Digital Catfish and Technological Ritual: Experimental Rites through Earthquake Early Warning in Japan*

Lee Kangwon**

(Abstract) This article highlights the "life surrounded by devices" generated through association between humans and devices, by analyzing the process through which the Japanese Earthquake Early Warning (EEW) System was established. Focusing on the catfish logo designs on EEW posters and devices, I explain how the propositional feeling, affect, information, and emotion are organically connected. I seek to emphasize the fact that living (survival, livelihood, life, and ecology) is comprised of the connection of devices, and as such, I propose that "technological ritual" and "experimental rite" are two concepts that explain "how to live surrounded by devices." The first proposition of this article is "catfish know before the quake comes." The Japanese EEW service was launched in 2007, emphasizing an alternative approach to mitigation of earthquake disasters by means of a "warning" system that "knows before the quake comes." Entities in the network are mediated through devices that act as digital catfish and constitute a unity that is co-affected by a feeling of possibility. The second proposition is "catfish restore world order." The process by which the world order is restored is through differences borne out of the continued repetitions of certain rituals. I have named this process "technological ritual." Each time an earthquake occurs, an EEW is issued. The EEW may be transferred from one place to another through the formalization of different entities' actions. The experiments in technological rituals mediated by digital catfish go beyond mere demonstration, as they seek to test out a new world.

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** Professor, Department of Japanese Language and Literature, Incheon National University.

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1. Introduction: Living among Devices

I resolved to travel far in order to follow the catfish that came and went at sites of disaster prevention technology (Yi Gangwon 2016). I followed the playfully swimming catfish in order to track the relationship between catfish and earthquakes. Catfish cut across the spheres of religion and science, transforming from divine beings to objects of experimentation in a laboratory. The myth that began as a popular belief that "when catfish leap, an earthquake will occur" changed to an experimental hypothesis that "the abnormal behavior of catfish is a sign of earthquakes." Over the course of ten years, several generations of catfish in aquarium labs demonstrated their capacity for sensing vibrations and electrical currents; in so doing, they went from being feared as "earthquake bringers" to being revered as "earthquake predictors." Thus, I became a companion to the continuously transforming catfish, circulating across mythology, social history, folklore, and science.

However, while following and holding firmly to the catfish connected with earthquakes, I also encountered catfish in other forms, in other places, at other times. The third kind of catfish I saw was in a logo (Figure 1) on the state-of-the-art EEW final-terminal network receiver. It was not a woodblock print of a catfish by Edo-period people nor the catfish in a scientist's article.[1] This catfish laughed brightly on the surface of the device and was not a mythical creature nor the object of an experiment; instead, it was transforming into something else. To understand the identity of this third type of catfish, I set out to connect it to the stories told in classic Japanese catfish prints.

The device is called "Digital Catfish" (デジタルなまず). While "digital catfish" could mean a device with a catfish graphic on it, this device was actually called "Catfish." It was a transformed catfish, with a catfish graphic on the surface and the word "digital" simply thrown in front. The catfish image—once a mythical creature and then an object of research in an aquarium tank—is now a device connected to state-of-the-art information technology. Just as the "catfish as earthquake bringer" and "catfish as earthquake predictor" had both been connected to earthquakes in different ways, this third kind of catfish was involved with earthquakes in its own

1 (Editor's note) Edo-period images of catfish can be viewed, for example, here, http://pinktentacle.com/2011/04/namazu-e-earthquake-catfish-prints/

way.

Earthquakes raise their voice through devices. Those who research earthquakes are familiar with devices. Installed in the underground mines of mountainous Tottori prefecture are four lonely seismometers. At Mt. Abuyama near Osaka, thousands of micro-seismometers lay waiting for ambush, covered in soil and leaves. In the Disaster Prevention Research Institute in Kyoto, there is a room with servers that record and measure seismic waves detected by seismometers. Varieties of seismometer networks—with names such as K-net, Hi-net, and Kik-net—produce different sounds at different amplitudes and cycles. Information about seismic waves measured by the tens of thousands of seismometers is dispatched to the research institute, and in the room with the servers, a graph of the earth's quakes is constantly flowing. As we follow this network of life-preserving devices that make the earthquakes alive and give them a voice, we can see and hear the heartbeat of Earth as it flows from the earth to the research center (Yi Gangwon 2012, 2014).

However, the space digital catfish inhabit extends beyond where those devices are physically located. The first places I encountered digital catfish were in ordinary citizens' homes and through smartphone apps. Earthquake meters are installed in isolated places, but rather than remaining in servers in research offices, the digital catfish enter people's homes and hands. If we were to map the geography of earthquake-related devices, we could show that the voice of earthquakes flows through a network that has grown increasingly extensive: from observation centers to research centers, meteorological agencies, broadcast stations, family homes, and ultimately into human hands. We can guess that once devices are introduced, they will cause fascinating changes in both earthquakes and people's daily lives.[2]

This article tells the story of how "foreign devices" affect changes in Japanese citizens' daily lives, explains how digital catfish are received, and explains what kind of earthquakes the "earthquake in the palm of your hand" delivered by the digital catfish are. This article also deals with digital catfish as unfamiliar "outsiders" in Japanese citizens' daily lives. This is because the simultaneous curiosity and fear inspired by an outsider is similar to the emotional response produced by an outside device alerting

2 With the interference of devices, a difference in representation is produced. For more on the process created by the form of existence between people and materials linked by devices, see Im Soyeon, Ha Daecheong, and Yi Gangwon (2013).

people to an earthquake. In the Japanese language, both the character for person (者) and the character for thing (物) are pronounced as *mono*. So digital catfish can be both "outside people" and "outside things." In this article, outside (*yoso*) *mono* refers to outside people, outside animals and plants, and outside inanimate objects. The human and non-human are not distinguished, but anything that brings change to daily life is called *yosomono*.

To understand this *yosomono*, it is necessary to question how digital catfish become primary actors. Are people afraid of digital catfish? Do they know how to live alongside digital catfish? Can they distinguish digital catfish types one, two, and three? Are digital catfish recognized as members of Japanese society?

However, in order for these questions to have meaning for anthropological research, it is necessary to understand how the exclusivism inherent in the culture concept blocked the settlement of *yosomono* digital catfish. Digital catfish are *yosomono* in Japanese citizens' daily lives and also in Japanese culture. In a concept of culture defined by "shared awareness and ways of living," the place taken up by new mechanical devices and technical interventions was not planned. Culture, like an exclusionary community, excludes mechanical devices of industrial society as if they were outsiders. Researchers have seen the actions of devices as "fixed," only repeating "passively" but, at the same time, they have been reluctant to affix the term "culture" to mechanical devices that threaten "humanity" or "alienate" humans. The modifier "mechanical" cannot be applied to anything "human" or "cultural" and is used to explain the exceptionality of culture as separate from machines. The result is that culture as a "defense mechanism against technology" (Simondon 2011: 9) becomes excluded from any actions involving mechanical devices, making it invisible. Although contemporary humans live in the midst of devices, their connection with these devices is denied through the culture concept. Culture, in its psychosocial apparatus to deny and defend, is, like mechanical devices, an invention of modern industrial society.

Thus, the journey to answer the question of whether digital catfish co-exist well with "Japanese culture" addresses a philosophical and anthropological debate over the relationship between technology and culture. Can "culture" cast away its position of defense mechanism over technology and accept technology as a member of society? Can anthropology's "culture concept" negotiate the common sense encompassing divergent areas such as technology and religion, science and ethics? This experiment in following digital catfish is a journey of overcoming this cultural line of defense and drawing the borders for a new kind of life. This adventure is a free and wild adventure to shed light on the "dangerous" concept revealed through experience. Without making a dichotomy between culture and technology, this experiment describes the "shared life" created through devices as mediums.

Fortunately, unlike the oppositional technology/society relationship of technological and social determinism, there are not many examples of raw hostility in the relationship between technology and culture. Cultural studies of technology on cell phones (Kim Chanho 2008) and the "cultural tech" that converges with technology development research (Kim Hyoyeong and Bak Jinwan 2013) carry a favorable attitude towards the convergence and interdependence of technology and culture. In its various fields—including the anthropology of science and technology and ecological anthropology—anthropology casts off the culture/technology dualism through concepts of hybridity, association, assemblage, and entanglement. Without ruling out "the immanent characteristics of technology innovation," this new research trend views "culture as having generative schemas." This research also emphasizes that the connection of culture and technology through devices contributes to the appearance of new lifeforms. Amidst devices, our hybridity increases, our entanglements become more complicated, our associations expand, and we live in a world of variegated assemblages.[3]

Through following the catfish, I found that they have become a state-of-the-art apparatus and, as such, cannot be disregarded, ignored, or deemed irrelevant. I emphasize that "a life amidst devices" means that living (survival, livelihood, life, and ecology) is accomplished through the mediation of devices. Thus, I add some final questions in response to the digital catfish's incursion into daily life. Can anthropologists talk about the existence of digital catfish? Do anthropologists have the concepts to talk about "ways of living amidst devices"? I offer the term "techno-totemism" to name the practice of connecting technology and religion (Yi Gangwon 2016). The digital catfish that accompany this article are an extension of

3 Refer to Yi Gangwon's (2013a) work on the anthropology of science and technology, Yi Seonhwa (2015) on ecological anthropology, and Yi Gangwon (2013b) on the anthropology of kinship, illness, and gender.

techno-totemism, and, at the end of the journey, they wait for a term to signify a practice that has not yet been divided into culture and technology. I suggest that we name this practice "techno-ritual" and "experimental rites."

A ritual is an action that repeats according to a set form (Miller 2014: 237–238). Whether sacred or secular, periodic or irregular, rituals have a core action that is repeated. A "technological ritual" is practiced amidst devices. Unlike established rituals, the things that give techno-rituals their strength are devices. And unlike ritual objects that display symbolic power in a place, devices are improved through experimentation and transmit information to various places through connection with other devices. Though there are commonalities to the repeated actions in a set form, technological ritual through the mediation of devices is practiced through a network of mutual sensitivity between members who, though physically separated, are part of the flow of information.

An "experimental rite" is an assembly of actions that put technological ritual into practice in accordance with new forms. Not content to stop at following established forms, it is a practice of repeatedly experimenting in order to realize new forms. Rather than a repeated action that follows a form, it produces a form through repeated action. Thus, it is different from rituals that reaffirm the appropriateness of everyday roles and customs and reintegrate society (Turner 1969). What is important in experimental rites is the development or invention of new devices. This is because the very action of connecting to new devices is a method of producing difference through repeated actions.

Following the above discussion, this tale of the digital catfish will now unfold. The first proposition this article will deal with is "catfish know before the shaking comes." This proposition appeared with the 2007 launch of Japan's Earthquake Early Warning System, linking earthquakes and catfish in a new association. This followed the sense of failure due to the impossibility of predicting the Kobe Earthquake of 1995. However, long-term seismic-sensor predictions were criticized for failing to help reduce damage in the Fukushima disaster of 2011 and the Kumamoto Earthquakes in 2016. In this atmosphere of frustration and despair, new feelings informed suggestions for improving the Earthquake Early Warning System, and this pulled together a lot of people and things in Japan.

People and things that felt the possibility that "catfish know before the shaking comes" shared a new worldview that there was a "trade-off between accuracy and speed." In accordance with this worldview, observatories, research institutes, meteorological agencies, railroads, factories, schools, houses, smartphones, and user associations were joined in mutual sympathetic affect through devices. In so doing, digital catfish habitat did not stop at one device but rather extended over the network made possible by these unions.

The second proposition of this article is that "catfish restore the world order." This straightening of world process is accomplished through repetition by way of rites and differences produced by repetition. I call this process "technological ritual." Each time an earthquake occurs, an earthquake early warning (EEW) is transmitted. Through formalizing actions of a group, earthquake early warnings can move from one place to another. And psychological burden is dispersed through the commonalities in action norms controlling the emotions induced by this kind of emergency information. With each earthquake, this formalization, movement, and allocation of burden are repeated "ritually." We anticipate that through this ritualized technology, information will travel faster as it becomes more accurate. And we anticipate that as emotions and actions become calmer, they will also become shrewder.

In technological ritual, digital catfish experiments are not limited to empirical experiments but are, in fact, experiments that test new worlds. Additionally, rites do not stop at confirming the established order but experiment with a new order. Thus, it is necessary in technological rituals to think of experiments and rites together. We can say that "experimental rites" are a process of creating new worlds through technological ritual.

Through describing these kinds of creative advancements, anthropologists take on a role supporting possibilities for human existence. Moreover, they praise the potentiality of transforming in accordance with these possibilities. "Supporting possibilities" and "praising potentiality" have theoretical and methodological significance for ethnographic techniques. Anthropologists can accomplish these through "simple" techniques.

2. "Catfish Know Before the Shaking Begins": From Earthquake Predictor to Earthquake Transmitter

The catfish in Figure 1 has none of the grace and subtlety of Edo-period prints, nor is it a prosthetic device or rough sketch for a scientist's article. The new catfish is very simple, but it has an antenna sticking out of its head and is transmitting signals. This transformed catfish's name is "Yurerun" (ゆれるん), a name that was selected in a competition sponsored by the Earthquake Early Warning Users Association and is a play on the Japanese word for "shake" (ゆれる *yureru*).[4] Yurerun's antenna transmits news that "It's shaking!" to people and things.

Under the catfish graphic are written the phrases, "Earthquake early warning" and "Know before it comes." It is not clear whether the actor in the sentence "Know before it comes" is the earthquake itself, the shaking, earthquake researchers, others interested in earthquakes, the EEW network, factories and highways, or ordinary citizens. But it is clear logically that the speaker of the sentence above—"It's shaking!"—is Yurerun. If Yurerun knows, then other people and things also "know before the shaking comes." The reason for Yurerun's simple appearance is that outside of contributing to the proposition that "it knows before the shaking comes," it also mends and repairs everything. The possibility that catfish alone "know before the shaking comes" becomes a fabrication that is easy to swallow.[5] If Yurerun is the place that the EEW network arrives at, then it can be found anywhere. People and things in these places stand at a turning point of whether to be drawn into the "feeling" (Mun Changok, Go Inseok, and Bak Sangtaek 2005: 516–517)

Figure 1. "Yurerun," the mascot of the Earthquake Early Warning Users Association. Under the catfish graphic are written the words: "Earthquake early warning, know before it comes."

4 Earthquake early warning alert user council, "Establishment of logo and pictogram for early earthquake warning." http://www.jmbsc.or.jp/hp/topics/0707/logo_pict0707.pdf (Accessed: November 15, 2016)

5 People in the Edo period caught, grilled, and ate earthquake-triggering catfish as a ritual, to avoid earthquakes. Yurerun is similarly prepared for the earthquake early warnings. Namely, it is designed to be easily consumed as a logical subject for the functionality of the proposition.

created by the new proposition that they "know before it shakes." If we retrace the places where Yurerun appears, we meet the people and things drawn together by the feelings of possibility.

Here let us judge whether catfish really know before the shaking comes. Let us first examine the suspicion that "at best, it's just a logo; can Yurerun have any great impact on decreasing the damage from earthquakes?" The Earthquake Early Warning logo, in mobilizing the "relatedness between earthquakes and catfish," gives a strong impression of the EEW service. The important thing is, even if the main actor of the proposition "it knows before the shaking comes" is not Yurerun, if people and things are added, we must examine how these people and things are connected and how the new world and old world of the transformed catfish are different. Then we can discover the great changes brought about by reservations of judgement.

When I conducted fieldwork between 2009 and 2010 in the Disaster Prevention Research Institute (DPRI) connected to Kyoto University in Japan, I was confused by terminology related to sensing large earthquakes and different methods of notification—"foresight," "prediction," "forecast"—that seemed similar but, in fact, occupied different space-times. At that time, there were three teams at the DPRI: 1) the "earthquake foresight" team, 2) the "powerful seismic waves prediction" team, and 3) the "earthquake early warning (forecast)" team. All three research teams had the focal point of pre-earthquake rather than post-earthquake. All three gathered to know, guess, and inform about the "pre" earthquake, but I came to understand that they were engaged with earthquakes according to completely different propositions.

I had already encountered the tenets of earthquake prediction by way of the proposition that "catfish's abnormal behaviors are a sign of earthquakes" (Yi Gangwon 2016). Catfish in a lab's aquarium, through sensing the earth's currents before an earthquake, could predict an earthquake 30 percent of the time. In order for the "earthquake predictor catfish" to exist, there must be the assumption that "they know before the earthquake occurs." The proposition "catfish's abnormal behavior is a sign of earthquakes; we can know before an earthquake occurs by observing the abnormal behavior of catfish" predicates the proposition of "earthquake-predictor catfish." What is clear is that whether through the catfish's earthquake predictions or machines' earthquake predictions, all make the proposition "[it] knows before the earthquake happens" self-evident.

The team researching "earthquake foresight" (Team 1) suggested that "by observing active fault lines and trench movement through earthquake sensors and GPS, we can know about an earthquake three to four days beforehand." The trouble is that this proposition of earthquake foresight contradicts other propositions, starting when the assumed order is revealed. Six months after the Kobe Earthquake in January 1995, the Earthquake Prediction Promotion Headquarters under Japan's Education, Culture, Sports, and Technology Ministry was shut down. In June 1997, the Geodesy Inquiry Commission presented the statement, "the actualization of earthquake prediction is difficult at this time." In 1999, a debate over earthquake prediction unfolded over the course of five weeks in *Nature*, with Tokyo University earthquake scholar Robert J. Geller taking a pessimistic view of earthquake foresight research, throwing out the question: "Earthquake prediction: Is this debate necessary?"[6] In 2006, earthquake prediction was referenced as if was already something of the past:

> In the 1960s it was hoped that prediction would be actualized within 10 years, and anticipation was raised. But even as observation networks' level of precision in realizing prediction was raised, due to the complexity of the mechanism of earthquake occurrence, prediction became more difficult. Although this period of investigation had great significance for research, looking at the results, prediction was not realized. (Wada 2006: 10–11)

The proposition that "if we increase the number of observation stations, we'll know before earthquakes occur" is referenced pessimistically within the proposition that "even if we increase the number of observation stations, due to the complexity of the mechanism of earthquake occurrence, it has become harder to *know before earthquakes occur*." One disaster prevention research center earthquake engineer declared earthquake prediction to be merely a "dream."[7] If "know before the earthquake comes" is only a phrase from a dream, it can no longer exhibit the power to attract devices, research money, or research personnel. Politicians came to mistrust earthquake forecasts,[8] and citizens who participated in disaster prevention meetings raised questions about the connection between the increase in observation

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6 "Is the reliable prediction of individual earthquakes a realistic scientific goal?" http://www.nature.com/nature/debates/earthquake/ (Accessed: October 22, 2016)

7 Interview with earthquake engineer Sawadawa (July 9, 2010)

8 http://www.bousai.go.jp/kaigirep/chuobou/2/gijiroku.html (Accessed: December 1, 2016)

stations and actual regional disaster prevention.[9] Earthquake researchers also raised the criticism[10] that "everyone knows that earthquake prediction is not possible, but under the Large-scale Earthquake Special Action Plan Law, which assumes that earthquake prediction is possible, one can receive funding for anything related to earthquake prediction if one simply applies."[11] As the proposition that "they know before the earthquake occurs" becomes suspect, receives criticism, and falls from interest, the lure of catfish as earthquake predictors whose "abnormal behavior is a sign of earthquakes" also loses its power. Even going beyond research to disaster preparedness, threats to funding for earthquake foresight through catfish got bigger. Almost no research results were published on the possibility of earthquake foresight through catfish, and the numbers of researchers doing experiments with catfish dropped to only a few.

Next, I connect this to Team 2, which is composed of architectural engineers and urban environment engineers who research strong earthquakes under the proposition that "[they] can predict strong shaking in advance." Following earthquake intervals, the team predicts the seismic intensity of and calculates, within a range of decades (usually within a 30-year period), when future earthquakes might happen in a particular location. If this work is repeated for predicted earthquakes, a hazard map of ground vibrations can be drawn. Areas with a high probability of experiencing intense tremors are indicated in red on the hazard map. This comes with the suggestion that "while we cannot know in advance when, where, or how large in scale they will be, we can reduce harm by calculating the probability of strong shaking." Thus, the point of contention moved from building more observation centers for active faults and ocean trenches to calculating ground-surface shaking in advance (Kyoto City Disaster Prevention Council 2011).[12]

However, following the Great East Japan Earthquake of March 2011 and Kumamoto Earthquakes of April 2016, the proposition that "we can

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9 Participant observation of an academic conference of the Disaster Prevention Research Institute (DPRI) at Kyoto University (October 8, 2010)

10 *Modern Business*, October 22, 2016. ((Editor's note.) No additional information on the source in the original.)

11 Refer to Kim Beomseong's (2012) research on Japanese earthquake researchers' in-depth debate on earthquake foresight.

12 京都市防災会議, 2011,『京都市地域防災計画—震災対策編』京都市.

predict strong shaking in advance" lost its power. The hazard map produced by the Earthquake Survey Research Promotion Office under Japan's Education, Culture, Sports, and Technology Ministry only showed an 8 percent probability of tremors above 6 on the Richter scale for Kumamoto in the coming 30-year period. In contrast, the probability for Yokohama was given as 78 percent and for Chiba as 73 percent. "We must repeal this hazard map, which not only failed to predict but also needlessly deceived people. We must recommend 'preparation for unpredictable disaster,' not only in specific areas but nationwide" (Geller 2011). As the proposition became negatively referenced, going from "appeal" to "deception," an alliance of researchers, local government, research funding donors, and enterprises left the proposition behind.

The "dream" of foresight broke down after the 1995 Kobe Earthquake. And the hope of prediction turned into "resentment" over hopes not met following the 2011 Great East Japan Earthquake and 2016 Kumamoto Earthquakes. In this atmosphere of breakdown and resentment, I became interested in the fate of the third proposition, that of "forecast." I began chasing after the whereabouts of the earthquake early warning's proposition that (Team 3) "[they] know before the shaking starts." And unexpectedly, I again ran up against the transformed catfish I referenced previously, Yurerun.

Where did Yurerun live? And how was the world of "forecast" it inhabited different than the former worlds of "foresight" and "prediction"?

Earthquake early warning researchers draw the worldview of earthquake forecast through complicated formulas in their research articles.[13] They explain these formulas as "the intersection of speed and accuracy" (Wu et al. 2007; Wu and Kanamori 2008). If an earthquake early warning can quickly and accurately let people know in advance of an earthquake's shaking, it becomes an ideal disaster-prevention technology. But in reality, increased speed means reduced accuracy, and with increased accuracy comes reduced speed. If the researchers observe the seismic waves from beginning to end to increase accuracy, the time taken would mean that the calculations would only be finished after great harm had already been done. On the other hand, if they want to maximize speed by only observing the

13 Worldview can also be defined as "the structure of order." For a definition of "worldview" (世界像 *segyesang*) and the difference between that and the similar *segyegwan* (世界觀) and a discussion of the actions arising from that difference, refer to Yi Gangwon (2014).

beginning of the wave and then calculating the coming shaking, they might calculate the strength incorrectly and make a confusing forecast. For this reason, different researchers stand on different sides of the line between speed and accuracy. The researcher group promoting earthquake early warning walked a tightrope of compromise between speed and accuracy. The speed of P-waves, which shake the ground vertically, is 6 cm/s. The speed of S-waves, which shake the ground horizontally, is 3.3 cm/s. Thus, P-waves arrive first at an earthquake site, and the S-waves that inflict the most damage arrive later. I learned that if researchers only calculate "three-second P-waves," even if it reduces accuracy, making the forecast quickly means they can buy some time before the S-waves come 3–20 seconds later.

In this way, an earthquake early warning can notify in advance that an earthquake will occur right before shaking begins in a place where it is not happening yet. They can use the short time in which "the earthquake has occurred but the shaking is not here yet" to reduce damage.

I entered this world where accuracy and speed meet by following Yurerun, the earthquake-transmitter catfish. This is a place measured in seconds, a space that is created and moves even faster than seismic waves. If the world of foresight is a world of three to four days, and the world of prediction is a world of 30 years, the world of forecast is a world of 3–20 seconds.

3. Digital Catfish Habitat: The Net is Vast

Even if the earthquake transmitter catfish are depicted in the world they inhabit, they are not fully members of that world. Forecasts that draw in people and things sympathetic to the propositional feeling of "know before the shaking comes" must prepare habitats that display power. Following the worldview that this habitat is at the intersection of accuracy and speed, it becomes space-time that erases order. When all people and things residing in the habitat act in accordance with this worldview of "intersection," the habitat's order is created. Thus, earthquake transmitter catfish adapt to the environment they are given instead of following any commonly held ecological knowledge about the habitat. Instead, they take a leap to "creating the environment through their adaptation itself" (Simondon 2011: 82). Along with the people and things that share this propositional

Figure 2. A digital catfish developed by the company 3Soft

feeling, the catfish construct the environment to which they adapt. As a result, if the earthquake transmitter catfish exist, the people and things who live alongside the earthquake transmitter catfish are able to exist.

It was in this new habitat that digital catfish appeared. Digital catfish are terminals located at the end of the EEW network. They are devices that forward Earthquake Early Warnings sent by the meteorological agency by connecting to cable TV and internet networks.[14] Unlike Yurerun, who is merely a graphic, digital catfish carry the status of mechanical equipment. The main body and the supporting device make up one unit. If we look at the logo in Figure 2, we see the digital catfish has a body sensitive to receiving and transmitting shaking, its whiskers in the shape of earthquake waves and heart pulsating with the shaking. Unlike Yurerun, with his antenna that transmit newsflashes, we can see that this digital catfish transforms to an appropriate body for receiving breaking news.

After digital catfish sound a warning alarm and alert to the seismic intensity, the countdown begins. Through a receiver, it offers new space-time by transmitting "*N* seconds before shaking" to various groups connected to the Earthquake Early Warning network. As more groups become interested in the space-time of the EEW, the digital catfish's habitat expands.

In schools, orphanages, and daycares that are at risk from earthquakes, EEW terminals have been installed, drills have been carried out, and regulations have been made and institutionalized. Starting in 2012, over a three-year period, Japan's Education, Culture, Sports, Science, and Technology Ministry (Monbusho) introduced Earthquake Early Warnings

14 http://www.digitalnamazu.com/ (Accessed: December 13, 2016)

to 52,000 public schools around the country. In the Great East Japan Earthquake of 2011, students at one elementary school calmly evacuated and were not injured. This was because the students, who participated in drills every day—practicing with teachers who had received education, advance training guidelines, successful examples, broadcast equipment, receiving devices, and propositions—had transformed into one body that could adequately react to earthquake early warnings. Because the students and teachers previously got flustered at the warning sound, they operated as a body that couldn't move, stayed frozen in place, or chaotically ran out of the school.[15] With practice, they developed habits of calm minds and actions, and when they heard the alarm were able to "unconsciously" get under their desks. Through the medium of this transformed collective body, the children were connected by the feeling of "[they] know before the shaking begins," and they came to reside in the web affected by the digital catfish. Disaster prevention researchers developed programs, recorded the training process, and interviewed the students and teachers in order to document the effectiveness of the EEW in schools (Nagata and Kimura 2013).

Factories and toxic material storage facilities always had an intimate relationship with the earthquake early warnings. In semiconductor factories, hazardous gas and chemical supply systems were automatically shut off when shaking began, which could prevent expensive equipment from being destroyed. In Japan there is the well-known case of semiconductor producer Clean Room incurring damage in an earthquake, resulting in bankruptcy of the company (Kawada 2009). Of course, this "automation" is made possible by the prior inspection and adjustment of humans. However, in order to make this adjustment possible, humans must borrow the power of multiple devices that together form the EEW. Thus, it is not important whether the automatic "actions" of equipment are initiated by a human or a machine. Through the process of possessing devices and changing one's body, the bodies of machines and the bodies of people mutually influence one another. Just like the transformation of the catfish, through their own transformations, people and equipment both are inside an affective chain exchanging the propositional feeling of "know before the shaking starts."[16]

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15 In disaster psychology, this reaction is known as "stationarity bias" (Yamori 2009).

16 Feelings and affect are terms frequently used to describe humans' psychology. However, in philosophy and the anthropology of science and technology, these terms are also

Through connections with the Earthquake Early Warning System, companies are able to reactivate their factories after big earthquakes. Thus, the EEW is included as an important element in companies' business continuity plans (BCP) or business continuity management (BCM) plans. From the perspective of project continuity, companies maintain the trust of businesspeople through quickly restoring the production line without suspending operations following earthquakes. Additionally, the EEW is helpful in the crisis management of supply lines, communications, and transportation related to national and social infrastructure.

Different interest groups including high-speed rail, administrative institutions, broadcasting stations, hospitals, families, and individuals all connect to the Earthquake Early Warning through different points of interest. All share the propositional feeling of "know before the shaking starts" and form a world of "intersection between speed and accuracy." Namely, all share the "possibility" of accepting that with speed, accuracy may have to be sacrificed. The predicted seismic intensity may be wrong, and, like an earthquake directly underground in which P-waves and S-waves arrive simultaneously, forecast may be impossible. Thus, for the Earthquake Early Warning to work, education about "unavoidable limits" is required. In this world, even as we question the accuracy of warnings, the "compromise" of maintaining a calm mind and moving the body as quickly as possible becomes a new virtue.

In this way, the standard of judgement changed. In the case of earthquake foresight, when warnings were issued three to four days in advance, then, in accordance with law, regional economic activities were halted and large-scale evacuations of residents began. In cases where foresight was off the mark, and the earthquake did not occur, there was large-scale social and economic loss. Thus, even if earthquake researchers quickly announced their foresight and gave warnings, it created a large burden. A long-standing debate over earthquake foresight among earthquake researchers went beyond the scholarly community and extended to legal issues (Hankyoreh, November 11, 2014).

In comparison, if there is an announcement over the Earthquake Early

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used to describe propositions, machines, animals, matter, and human relationships. Not only humans but also non-humans feel and are affected. Also, between humans and non-humans, feelings are shared and exchanged, such that affect that gives and receives mutual influence is possible.

Warning System, people get under desks, equipment is grounded, and the high-speed train reduces its speed temporarily. So, even if the forecast's accuracy is insufficient, the money loss is minimal. Due to the imprecision of earthquake early warnings, there is not much possibility that anyone will have to bear responsibility for it. If a forecast is off the mark, the meteorological agency may issue a formal apology, but there is no great possibility that earthquake scholars will be drawn into a lawsuit. Through earthquake early warnings, the aforementioned intersectional world distributes the burden of responsibility for accuracy and speed to all its members, arriving at compromise. This union of concession and compromise is the innovation realized by EEW technology.

Viewed in this way, the process of forming the digital catfish's habitat is—along with being a technological innovation—a political process in which the burden of the various actors is allocated and shared through compromise. In this process, the digital catfish's habitat becomes extended to more groups. In mutually affected habitats, the catfish's voice and smile is mobilized. The digital catfish is not in one place; digital catfish are everywhere, across a vast net.

4. "The Catfish Restore World Order": Technological Ritual and the Messenger of Order

Even after installing Earthquake Early Warning devices, carrying out education and training, and obtaining automatic suspension systems, the order of trade-off cannot easily find a place in the habitat of earthquake transmitter catfish. "False information" that is neither speedy nor accurate is continuously transmitted. As we are unable to calm down or move fast enough, we are engulfed by "panic" and "unease," or we move on to the dominant emotion of "disinterest." As members of this "units-of-seconds" world experience continuous earthquakes and the related EEWs, they have to block ritual processes that maintain order. In so doing, the trial of fast and accurate information, and naturally making an atmosphere in which one can be calm and still move quickly, is repeated. We can call this process of preparing an atmosphere in which information and emotion flow between people and devices in the digital catfish's habitat "order politics."

If we can say that the modern construction of order is carried out through state-of-the-art information technology, the construction of order in traditional Japan was carried out through religious ritual. The Susanu and Ameterasu myth in *Kojiki* [古事記 Ancient records] illustrates the process of creation of disaster-ceremony-order.

> Azanagi and Azanami made an island in the sea of chaos and bestowed to their children Ameterazu, Sukuyomi, and Susanu the sky, stars, and sea. But Susanu alone defied the construction of this neat and ordered world and appeared as a god of calamity. He cried out his refusal to rule the sea and made the mountains and sea barren so that disaster befell the land. Banished by Azanagi, Susanu flew up to where his elder sister Ameterazu ruled the heavens and brought terrible calamity there as well. Sun goddess Ameterazu, fearing her brother, hid in a cave. The earth was thrown into darkness, an unending state of night. The gods all made elaborate plans to draw Ameterazu out of the cave to restore light and order. They enlisted blacksmiths to craft a mirror out of ore, and made a necklace by stitching grain, and burned patterns onto deer bones and hung them at the entrance of the cave with linen and cotton. When a female shaman took the stage and performed an obscene and ridiculous dance, all the gods laughed all at once, and Ameterazu's curiosity was aroused by the sound, and she stuck her face out of the cave. The gods hid around the side of the cave, and, after enticing Ameterazu with the mirror, grabbed her hand and pulled her out of the cave. So, the world became bright again, and a new order was restored. Susanu, who was banished by resolution of the gods at the time, returned to modern Japan and caused great earthquakes, throwing Japan into chaos. The political order established at the end of the myth begins again with this new but ancient chaos. (Ohno 2007)

In the myth, the god of disaster is banished, and tools are fashioned to call the goddess of order, a stage is prepared, and ritual is performed. In the sense that political process is the construction of order from chaos, both the myth and the earthquake early warning are ritual processes. However, in the case of earthquake early warnings, technological ritual is carried out with devices such as seismic instruments, algorithms, the meteorological agency server, posters, receivers, disaster prevention education, automatic equipment, and drills. And each time a large earthquake occurs, the technological ritual of constructing new order at "the intersection of accuracy and speed" is repeated.

On April 28, 2008, at 2:32 a.m., the Miyakojima Island coastal water earthquake occurred in Okinawa Prefecture (M5.2). The first earthquake early warning was sent. The Japan Meteorological Agency sensed seismic waves at 2:32:14, and the Earthquake Early Warning (forecast) made its first broadcast at 2:32:19, reporting "seismic intensity 4/Okinawa Prefecture

Miyakojima."[17] The EEW sent 12 reports in total. Among these, the third report at 2:32:25 read "seismic intensity 5/Miyakojima," and it was upgraded to a warning to the public. This was 11 seconds after the shaking was first sensed at the meteorological agency. One second after the warning was sent, NHK TV and radio transmitted the EEW through automatic broadcast devices. However, on Miyakojima, shaking was felt 5 to 6 seconds before the warning. As heard in subsequent testimony—"I saw the Earthquake Early Warning on the television as the shaking went on" (Watanabe 2008: 32)—Miyakojima residents couldn't "know before the shaking started," but only "during the shaking."

The Earthquake Early Warning was transmitted even later to viewers of broadcasts other than NHK. The Ryukyu broadcasting station representative could not feel the shaking and carefully checked the meteorological agency's newsflash before manually entering the warning 54 seconds after the meteorological agency's report (Watanabe 2008: 33). Despite repeated trainings to enable speedy broadcasts following the introduction of the EEW System, those who first encountered the system spent several seconds confirming the accuracy of the information. The time the earthquake occurred was during the hour of 2:00 a.m., and since the earthquake was only a level 4 rather than the level 5 the warning had first advised, there was no great disorder on Miyakojima.

Information is "in-formation" (Latour 2007: 223). It is the "possibility of transformation" from one form to another (Simondon 2011: 197). In the process of transformation, only one small part of power from the previous form is transferred to the new form. While information failure does occur, the power can be transmitted even farther thanks to the newly granted form. In the reworking process that occurred in the transformation from the meteorological agency's EEW to breaking news broadcast, it became information that sacrificed speed due to caution. Although training had

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17 The Earthquake Early Warning is further divided into warnings and forecasts. "Earthquake Early Warning (warning)" predicts shaking of seismic intensity 6 or greater but is sometimes broadcast for strong earthquakes of intensity 4 or greater. Warnings are broadcast through television or radio (NHK, etc.) to the general public. "Earthquake Early Warning (forecast)" is issued when predicted seismic intensity is above 3 and scaled above 3.5. Terminals operate to activate shut-down for equipment and places such as elevators, railways, factories, and hospitals. Forecast users are differentiated from general users and called "advanced users." Forecasts are broadcast through permission from the meteorological agency as "forecast business permitted enterprises."

been received, in the process of transferring to the medium of quickest broadcast, the form that matched the order of "intersection" was not maintained.

Automation cannot completely solve the problem of in-formation. Ten days after the Miyakojima earthquake, an earthquake in the distant sea off of Ibaraki Prefecture (M7) occurred. But this time, the warning was given only after shaking had already been felt throughout the Kanto region. The meteorological agency detected seismic waves at 1:45:33 a.m. The EEW (forecast) first transmitted to advanced users at 1:45:43: "scale 5, Chiba Prefecture North and East areas." This was the forecast given in broadcasts one through eight. In the final broadcast (number nine) it was changed to an EEW (warning) for the general public: "scale 4–5, Chiba Prefecture North and East areas." By this time, 59 seconds had elapsed, and it was 1:46:32. From this we can determine that the warning came late because the meteorological agency was late in upgrading to a warning.

When the meteorological warning is late, the broadcasting stations' Earthquake Early Warning broadcast is also late. At the 45-minute mark, when NHK broadcast an alert, the broadcasting station was already shaking. But this broadcast was not an EEW (warning). The meteorological agency's emergency earthquake alert (warning) was not transmitted until 46 minutes and 32 seconds. While the warning was transmitted automatically after one second, NHK put out the automatic broadcast at 1:46:33, after it had already started shaking. It seemed that NHK put out the earthquake alert faster than the automatic EEW (warning). Thus, it became a situation in which the earthquake had passed but there were still alerts of "Shaking is going to start!" (Watanabe 2008: 34–38).

The first earthquake for which the Earthquake Early Warning was timely was the Iwate-Miyagi inland earthquake (M7.2) of June 14, 2008, at 8:43 a.m., a big earthquake in which 10 people died in landslides and 10 people were declared missing. There were 72 forecasts and four warnings in total. Warnings were issued by NHK and 22 commercial broadcasters in Northeastern Japan and by NHK, two commercial AM stations, and two FM stations in Iwate-Miyagi. Station NTT Docomo and au by KDDI sent warnings to cell phones. Earthquake Early Warning broadcast terminals, including digital catfish, also transmitted warnings (Watanabe 2008: 39–41). At one junior high school, the students got under their desks as soon as the in-school broadcast sounded, before they experienced shaking. After the shaking stopped, the students evacuated to the sports field, and not one student was injured. At one hospital, they were able to receive a transmission from the broadcast system connected to the EEW terminal, and the quick actions of patients and staff reduced injury and damage.

We can see that in the third example, earthquake early warnings began earlier than the shaking. The meteorological agency developed the speed to send out its first EEW (forecast) in response to shaking detected by seismic sensors in one place. As the warning broadcast went from being manual to automatic, speed was secured. But as the frequency of earthquake early warnings increased, the problem of "false reporting" related to accuracy became an issue.

On July 14, 2008, a company offered an earthquake early warning (forecast) that made an unbelievable and false report about a "far-off sea, Ibaraki Prefecture earthquake with a seismic intensity of 7 and estimated scale of 12.7."[18] Even in Tokyo, subway lines were suspended and delayed by 10 minutes once they reopened, and in Aichi Prefecture, junior high school students hid under desks. After this incident, the meteorological agency carried out an inspection of its forecasters, withdrew terminals that had transmitted inaccurate information, and cancelled licenses of forecasting businesses.[19]

After the 3/11 Great East Japan Earthquake, strange incidents occurred with EEW seismic equipment in the Northeast region. Between 4:24 a.m. and 4:26 a.m. on March 12, 2011, 81 Earthquake Early Warnings were made. The meteorological agency system was processing Northeast Pacific earthquake aftershocks and multiple earthquakes that occurred around the same time, intertwining them in its calculations.[20]

The false reports continued. On August 1, 2016, at 5:09 p.m., the EEW (forecast) reported shaking in Tokyo with a maximum seismic intensity of 7. It predicted an earthquake of 9.1 in scale with a seismic intensity of 7

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18 Japan Meteorological Agency, "Earthquake early warning (forecast) announced at 19:41 on July 14." http://www.jma.go.jp/jma/press/0807/14b/eew20080714.html (Accessed: November 12, 2016)

19 Japan Meteorological Agency, "Responding to defects that occurred in some seismic motion forecasting licensed businesses." http://www.jma.go.jp/jma/press/0807/22a/0722jigyousyafuguai.html (Accessed: November 12, 2016)

20 Japan Meteorological Agency, "Earthquake early warning (forecast) announced from 4:24 to 26 on March 12." http://www.data.jma.go.jp/svd/eew/data/nc/oshirase/20110312.pdf (Accessed: November 10, 2016)

throughout the Kanto region. The newsflash was sent out by an app with a membership system, and cell phone users who received the alert were thrown into disorder. The high-speed train was suspended, and elevators in skyscrapers stopped. But there was no earthquake.[21] The EEW System broadcast warnings about tremors detected by machines all over the country. In order to increase accuracy, it was set up to transmit broadcasts to general users only when the system sensed shaking from at least two sensors. But to "advanced users" who wanted information a little faster, it transmitted shaking detected by just one sensor. It made a forecast based on shaking detected by one seismic sensor; then, if, after comparing with other sensors, it found no other shaking, canceled the forecast. Sensors that were triggering incorrect forecasts were in Chiba prefecture, and the problem was they were picking up the noise from a thunderbolt in the vicinity.[22]

In order for information to flow between mutually affected bodies and devices, a sophisticated process of transformation is required. Only when it quickly and accurately transforms from one form to another can information move to other times through the network of affect. Thus, we can say that the important thing at this stage is not the power of a transmittal but the transformation that transmits information as quickly and accurately as possible. We find that there are many points at which shaking itself is transformed into new forms to call order to the world of many intersections: meteorological agency algorithms; developers of receiver terminals; forecast service managers; calculation software; electric company workers managing software; earthquake sensors placed all over Japan; calculators that separate and analyze earthquakes that arise at the same time; terrestrial broadcasters' receiving devices; cell phone apps; observation stations that can withstand lightning; and automatic relay machines that turn warnings into broadcast alerts.

False reports expose these various points and become an opportunity to improve the existing power so it can transform. Each earthquake—repeated in a sequence but different from the others—becomes an experi-

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21 Japan Meteorological Agency, "Earthquake early warning (forecast) announced at 17:09 on August 1, 2016." http://www.data.jma.go.jp/svd/eew/data/nc/oshirase/oshirase.html (Accessed: November 11, 2016)

22 Japan Meteorological Agency, "Earthquake early warning (forecast) announced on August 1, 2016." http://www.data.jma.go.jp/svd/eew/data/nc/oshirase/20160812.pdf (Accessed: November 13, 2016)

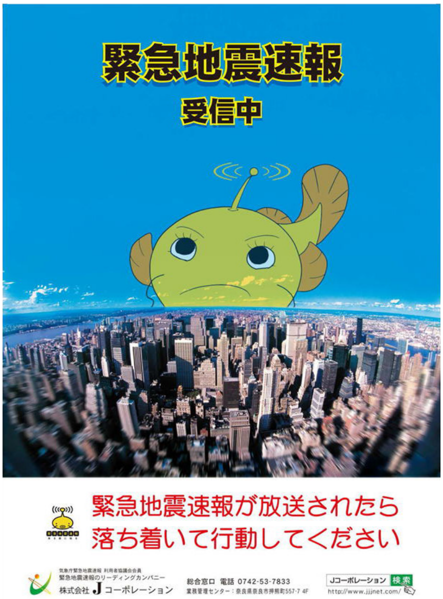

Figure 3. Earthquake early warnings and emotions. Below the poster is written "If an Earthquake Early Warning is broadcast, act calmly."

ment. Through these experiments, the various factors that structure the digital catfish's habitat can be called technological ritual, the process of becoming actors who encapsulate the world of many intersections.

Another important thing in technological ritual is that in joining mutually affected bodies, members also share emotions. The proposition of "know before the shaking starts" in order to reduce harm during earthquakes does not just mean understanding that shaking is coming; it also means being competent enough to evacuate without panicking or rushing too much. We can say that this is an emotional competence that members of this established world must be equipped with through the Earthquake Early Warning. In a network in which influence is given and received through mutual affect, emotion does not stop or stay at individuals or individual bodies. Thus, in order to maximize this emotional competence, the act of adjusting the affect between mechanical bodies and human bodies takes on importance.

Following the flow of emotion, I bumped up against Yurerun once again. In Figure 3, Yurerun is receiving an Earthquake Early Warning.[23] "If

23 Earthquake Early Warning "option poster," http://www.super-rabbit.jp/pdf_other/

an Earthquake Early Warning is broadcast, act calmly!" There is no sign of dread or anxiety in Yurerun's expression in the poster. He wears a determined expression and looks to be concentrating on what he is receiving through the antenna on his head. Just as the information transmitted through Yurerun becomes a transformed transmission to members of the network, the emotion in Yurerun's expression can be changed when filtered through the affect between devices and bodies.

We easily see how, through mutual affect, emotion becomes a cared-for result of movement between hearts, as evidenced in the process used to develop the alarm sound accompanying NHK's Earthquake Early Warning public broadcasts. The following factors were considered during NHK's development process: the sound had to grab one's attention and cause one to act; unlike existing warning sounds, it could be neither extremely unpleasant nor pleasant and neither bright nor dark; and it had to be audible to the hearing impaired (Tsutsui 2012). The sound had to link mechanical bodies and human bodies—capturing attention while encouraging action yet not invoking fear, and being audible to the largest possible number of people.

We can see how important the design of the warning sound was when we consider a foundation of human psychology, which is that moving one's body can be impossible when in a state of terror. Without taking this concern into consideration, the warning sound could trigger a state of being frozen in fear, immobilized by terror and anxiety. It became clear that the warning sound chosen for NTT Docomo cell phones only met the condition of "capturing attention." After the initial Kumamoto earthquake on April 14, 2016, refugees at an evacuation center experienced several dozen aftershocks. At that time, all the cell phones of the people in the evacuation center simultaneously issued a warning alarm, and children who already had received a great shock from the earlier earthquake remembered and cried out, "I'm scared!" Moreover, since the Kumamoto earthquake occurred directly under land, the shaking and EEW had arrived at almost the same time, and the sounds of warning alarms ringing out as the shaking went on only intensified people's sense of terror.

Demands to change the warning sound flooded social media. But the opinion that people also had to try to understand the warning sound's functional specifications circulated as well. After hearing from an expert

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option_poster.jpg (Accessed: November 30, 2016) that the warning sound was the best possible one for elderly to hear clearly, the warning alarm was not changed. Instead, the company made it possible for people to opt out of receiving earthquake early warnings or to put the alerts on vibration mode.[24]

Technological ritual has never ended. When the Tottori Prefecture Central Region earthquake struck on October 21, 2016 (2:07 p.m., M6.6), students and teachers were gathered for an assembly in the auditorium of a school in Kobe Prefecture. During the assembly, the Earthquake Early Warning began to ring out through the cell phones of several hundred students. Although the alarms came 15 seconds before the shaking, they did not evacuate. Even when the auditorium and ceiling lights began to shake, the teacher only repeated the phrase "be quiet," and the students stood trembling, not knowing what to do. Even amidst the shaking, the teacher continued to obstruct progress.[25] The timely information simply flowed by, and no actions were taken. It remained without being incorporated into the digital catfish's habitat.

In catfish artwork of the Edo period, earthquake-bringing catfish were depicted being caught, grilled, and eaten, but in a world collapsed by earthquakes and torn apart by income inequality and the threat of foreign powers, catfish became enchanted figures that could restore order to the collapsed world. Catfish that could "restore world order" (世直し *yonaoshi*) (Bak Byeongdo 2012) became earthquake predictors in the modern world, and then earthquake transmitters. Earthquake-transmitting catfish broadcast information and induce emotion in the sense of technological ritual and become guides who lead this world in which order has been erased, at the intersection of the speed and accuracy contained in the Earthquake Early Warning.

In the end, after following the catfish's various propositions, I arrived at the proposition that "catfish set the world straight." This final proposition is a proposition that contains the catfish in Edo-period artwork, the catfish

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24 For a comparison of NHK's and NTT Docomo's warning sounds, see NHK earthquake early warning alarm: https://www.youtube.com/watch?v=RWh5yV-SnZ4 (Accessed: December 10, 2016); NTT Docomo earthquake early warning alarm: https://www.youtube.com/watch?v=4gZW7HRHJmM (Accessed: December 10, 2016)

25 A video showing the situation in the school auditorium: https://www.youtube.com/watch?v=F_VAHNDgBKc (Accessed: December 11, 2016; as of January 11, 2017, it had been deleted.)

in labs and academic articles, and the catfish in EEW devices and posters. In all of these various ways, in different times and places—as a divine hero, a test subject in the lab, or transformed into digital devices transmitting information—catfish have performed a guiding role to restore the order of the world.

5. Conclusion: Experimental Rites

I entered the world of Japan's Earthquake Early Warning broadcasts by following the transformed catfish. I encountered them in the world of "the trade-off between speed and accuracy." And I entered this worldview of fast/accurate information that incurred vitality and atmosphere that attempted calm emotions. In this atmosphere, technological ritual was repeated every time a big earthquake happened in order to restore order. I observed how, in this process of technological ritual, an "island" of new order was constructed in the form of the Earthquake Early Warning broadcast as various bodies—whether mechanical or human—mutually affected one another. This "island," which can also be considered the digital catfish's habitat, is continually in the process of expansion. There are still people who panic and freeze when they receive an EEW. Every time an earthquake occurs, there are new kinds of false reporting that repeat and people who ignore the alert. In spite of this, through technological ritual, more people and things are coming to feel the possibility of "knowing before the shaking comes."

"A life amidst devices" is the life of those who can connect with devices and have the capacity to live life while connecting with these devices. In this kind of life, devices are not merely a toolkit to extend the body's movements beyond the body itself. Devices are mediators, instruments for perceiving the world more clearly and transforming the body to connect with other bodies.[26] Through this connection, the bodies of devices and the bodies of humans affect one another and produce the information and emotion that realizes propositional feeling such as "know before the shaking comes." The transformation of these bodies—their de-formation—starts from the feeling of possibilities and turns into affect and emotion; it is what makes the atmosphere of flow of information and emotion possible.

26 Refer to Simondon's distinction between toolkit and instruments (2011: 166).

All these transformations made feelings, hearts, and information respond to each other and affect each other. The catfish I followed were guides, showing us the possibility of transformation and also the results of that transformation materialized.

Could the culture concept have described the various bodies transformed through connection with devices? Could machines of postindustrial society or state-of-the-art devices of post-information technology and post-artificial intelligence receive attention under the culture concept? In the introduction to this article, I already indicated that the culture concept operates as a defense mechanism against connecting with devices and resulting transformations. The fear of alienation because of devices and technology develops into a movement to defend "human things" with the culture concept. Spinning off from this, we limit our research scope by insisting that feelings, affect, emotions, body, and so on are "things humans have" and "things mechanical devices cannot understand."

Rather than defend the human sphere, I followed the connection between a chain of bodies through following catfish. I described devices along with human bodies through connection rather than defense, through inclusion rather than exclusion. In so doing, I illustrated the process that produces feeling, affect, information, and emotions through connection between humans and devices. Humans and devices are ontological companions who "feel together, move together, and know together." Thus, in this story of catfish images, no matter how many devices appear, there is no image of the excluded human. The devices of technological ritual that I offer, far from threatening "humanity," on the contrary offer the possibility of realizing propositional feeling. They have cooperated to change and adjust information and emotion for the sake of the realization of possibility of mutual affect and emotion.

Of course, I cannot see humans, living organisms, as being exactly the same as machines. Those who offer a new worldview at the "trade-off of accuracy and speed," and who invent the world of prediction as differentiated from foresight, are all human. What is exposed in technological ritual is the fact that humans are mediating the relationship between devices and humans across the network—terminal suppliers, observation station inspectors, disaster-prevention education teachers, broadcasting-station alert managers, and warning-alarm developers. This is because the things that the Earthquake Early Warning network experimented on through technological ritual always remained as indeterminacy that did not erase order through the placement of the devices. As an open world, there is room for digital catfish habitat to improve or collapse through human action. A life amidst devices includes this experimental transformation originating from this space and indeterminacy, and humans have a talent for this experimental transformation.

Now some new words are needed to enable understanding of life lived alongside devices. I have already suggested that in technological ritual there is a process of constructing life's order through connections with devices. And I have suggested that technological ritual experiments do not stop at substantiated experiments. I have offered that there are factors for false reporting to be newly considered. And if you put those factors anywhere in the network, all members must change a little.

Thus, the technological ritual that follows each earthquake becomes an experiment that tests the new world. We can call rituals that confirm order "rites." However, the process of technological ritual does not end with confirming the existing order; it becomes a rite that experiments with a new order. Thus, with technological ritual, there is a necessity to think of experiments and rites together. We can say that "experimental rites" are processes that create new worlds through technological ritual. The worlds that experimental rites put into motion are neither in the sphere of science nor of religion but can been seen as a process that creates new worlds that inscribe new technology, new religion, new science, and new ethics through the connection between multiple and diverse bodies.

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Lee Kangwon is an assistant professor at the Department of Japanese Language and Literature at Inchon National University. He received his PhD in anthropology from Seoul National University in 2012. His research interests lie in the areas of science and technology, post-humanity, disaster, and Japan Studies. Among his recent publications are『재난과 살다: 대지진에 대비하는 일본 방재과학기술의 집합실험』[Living with disasters: Collective experiments in preparation for great earthquakes in Japanese disaster research] (2017), “센스&센서빌리티: 일본 안드로이드(로봇)의 관점과 나름의 인간” [Sense and sensibility: Perspective and humanity of the android (robot)] (『한국문화인류학』[Korean cultural anthropology], 2018), and “응답하라 시민센싱: 포스트후쿠시마 방사능지도 그리기의 리스크 커뮤니케이션” [Reply citizen-sensing: Risk communication in post-Fukushima radioactive pollution map drawing] (『공간과 사회』[Space and society], 2020).