor groups but rather on networks of individual organisms. (1) They have found that the beneficial effects of altruistic behavior extends beyond one's own friends to their friends and even their friends' friends. In other words, network theory claims that any individual actually enjoys three degrees of agency. (2) My behavior can have a statistically significant effect not only on the behavior of my friends, but through them, their friends, and through them their friends. Sharing resources with my friends gives them more resources to share with their friends and thus the latter also benefit to some degree from my generosity. So too not only having friends in high places, but having friends who have friends in high places can also benefit me. Or, otherwise put, one of the benefits of having friends in high places is that others may want to be my friends, too.

   a. (3) Similarly the pervasive advantage of cooperative networks leads to the punishment of free riders not for the negligible direct loss of any particular individual, but rather to the threat it possess to ongoing cooperation across the entire network. The harm done is a network harm to a network benefit and thus it is the network that would have a competitive advantage against other networks if

it includes members genetically disposed to be outraged by cheaters and to punish free riders even at a cost to themselves. (4) Thus just as Neo-Darwinianism had argued that altruistic cooperation can spread through a species even at a cost to the individual organism, so networks with altruistic punishers can spread through a species even at a cost to the punishers own direct genetic success. The genetic trait spreads due to the value to the network rather than the individual carrier.

14. Thus even in the most primitive stages of human evolution, network theory can shed light on human society. At the other end of the technological continuum, the internet of things and cloud computing exponentially magnifies network effects and extends them globally. Distributed agency, together with distributed cognition, to be discussed in the next video lecture, thereby become universal, ontological categories replacing both objective scientific materialism and subjective transcendental idealism with an intersubjective network ontology of both allies and resources that at once empowers and entangles the agency of its constituent actants.