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Meditations on the "Unimaginable" (*soteigai*)

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_____Almost two years have passed since that fateful day in March 2011 when a tsunami triggered by a massive earthquake washed over Northeast Japan, leaving in its wake pain, suffering, destruction, and an ongoing nuclear crisis. While there was never any disagreement following the catastrophe over the unavoidability of the earthquake and tsunami, considerable discussion in the Japanese media, corporate, and governmental spheres since the event has focused on the oversights that led to a meltdown in three reactors and a spent fuel containment failure at TEPCO's (Tokyo Electrics) Fukushima plant. In this context, TEPCO's persistent attempt to categorizing these events at its plant as "heavenly misfortune" (*tensai*) — roughly meaning an act of God or Nature — instead of an accident caused by human error (*jinsai*) drew tremendous attention and criticism. TEPCO's logic was indeed dubious. Although the specifics of the crisis have become commonplace its worth recalling briefly that as far as what is currently known, overall infrastructure at the power plant survived the earthquake. The problem, rather, was the fifteen meter high tsunami, which overwhelmed the five meter (plus) high breakwater wall protecting the plant from the sea and flooded the compound. Flooding rendered backup diesel generators that had been placed at below ground levels useless, leaving the plant without power to its primary cooling systems. Overheating and an initial core meltdown ensued in three operating reactors, which generated hydrogen gas that exploded and destroyed the facilities housing the core to release vast plumes of radiation into the atmosphere. The power failure also knocked out pumps delivering water to a storage pool, where fuel from reactor was being kept while the reactor was offline for maintenance. With water draining from the pool as a result of earthquake damage, the fuel rods were exposed to air and began heating, releasing more radiation. Not surprisingly, the combination of failures begged a number of questions, namely why had TEPCO not fortified and heightened the breakwater wall prior to the tsunami, and why had it placed the backup generators in a position vulnerable to flooding. TEPCO's response, which was also its rationale for labeling the event *tensai*, hinged on its insistence that the tsunami and its subsequent effects were *soteigai.* Composed of Kanji (Chinese characters) for "concept, think, idea, thought" (*so*), "measure, determine, establish" (*tei*), and "outside" (*gai*), the three-character compound *soteigai* translates loosely as referring to something that is beyond expectations. Accordingly, it is commonly understood to denote something that can not be anticipated via existing risk management models and technologies. Essentially, then, TEPCO's argument was that the height of the breakwater wall and positioning of generators had been determined by disaster models and probability scenarios based on empirical data gathered from geographical analysis of the area (including the ocean floor) and historical records. As such, TEPCO was able to claim that the plant had been prepared for all anticipatable catastrophes. Since the magnitude of the March 2011 earthquake and the force of the subsequent tsunami was outside the scope of existing data and records, it was un-anticipatable and thus an "act of nature" for which the company (very conveniently so) could not be held unaccountable.

The combination of events around the Fukushima nuclear crisis would seem to evoke important questions about the limits of science and the production of knowledge alongside inquiries into the scope of risk analysis models. To a limited extent they have. But that conversation has also been truncated by revelations that TEPCO's inadequate

catastrophe measures were not, as it claimed, the result of any epistemological boundaries but rather an old story of corporate negligence and technological mismanagement driven by the profit motive. As TEPCO tried to claim the scope of the natural disaster leading to the meltdown as *soteigai*, numerous authors, scientists, journalists, and even government officials came forward with evidence that the company had been warned on numerous occasions about the shortcomings of its defenses and preventive measures at the Fukushima plant but had failed to take action. What is more, it became clear that TEPCO had buried geographical survey data that did not accommodate the parameters of its risk models. Naturally, not all criticism around the nuclear crisis at Fukushima has concentrated solely on TEPCO's questionable use of *soteigai*. A number of scholars along with members of the long-running anti-nuclear movement in Japan point to the crisis as evidence of the general impracticality of nuclear power, demonstrating, as Koide Hiroaki does for example, the staggering inefficiency of the technology and its impact on the environment. Nevertheless, I want to look closely here at the matter of *soteigai*, not only because of its centrality in the discussion but also for the manner in which it gestures to the nuclear crisis as an ontological and epistemological problematic, that is, a problem of emergence and representation, thinking and knowing,

As one might imagine, the scandalous nature of TEPCO's claim of *soteigai* amidst evidence of its obvious misconduct and negligence became an object of intense media spectacle in Japan (and to some extent abroad), spurring the publication of countless texts and exposes in weekly and monthly magazines. Most of the arguments in this context pursued a similar line of attack, punching holes in TEPCO's claims by demonstrating how the tsunami was never really beyond a rationally determined science of expectations and/or how other factors intervened to distort or tarnish empirical natural catastrophe data. The underlying claim in these different arguments is that the tsunami and ensuing nuclear crisis was never *soteigai* but rather *sotei-nai,* the final character of the expression *gai* (outside) swapped for *nai* (inside) to alter the meaning of the compound to denote something that is within what is anticipatable. Nonetheless, one can identify therein two different approaches to the problem. One approach generalizes the crisis, framing it as the result of bureaucratic failures indicative to operations under capitalism's profit motive. As such, it undermines the novelty of the crisis, evoking comparison with other recent accidents that should, theoretically, have never happened — such as the derailment of a commuter train in Kansai, Japan in April of 2005 that left 107 people dead. According to this approach, the failures around TEPCO's Fukushima nuclear plant make intelligible a universal logic of capitalism.[1] By contrast, another approach particularizes the crisis, pointing to cultural specific determinants behind what made Fukushima *soteigai*. In this case, the discussion wavers between a kind of self-effacing cultural essentialism and conspiracy theory that works to re-establish the notion of a lack of proper modernity in Japan.[2] There is nothing wrong with nuclear power, this approach implies. Rather the problem is nuclear technology in the hands of less-than-modern collectives with their irrational collusive networks (*nareai*). It is worth noting here that newspapers in the United States quickly adopted this latter approach, highlighting the events at the Fukushima plant as an instantiation of Japan's "culture of complicity.[3]" The rhetoric effectively relegates the Fukushima nuclear crisis to a "Japanese thing" much the same way that the meltdown at the Chernobyl nuclear power plant in 1986 was particularized as a failure of a socialist technological apparatus and not nuclear science. As with the situation around

Chernobyl, such particularization rationalizes the disavowal of any need to scrutinize nuclear power in the United States.

What I find problematic in these approaches to the matter of *soteigai* is not only the explicit logic they support whereby the nuclear crisis at Fukushima is the result of the failure of rational thinking, but also the manner in which both subordinate the nuclear machine to some overarching structural determinate — namely, economy or culture. In other words, such logic attends to the nuclear technological assemblage only insofar as it exists as a pliant material to be shaped by exterior forces. It thus fails to take account of the technology as a material force. To offer a somewhat simplistic analogy, such logic is commensurate with the notion that guns do not kill people but rather people kill people, which fails to understand how the existence of guns and the vast network necessary for their production informs relations in society and changes the very essence of embodied experience. Although such a shift in approach may sound simple enough, it is a little more complicated than it seems. To consider technology as a material force requires that we untether ourselves from the comfort of received representational practices and corollary premise of epistemological objectivity and embrace a performative, or rather emergent mode of thinking technological assemblages. Where the dominant conversation has approached questions of thinking around *soteigai* as the failure to anticipate and prepare for the tsunami and possibility of nuclear meltdown, thinking the technological assemblage means attending to *sotiegai* as the problem of a limit in thinking the nuclear apparatus and crisis. This involves thinking *soteigai* in the context of a relationship with technology.

What would it mean to think *soteigai* as a relationship with technology? In attempting to address this question I want to turn first to the work of Hatamura Yotaro, an engineering professor emeritus at Tokyo University and founder of a school of thought called *shippai gaku* (failure learning), which he summarizes in a recent book, *Soteigai wo sotei se yo!* ("Let's make the 'unexpected' expected").[4] Hatamura is also a member of the government-appointed committee assigned to investigate the crisis. While Hatamura ultimately rehearses the conventional discussion around *soteigai* as a failure to adequately anticipate, his argument is worth dwelling on for a moment for the manner in which it engages *soteigai* as a problem of the limit in thinking a relation with technology rather than a question of insufficient data analysis or culture of collusion.

For Hatamura, to think about *soteigai* is to think about thinking. He argues that when one is trying to think about something one naturally imposes some kind of boundary on the thought. Without that boundary, the thought remains only a feeling. Usually, this imposition of a conceptual boundary occurs at a subconscious level, without thinking. But it is the condition of possibility for thought. Within this conceptual boundary, the things that are thought become the "seeds" or "ideas" that one then begins connecting in order to build a thought. Creating this conceptual boundary is the process of forming a presumption or supposition (*sotei suru*) and the condition of possibility for thought. When we speak of someone with expertise, we think of someone whose conceptual boundary is tightly established and thus someone capable of thinking carefully about all those things within those boundaries. By contrast, an amateur or person outside the area of expertise is liable to have very wide conceptual boundaries.

Shifting the perspective from individual to group thinking, Hatamura writes that when individuals think together, about a project, for example, they need to establish a collective conceptual boundary. Such boundaries, moreover, are parameters based on material conditions. For example, they might consider things like cost, time, expected

opposition or concurrence with the project idea and so on. As a result, an assumption is established based on the conceptual parameters derived from various conditions (material and immaterial). Offering a tangible example, he explains that when a company is developing a product, whether it be a fan, car, washing machine, in order to improve product safety, it will imagine first typical consumer and use. Such typical use falls within level one of supposed (*sotei*) practices. The company might then try to imagine two more degrees of use that fall outside the supposed normal use, such as the product being dropped, left in the sun, abused, and so on. Although these additional two degrees diverge from anticipated normal use, the company would still design the product to withstand them. Anything above these three degrees of supposed use constitutes a realm of indeterminacy. That is, the company can imagine that the product might be used in ways that it did not expect, or misused in ways that it did not anticipate, but at the same time it must concede a vast area of uncertainty around forms of misuse that it could never imagine. Nevertheless, it can incorporate this indeterminacy into its thinking by expanding the margin of indeterminacy for misuse. In so doing, it increases the parameters of *soteinai* such that the product can be misused or fail before the results become fatal for the user. We might call this simply creating fail-safe technology. Yet since the emphasis is on irreducible contingencies within the environment of operation rather than technological malfunction the term fault-tolerance is more appropriate.

Hatamura emphasizes that a company can only speculate about possible use patterns. Although the situations it imagines may be informed by tests and surveys, the data is abstracted from a relatively large number of user patterns and thus always nothing more than a supposition. It cannot thus anticipate the effect of radically different circumstances or environments. Hatamura's point is here is that *sotei* ultimately designates only an arbitrary value. Accordingly, anything that falls outside that value [*soteigai*] is not something that cannot happen but rather something that the chances of its happening are relatively low. In other words, *soteigai* is not something totally unexpected, but rather something that was imagined to be highly improbable. From this he suggests that the process of *sotei suru* reflects human psyche more than anything else such that *soteigai* reflects a flaw in ways of thinking and not a flaw in method. Specifically, *soteigai* is a problem of the human predilection for wishful thinking — for not seeing what we don't want to see and not thinking what we don't want to think. Thinking that is *soteinai* is thinking that follows a received framework of thought and pre-established process for handling a problem. It involves thinking in a predetermined fashioned and thus is utterly inadequate for thinking *soteigai*. His ultimate argument is that in order to address *soteigai*, we must be prepared to deal with radical contingency. Quite simply, this means realizing that not every contingency can be anticipated. Thus one needs to remain ready for the unimaginable, ready to grasp an unanticipated situation and formulate a response. Claiming that one was not ready since the event was unanticipated, argues Hatamura, is akin to negligence.

How does one prepare for radical contingency? Hatamura suggests three methods. First, radical contingency has a soft and hard dimension. The hard dimension involves preparing infrastructure for catastrophic failure. For instance, when making a barrier against tsunami one should also prepare for the possibility that the barrier will fail by creating escape-routes to high ground. The soft dimension involves a psychological component, for example, training the population to be ready to escape the moment they need to and having them maintain that readiness even in the midst of

their habitual everyday life. Second, Hatamura claims, we need to stop trying to determine responsibility for the past failures and think more about what the failures teach us in order to prevent them from reoccurring. Finally, he suggests that in order to guarantee the safety of systems and machines, instead of developing safety control mechanisms, safety should be part of the actual design. Here he offers the example of revolving doors in Japan and the incident a number of years ago in which a child was caught and crushed to death when entering a building. Attaching a sensor to detect children is a safety control, Hatamura explains, but developing a light door that turns very slowly and is thus not capable of hurting a user is designing safety into the actual mechanism.

In short, Hatamura's argument shifts the discussion around *soteigai* from the question of inadequate preparation as a result of the failure of rational thinking to the necessity to confront real limits of human control eventuating from an ineluctable contingency that is part of human society. Radical contingency, it says, is a factor of the complexity of lived relations within a shifting environment and cannot be contained. But it can be managed by means of careful attention to technological limits and material. Essential to this management is a capacity to imagine irregularity as part of regular functioning rather than a deviation from a rationally prescribed order. But this begs the question of how to imagine nuclear reactor core meltdown as an regular irregularity? How does one think the ensuing radiation from such an event as a force to be accommodated within everyday life? It is significant that Hatamura offers no discussion of the nuclear crisis at the Fukushima plant. His theory of *soteigai* works fine, it seems, for events like a tsunami and automatic revolving doors but is still unable to think the nuclear.

According to Mori Kinji, an engineer at Waseda University's Green Computing Systems Research Organization and inventor of a system for accommodating irregularity into the regular operation of Tokyo's commuter train network, Hatamura's inability to address the radical contingency of nuclear technology makes perfect sense. Nuclear power, explains Mori, is an "absolutely determined technology.[5]" What he means is that every aspect of operation within a nuclear power plant must be rigorously planned due to the nature of the highly unstable reaction that is the core of the technology. Consequently, once a power plant is built its form and processes can not be altered. The plant is finished, done… and dead, meaning that it is a closed system, operating heedless to its environment and thus incommensurable with a fundamental principal of human life and society. Technological ensembles, Mori insists, must be organic. That is to say, they must be able to grow and evolve in accordance with changes in the environment. Most of all, they must be able to handle irregularity in the same way that a living organism does, which never functions as a perfect system but rather is always dealing with abnormal cells or viral and bacterial invasions as it grows and changes with its environment.

In insisting on a certain level of processual commensurability between the organic and technological, Mori's argument brings to mind the aspirations of a number of philosophers of technology from the past century who rejected the totalizing and deterministic understandings of technology that dominated discourses of modernity in their day. Instead, these thinkers of techne became concerned with working though the way in which the technological and the human are enfolded in a co-productive and co-structuring relation. Such thinking involves not only taking into account the impact of technology on human society but rather paying attention to life as an enfolding of interiors and exteriors around an indeterminacy held together as a provisional

organization of relations. Lewis Mumford offers one way of understanding this process when he states in his treatise on historical phases of technics that "Man internalizes his external world, and externalizes his internal world;[6]" and Martin Heidegger articulates a similar orientation when he imagines thinking techne as a poeitic revealing.[7] But Gilbert Simondon is perhaps most clear on the matter when he calls attention to a technicity that follows the persistent modulation of internal and external milieus of humans and machines.[8] Importantly, for each of these philosophers, thinking techne involves putting the human and technological into relation as part of an emergent processes with socio-political ramifications in that it cultivates the possibility of different relationship with technology. On the human side of things, this requires recognition of the body as an entity "as such" — that is, as a processes of constant change through growth, metabolic renewal, and adaptation — rather than a bounded and determined object. On the technological side of things, it demands the creation of technologies of life, that is, technology that can evolve and emerge in correspondence with a changing human collectivity. That the nuclear ensemble fails miserably in this respect is distilled in the chant that was often heard around anti-nuclear demonstrations in Tokyo, "Human and Nuclear Cannot Co-Exist!" (*ningen wa kaku to kyōzon dekinai*). Understood in the context of the philosophy of techne, what the chant declares is the impossibility of thinking a relationship with the nuclear ensemble as a result of the absolutely determined and closed nature of the nuclear technology. As such, it suggests that the question of *soteigai*, that is, the question of unthinkability around the nuclear crisis in Japan was never about the difficulty or limits in imagining possible causes or contingencies leading to the failure of the nuclear machine. Rather, it has always been about the impossibility of thinking the consequences of the nuclear crisis.

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[1] An example of this thinking is found in Hirose Takashi's *Fukushima genpatsu merutodaun* (Fukushima Nuclear Meltdown) (2011) , which argues that Tepco never prepared for a tsunami in any of its risk management scenarios. Drawing on historical data on tsunami that exceeded the 5.5 meter defense system at Fukushima (38), he

shows that this was in contradiction to an obvious threat as well as predictions, by himself and others.

[2] In *Fukushima dai ichi gennpatsu jiko wo kenshō suru* (Investigating the Fukushima Daiichi Nuclear Accident), (2011), Sakurai Kiyoshi argues that the crisis at Fukushima was not *soteigai* by comparing what happened at there with the conditions at a nearby reactor that survived the earthquake and tsunami unscathed. What made the accident *soteigai* was a culture of collusion (*nareai)*. T

[3] Norimitsu Onishi and Ken Belson, "Culture of Complicity Tied to Stricken Nuclear Plant." New York Times, April 26, 2011.

[4] (Hatamura 2011)

[5] Note from interview with Mori Kinji, July 5, 2012.

[6] (Mumford 1963)

[7] (Heidegger 1977)

[8] (Simondon 1958). See also (Combes 2013).