**Driverless Activism: Hands-Free Digital Humanities and AI**

**Intro: Overview of project**

There are two tracks for *techne* (broadly, art or craft): one that gets you to an end point with an assumed course, or something that starts and ends exactly as planned. The other, messier, or stochastic, form of *techne* gets you to that end point, but via an unknown path (Angier, 2012; Roochnik, 2007; Dunne 1997). By applying the ideas of stochastic *techne* to developing forms of artificial intelligence and deep learning, I argue that the rhetorical nature of these spaces is a new interpretation of *techne*. In a March 2018 episode of *Fresh Air*, *New York Times*’ technology correspondent Cade Metz described that driverless cars are programmed as if they are playing video games. If, for instance, the goals of these video games are to rack up the most points, programmers would simply “train” driverless cars to do just that. What they didn’t anticipate, however, is these driverless cars would arrive at that end goal very differently. For example, Metz describes a situation in which these systems played an old boating video game. By “deciding” they could rack up the most points by crashing into objects and starting over, and never in fact having the goal of finishing the course, these AI systems arrived at the goal very differently than the one humans anticipated. Such aims surface a whole new set of problems for roboticists and, arguably, digital humanists (Lipson and Kurman, 2017). This presentation will interrogate the ways the *techne* of machine learning is dramatically different from the outcomes we think they will follow. Such intelligent systems might make their own paths, still arriving at the desired outcome, but in dramatically different ways than anticipated. From an activist perspective, this presentation also questions what these unanticipated outcomes mean for communities in which such systems might mean further marginalization.

**Techne: explanation of rhetorical terms**

One of the most interesting, albeit frustrating, aspects of *techne* is its widely debated definition. Not only do Plato, Aristotle, and even Isocrates have widely ranging interpretations and applications of the term, but the debate rages on even in today’s rhetoric circles. As a result, the definition of the Greek term *techne* has always been a critical debate, largely the result of the inability to locate a precise word by which to translate it. *Techne* is frequently translated as “skill” “craft” or “art” but more regularly *techne* has become grouped alongside – or even absorbed completely – by the use of the word technology. Because their linguistic roots are nearly identical, it is not unusual to see the words “*techne*” and “technology” used interchangeably, although sometimes incorrectly, for one other. For example, in his essay “The Question Concerning Technology,” Martin Heidegger searches for the essence of technology, employing *techne* in order to differentiate between making and bringing-forth. Edwin T. Layton, Jr. opens his essay “Technology as Knowledge” by borrowing two aspects Charles Singer’s classic definition of technology: “how things are commonly done or made” and “what things are done and made” to explore the epistemic implications of *techne* in recent technology studies (31). Carl Mitcham reminds us in *Thinking Through Technology* that, “virtually all historians use the word ‘technology’ to refer to both ancient and modern, primitive and advanced making activities, or knowledge of how to make and use artifacts, or the artifacts themselves” (116). Additionally, Jan Edward Garrett also comments that, “‘technology’ would not be a bad modern translation of ‘*techne*’” (Garrett 286). Certainly the linguistic tendency to swap technology and *techne* is an easy one—they both sound and look alike. In fact, this substitution now happens so naturally that those of us in digital studies utilize “technology” as a blanket term to cover any process of advancement, the tools used to move forward, and as a suggestion of the future itself.

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In order to explain the development of expert knowledge, David Roochnik notes that *techne* can be characterized at two different levels: “Techne 1” and “Techne 2.” The former, T1, is a determinate knowledge where “end is identical to function” whereas the latter, T2, is stochastic, messy, less determinate, and its end is distinct from its function (54, 52). Stochastic is derived from the Greek verb meaning “to aim”; T2, therefore, merely aims at an end point but can arrive there differently every time (Allen 86). T1 represents situations where the outcome will always be the same, much like mathematical equations whose endings are never vary, given they are performed correctly. T2, on the other hand, is used in situations where chance (*tyche*) [ty-key] interferes with the process, forcing someone with expert knowledge to take a different path to access an end. For example, if a cruise ship is scheduled to leave its port in Florida and dock several hours later in the Caribbean, but a storm (a natural, albeit chance, occurrence) interferes with the planned journey, then the ship’s Captain must use his expertise to side-step the storm but still arrive at the same end point. What is at play in this example is the Captain’s use of expert knowledge even in the event of natural forces acting against the original plan. The Captain’s abilities to overcome chance by employing his expert knowledge averted a potential catastrophe between the ship and the storm. Later, T1 will take center stage when I discuss the teleological effects on use and T2 will also resurface during an exploration of the role of “error.”

Yet “knowing the cause” introduces another level of mastery to the *techne* conversation—the role of error and failure. *Techne* scholars Frances Ranney and David Roochnik place significant emphasis on the importance of error in relation to *techne*. Because the expert has such a thorough understanding of his field, he knows when and how to manipulate the situation favorably. Error is only acceptable because a *technites* (one who has/practices *techne*) understands the complete picture; he has the foresight and the understanding to provide a complete account of the intended action. Again we come to the distinctions between T1 and T2; T1 is never susceptible to error or failure because it is so stringent. Contrary to T1, T2 then is the only place where error and *techne* are compatible because it provides “rules of thumb” rather than strict guidelines. T2 “requires appropriate responses to particular occasions, and is compatible with failure” (Roochnik 52). By linking *techne* and failure, expert knowledge is not only “knowing-how” but also “knowing-when”: when to retreat, relax, or err in specific situations. “Knowing-when” is often used to explain *kairos*; in “Toward a Sophistic Definition of Rhetoric” John Poulakos defines the *kairotic* rhetorical moment as “the opportune moment,” a temporal choice that considers not whether to speak but whether to speak *now* (56, 60). In his essay “The Ancient Conception of and Art,” James Allen notes that *kairos* and *techne* are directly connected and that, “stochastic artists needed to do more than acquire a mastery of the formal precepts of their art; they also needed to develop a sensitivity to the peculiar features of a particular situations, sense of the opportune moment” (88). Intentional error, thus, magnifies the influence of *kairos* on *techne* because the expert must not only know how to deploy his skills, but he should also know the precise opportune moment to eschew them. By “knowing-how” to execute error, the expert is once again overcoming *tyche* by mastering the situation. Take, for example, the field of medicine, one of the most frequent examples cited to explain the role of error in *techne*. Because it is prone to failure, medicine can only ever be a T2—it “cannot achieve the high level of precision or rate of success expected of a T1” (Roochnik 61). To explain, sometimes an ill person heals herself without the help of a doctor; by resting or self-medicating, she could be back on her feet in a few days. It is likely, however, that the patient changed her routine—it was not simply random good luck that healed her, but the amateur happened to stumble upon the correct treatment that worked for her individual case (Roochnik 46). Just because a doctor had no role in her returned health, it does not diminish the fact that the medical field is effective. Similarly, sometimes a doctor cannot cure one of her patients regardless of the tests and treatments she prescribes. Although such a failure might lead to death, it does not discredit her standing as a doctor. Failure, here, is a result of trial-and-error; even though the doctor used all of her expertise and skills with the intention of healing, the end result (good health) did not materialize.

As I’ll suggest throughout this presentation, techne might have an interesting connection to neural networks, which I’ll discuss more thoroughly in a minute.

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If, for instance, having a techne means having a skill that is repeatable, then neural networks (reductively: the ability for one program to learn something meaning all programs learn together) can all have a techne at the same time. Further, there will be a supportive system in which all these networks perform equally, an important idea for an activist mindset.

When we think of “use” and *techne*, I find it helpful to consider a few questions: How do we use the tools we make to extend our human abilities? What happens if we use those tools “incorrectly”? How can these tools be used repeatedly to produce a certain outcome with some sense of reliability? While there have been several scholars before me who have asked similar questions (Johnson; Mitcham; Ellul; Winner), it is important to recognize that their contributions have steered the path for these inquiries while also helping to clarify the impact of the use/*techne* combo.

First, it is helpful to consider what “use” actually means. In *Thinking Through Technology*, Carl Mitcham defines use in the following way:

The verb ‘to use’ commonly denotes ‘to bring or to put into service’ and ‘to employ for some purpose’ – hence the ‘useful’ arts and crafts, in the sense of making things to be employed. […] Furthermore, because of its connotations of regularity or commonness ‘use’ seems associated more appropriately with repetitive, not to say mechanical, processes than with creative or original ones, that is, putting into practice as opposed to bringing into existence (230-1).

This comprehensive definition takes aim at what I hope to accomplish in this project—to show how use is an action demonstrated by an expert as well as an action that is exerted on a made product.

**AI and Driverless vehicles**

*From Cade Metz interview*

Returning to the Cade Metz interview I mentioned earlier, there are a few other ideas that are important for linking *techne* and driverless vehicles:

* [SLIDE]
* The power of neural networks for activism?: If every system can “learn” the same ideas, then there’s no disparity.
* Recognition vs. Understanding: There is, however, a very deep difference between recognition (a system recognizing ideas) vs. understanding (actually having the rationale to grasp these concepts)
  + This isn’t dissimilar, I think, to how we conceptualize “rote memorization” vs. “transfer of knowledge”
* The question becomes with neural networks, and thus driverless vehicles altogether, is that there is a gap between learning specific tasks, not merely mimicking them.
  + This disjunction is critical for *techne*: if something merely mimics another idea, it’s not full mastery, it’s merely imitation
* With AI, What ended up happening was it ended up Building systems on its own—completely bypassing the human component
  + Go example: The system would try and try different combinations of moves until it figured out the game—it wouldn’t tire (human-ness avoided)
* This leads to the example I opened with: the boating example
  + OpenAI (Elon Musk’s group): the group who did the boating experiment
  + [SLIDE]
  + So rather than “allowing” the system to do whatever it wanted to, [read slide]
    - “And what they ended up doing is they ended up building an algorithm that allowed for human input. When the machine started doing things like that that there were unexpected, the human designer could provide suggestions - give it a little nudge here or there, show that it needed to complete the race and not just wreak havoc.”

**Techne and driverless vehicles**

* [SLIDE]
* So following this idea, the suggestion that neural networks will allow systems to all “recognize” tasks simultaneously while also creating unexpected outcomes (ones human programmers didn’t anticipate), will this lead to a third definition of *techne*?
* What might this look like? T3 might be defined as anticipated outcome (similar to T1 and T2), method of arriving to end point might be messy (similar to the stochastic T2), but that method of arrival is one no human could anticipate, thus we are encountering a new form of techne. Typically techne has a human element, but with these systems, that’s different.
* This brings me to some concern for activism/social justice: Development of driverless vehicles—cars will be used for leisure activities, only if one has the means to use that time for that purpose. There will be a disparity in time usage

**Connection to Detroit and Activism more specifically.**

# *From Kate Bertash:* The Self-driving Car as Social Justice

# [SLIDE]

* Could automation of our vehicles right a centuries-old wrong in how we work?
* The elimination of crews to transport goods could reduce costs of products across the board.
* Driverless fleets could restore human rights
* “Cost and time and damage to human health will be reduced”
* Replacement isn’t unheard of: looms, washing machine, switchboard operators: but… “we haven’t hit the upper limit on all the work there is to do in the world”
* Issues: making sure many kinds of people have their voices represented in the development of driverless fleets, to ensure the needs of the many are being addressed.

**Robots-replacing-workers is a bad reason to fight against a higher minimum wage: Ethan Chiel**

The idea of “working for an unlivable wage” vs. the fear of losing your job to a robot. Take the unlivable wage rather than risk losing your job with a higher wage.

# Students to City Council: Use Self-Driving Vehicles to Help Underserved Communities

**By Stefanie Johndrow**

In Pittsburg earlier this year, students from Carnegie Mellon proposed driverless routes for Allegheny County, suggesting autonomous shuttles carrying 15-20 people each would promote equity within transportation.

To close, rather than optimistically stating that “Yes! What was proposed in Pittsburgh will work for Detroit,” I’d rather emphasize the capability of these systems to adapt, harness good, and begin learning.

Thank you!

***Extra info:***

Lipson and Kurman, *Driverless: Intelligent Cars and the Road Ahead*

This book was a really strong primer on driverless vehicles. Ranging from the technical aspects of deep learning and its history all the way to potential shifts in the ways we conduct ourselves (in business and life), the authors were really thoughtful and inclusive. One of the greatest takeaways from this book is the argument that driverless vehicles are not a matter of reengineering infrastructure; instead, driverless software focuses on learning and adapting to the surroundings by learning to read the visual cues of driving. The authors emphasized the difficulties of “training” driverless vehicles to make instant decisions based on incoming stimuli, similar to human-drivers. Driverless vehicles must have an incredible high accuracy rate in order to be “taken seriously.”

Marcus, Gary: “Deep Learning; A Critical Appraisal”

This article provides an overview of Deep Learning and AI, more addressing the popular misconceptions of the systems. Specifically, Marcus argues that Deep Learning isn’t as advanced as the popular notions of it seem to suggest. For example, the systems are incapable of vast hierarchical learning (such as complete language) and instead base “language” on patterns, not cognitive inferences. AI cannot, for example, reason very well. When faced with comprehension and application, it cannot perform “on the fly,” but only based on experiences it has had before. It cannot make new inferences. AI systems haven’t been able to replicate the visual capacity of the human brain, and as Marcus argues, maybe that’s not something we should aim for. Perhaps we should be using AI and deep learning to help us understand the brain, not the other way around as is often suggested.

Kurzweil, *How to Create a Mind*

Some of the more interesting ideas in this book form around pattern recognition. Granted, I didn’t understand everything, but reading this book in conjunction with the article above gave me a pretty good primer about hierarchies. Kurzweil also relies pretty heavily on linguistic theory, specifically Searle and Chomsky, to discuss these hierarchies. Basically, he’s saying that certain ideas (for Searle and Chomsky, words) are just the small part of something larger. They are all parts of something that will build on the previous thing. For example, you might have a leaf, which belongs to a stem, which is connected to a branch, which is connected to a tree, connected to a forest, connected to an ecosystem. These webs of information are what occur when we see patterns—we try to formulate the connections, or patterns, based on the connections in which we’ve seen them before. We’re already predicting machines; we do this all the time with language and memory. AI and deep learning are trying to do similar tasks, with varied success. This book was also a little outdated, spending a lot of time talking about Watson (the computer that won *Jeopardy!*). Kurzweil considers whether machines know anything or whether they simply process information. Watson is a prime example because on *Jeopardy!*, the program had to “understand” linguistic clues, not just “if/then” statements. This is an indicator that machines are capable of understanding from a different perspective than we really know of yet.