

Biosecurity Practices in Laboratories and Museums: Sentinels, Simulation, Stockpiling

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Pandemic infrastructures

Pandemics are usually thought of as sudden, imminent catastrophes. The threat of a new virus emerging is described as a natural disaster on the model of earthquakes or floods, as it kills thousands of non-immune patients, such as the Ebola outbreaks in Africa or the influenza virus that caused millions of deaths after the First World War. But they can also be described as silent, slow moving, invisible catastrophes because they are related to the environmental changes that they signal through a sudden break in daily life. Ebola reveals the lack of public health infrastructures in African countries and the changes that occur when viruses that emerge in the wild ecology connecting bats, monkeys and humans appear in big cities. Influenza pandemics are linked to the “livestock revolution” whereby the increase in the number of poultry and pigs raised for human consumption multiplies the chances of mutation and reassortment of these viruses. Other viruses, such as dengue fever or Japanese Encephalitis, are linked to climate change and deforestation that force mosquitoes and bats to move from one environment to another, infecting non-immune populations. The idea of an ecology of infectious diseases was proposed by biologists in the 1960’s when they realized that the co-evolution between microbes and mammal species (including humans) was dramatically altered by environmental changes ¹⁾. We thought we lived in a world where infectious diseases belonged to the past, but the way we are transforming the environment has caused new infectious diseases to emerge.

How can anthropologists think about the moral and political aspects of this discovery? One way is to analyse the changing rationalities of risk among communities of experts who deal with the threat of a pandemic. With a group of anthropologists, we have focused on techniques of biosecurity that have configured the circulation of living material as a site of catastrophic emergence ²⁾. Biosecurity means that the more life circulates, the more it needs to be secured. It is a new rationality of risk because it does not rely on the calculation of probabilities of infection in a given population (as infectious diseases in the tradition of Pasteur: tuberculosis or rabies) but on the imagination of an imminent catastrophe. It is impossible to calculate the probability of the emergence of a new virus given the number of pigs and poultry who are raised on this planet. It is estimated that the number of poultry raised in China shifted from 13 million to 13 billion between 1968 and 1997, and the number of pigs from 3 million to 300 million ³⁾. Influenza experts say: the question is not when a new virus will emerge, but if we are prepared. Being prepared for to the

emergence of a pandemic means imagining that a new virus is already here. How can we imagine that animals pass humans new viruses in response to the changes in the way humans breed, kill and eat them ?

This is a broad question for media studies or cultural studies, who can analyze the images of birds as virus bombs or mad cows as cannibals. However, my method is derived from science studies. I am interested in how experts on infectious diseases introduce this imagination of preparedness to their technical devices. My argument is that pandemic threats create an interesting tension between biosecurity and biodiversity. Biosecurity prepares for an imminent catastrophe: the emergence of a dangerous virus from animals. Biodiversity prepares for a more silent catastrophe: the extinction of animal species, among which the human species may be counted, because of ecological changes. Microbiologists draw images of the circulation of viruses among species, where the human species is described as an “epidemiological dead end”. It means that the human is considered as the final stage of the process (hence we must protect humans from other animals) or as only an occurrence in that process (viruses will always have material for replication even if the human species disappears). Microbiologists thus shift from seeing viruses as enemies to seeing them as revelators of the proximities and distances between species. From the viruses’ perspectives, what changes if the human species disappears rather than a bird species?

I became engaged in these speculative paradoxes when I discovered that some microbiologists were working with birdwatchers. According to birdwatchers, Avian Influenza is not a real threat for humans: on the contrary, it is a threat for birds who are designated as the causes of infection. Billions of poultry have been killed in farms since Avian Influenza became a public health concern in the 1990’s, and reserves for migratory birds have been closed because the contact with humans was considered dangerous. But birdwatchers have realized that they could work with microbiologists and collect samples of bird feces for research. They contributed to the surveillance of infectious diseases in the bird population, whilst also gaining more knowledge about the routes and habitats of migratory birds. Microbiologists could see the invisible paths of flu viruses in the bird population, but birdwatchers could follow their visible trajectories. While the media have focused on the threat of birds with flu for humans, these scientific communities have followed the bird populations as a threatened ecology.

If we look at the history of flu research, it is a story of how laboratories were connected to follow the mutations of the flu viruses. Because of the rapid changes of flu viruses, the vaccines that were produced for seasonal flu had to be modified regularly. When a new pandemic virus emerged from animals, new vaccines had to be produced for humans. As new flu viruses emerge around on the globe, laboratories had to be connected to standardize their methods for identifying flu strains. A main change in this collection of data was brought by Robert Webster in the 1970’s, when he introduced to these viral banks flu strains from wild birds. It became possible to say retrospectively from which bird species a new flu strain had emerged in humans, based on the virus bank set up by Webster in Memphis, Tennessee. Around the same time, Kennedy Shortridge

built the department of microbiology of Hong Kong University, where he collected flu strains from ducks and pigs in south China. He proposed the hypothesis that given the proximity between ducks, pigs and humans in south China, the next flu pandemics would likely emerge from this part of the world. This scenario led to the global warning against Avian Influenza after the emergence of H5N1 in Hong Kong in 1997. The fear of pandemics would not be justified if there was not this massive infrastructure of laboratories connecting humans and other animal species through the standardization of viral strains.

These laboratories exchange flu strains under high biosecurity conditions. When a new flu virus emerges, such as the H1N1 pandemic which came from Mexican pigs in 2009, they can compare its sequence to those of previously known viruses. Huge data banks have been set up where the diversity of flu viruses is rationally organized. If the sequence is new and causes an epidemic, microbiology laboratories send the living part of the virus to pharmaceutical laboratories to produce a vaccine. Here we see again the link between biosecurity and biodiversity: to protect the human species against a pandemic, it is necessary to compare the virus strain with a diversity of strains in animals. We can say that there are two forms of invisibility in the management of pandemic flu: the invisibility of the pandemic to come, and the invisibility of the paths viruses take in the animal population. The global warning against pandemics takes place at the crossroads between these two forms of invisibility.

Museums as spaces for preservation

Now I want to make a comparison that I hope will not be too eccentric. For the past year I have worked in an ethnographic museum, the musée du quai Branly, and I was struck with the similarity between the work of curators and the work of microbiologists. Ethnographic museums were designed in the 19th and 20th centuries to present the diversity of cultural artefacts collected around the world. In the same way as microbiologists relied on passionate naturalists to learn about the trajectories of migratory birds, ethnologists have relied on passionate collectors to learn about the histories of the objects they presented. The function of ethnographic museums is to preserve these objects from an ongoing catastrophe: the erosion of cultural diversity by globalization, the disappearance of “natural societies” through their encounters with modernity. Claude Lévi-Strauss famously argued that if the whole of humanity had to disappear, what should remain are its most beautiful artefacts, attesting to the diversity of a world that has disappeared.

When the project of the musée du quai Branly was launched in Paris in 1996 by Jacques Chirac, it was highly criticized because it separated ethnographic objects from their social context. In the former Musée de l'Homme, masks and statues were presented along with tools of daily life and human figures in wax. It was as if the societies these objects came from were killed a second time. The objects were presented under a strange light to reveal their inner beauty and mystery, which was criticized as a primitivist atmosphere. This debate took place at the same time as the

debate around the mass killing of cows in Europe and the mass killing of birds in Asia. It was as if animals were killed for the sake of public health and ethnographic societies were killed for the sake of beauty. It might also be argued that the laws of the market required the destruction of animals or artefacts with less value to provide more value to more prestigious food or works of art.

My contribution to this debate argues that the musée du quai Branly followed a path to biosecurity very similar to the one that was taken in laboratories for microbiology. The collections of the Musée de l'Homme were considered as things to preserve, and their materiality was more rigorously taken into account. Ethnographic objects have the specificity of being composed largely of organic materials (wood, skin, skulls, feathers, saliva) that can easily be degraded by their exposure to oxygen or to insects. Ethnographic museums have the difficult task of preserving objects that were not designed to be preserved in museums. They apply to fragile materials rules of conservation defined for enduring materials such as wood and stone. Ethnographic objects have a life of their own, in the double sense that they are animated by spirits (they bear the intentions of those who have made them, as analyzed by Alfred Gell ⁴⁾) and they are submitted to a slow process of degradation. If the disappearance of a society with its knowledge and languages is a sudden catastrophe, the disappearance of the objects it left is a slow moving invisible catastrophe.

Krystof Pomian has famously argued that the value of collections comes from the fact that they link the visible and the invisible ⁵⁾. While this concerns the spirits and divinities in traditional societies, in modernity it refers to the body of the nation that hold them as heritage. I would add that the invisible force that gives value to the collections today is the possibility of their radical destruction. The strange atmosphere of ethnographic museums comes from the fact that they display objects from societies that have largely disappeared, and yet display them as if they had been there forever. The value of an ethnographic object seems connected to invisible spirits, and yet it is also a part of the infrastructures of collections that have brought them to the storage of museums. Today the notion of national heritage is constantly challenged as objects circulate increasingly between museums. The exhibition has become the main form of museum display. It is also a reply to demands of repatriation to the societies where they come from: objects cannot be alienated from their national heritage, but they can be lent for exhibitions in their countries of origin. This growing sense of catastrophe is certainly a motor in the acceleration of the art world, but it is tamed by practices of biosecurity. James Clifford defined museums as contact zones characterizing their post-modern mode of existence ⁶⁾; I would rather define them as spaces of contagion, due to the intense acceleration of the circulation of objects.

Sentinels, simulation, stockpiling

If my comparison between laboratories and museums makes sense, biosecurity refers to a set of norms that regulates the circulation of living materials in these two kinds of spaces to prepare for a coming catastrophe: the sudden outbreak of a pandemic (with the underlying threat of species

extinction) and the gradual degradation of ethnographic objects (as a sign of the extinction of the societies they come from). In the domain of pandemic preparedness, Andrew Lakoff distinguished three techniques, which he shows come from the military world of civil defense to be applied to natural disasters: sentinel devices, simulations and stockpiling ⁷⁾. I want to consider how they shed light on practices in laboratories and museums.

Sentinel devices send early warning signals of the coming catastrophe. They can use non-human bodies that are more sensitive to a threat that also affects humans. These threats can be sudden events, such as a nuclear explosion or an epidemic, or slow events, such as species extinction or endocrine disruption. As sentinel devices produce signs of an invisible threat, they are at the line between the visible and the invisible.

Sentinels are also the first line of exposure in a space of vulnerabilities. As military vocabulary imported into environmental health, they produce a solidarity between humans and non-humans in a common exposure to threats. In Hong Kong, the term “sentinel” was applied to unvaccinated chickens in a farm, dying first in the presence of Avian Flu, as well as to the whole territory of Hong Kong, close to what was considered an epicenter of pandemics.

When visitors arrive at the Musée du quai Branly, they see a tower of musical instruments, that shows the collections of ethnomusicology from the Musée de l’Homme. The architect has integrated this tower as an open reserve, but it displays only 5% of the reserve, most of which remains hidden underground. It can easily be guessed that the musical instruments were exposed to the public because they have less value on the art market than other ethnographic objects. And yet they have an ethnographic value that must be preserved. A technique has been designed to visualize the threats of infestation by fleas. It increases the low sounds insects make when they eat the wood of instruments and provides a map of these insect populations in the tower. It was thus possible to show that there was an abundance of insects near the cloakroom, because these insects jumped from visitors clothes to musical instruments. In this case, humans are a threat to objects via the insects they bring in the museum. A possibility would be to present this map of infestation to the public to raise awareness of the vulnerability of the objects, in which case the tower would serve as a sentinel device to warn about threats that affect the rest of the reserves underground.

Another device that could be called sentinel is a robot called Berenson who moves around the museum and looks at visitors while they look at the objects. The software that drives this robot allows it to imitate the emotions of visitors, and to learn how to behave in a human environment, avoiding awkward moves or unpleasant faces. The robot introduces a non-human element in the interaction between visitors and the objects, thus signaling other discontinuities that make this interaction possible.

A second technique of preparedness is the use of scenarios to simulate a catastrophe. This technique also comes from the military world of civil defense during the Cold War. It requires building realistic scenarios, using accessories, make-up, and masks to immerse actors in the imagination of a nuclear winter. I observed simulations of epidemics in Hong Kong, in which the

“patient zero”, an actor carrying a tag describing the flu symptoms, was triaged among a series of other actors. Simulation uses fiction to immerse the public in the imagination of the future planned by experts. There are two kinds of simulation of natural disasters: either desktop exercises, using cards and computers to connect decision-makers situated in offices, or real-ground exercises, using actors who play victims and rescuers.

The musée du quai Branly also uses scenarios to immerse the public in the imaginary dimensions of the visit. Some scenarios use tales of the history of the objects, others use augmented reality to give access to invisible aspects of the objects. A scenario is under construction by game designers to propose an exploration of the collections based on a series of puzzles. These enigmas can be solved through mobile applications that provide knowledge about the objects. A series of objects has been passed through a medical scanner to reveal the interiority of their structure. A Songye statue has been showed to contain a digestive tract filled with magical charges. These images can be used in the scenario of the game to answer questions about what the objects hide or contain. Game designers work on how to build a realistic scenario, that immerses visitors in a meaningful environment. This scenario does not rely on a future catastrophe, but it plays on the idea that objects speak by themselves, as if there was no human community to speak for them. It is closer to the desktop exercise.

Another scenario prepares for a real catastrophe: the plan for the evacuation of objects in case of flood. The musée du quai Branly is situated on the banks of the river Seine, along with the musée d'Orsay and the Louvre. As a flood is expected every century, the construction of the building included infrastructure to protect from the flood, such as a hull made in clay around the buried storage. There are also exercises every year to evacuate the objects from the storage to the first floor of the museum. Objects have been classified in terms of their exposure to flood, and the objects in the first line of the storage are stored in shelves with wheels because they should be evacuated first. There are discussions on this classification because it combines risk with value: some objects in the first category could resist the flood but they have a high commercial value and need to be evacuated. These exercises are opportunities for the agents of the museum to see and manipulate the objects, since the storage is accessible only to restricted staff called régisseurs (stewards), in distinction to curators.

This leads me to the third technique of preparedness that I call, following Lakoff, stockpiling. By stockpiling, Lakoff means the accumulation of drugs and vaccines to mitigate the effects of a disaster such as a nuclear attack or an epidemic. I have started thinking about the difference between storage and stockpiling. In stockpiling, a large quantity of similar products should be accessible in time of urgency. In storage, samples should be classified to give access to their diversity, in a temporality of knowledge. Thus, microbiologists build phylogenetic trees built out of the diversity of viral samples they collect from animals and humans. It could be that the storage at the musée du quai Branly, by adding a classification in terms of risk to traditional classifications in terms of cultural areas and use, combine the logic of storage and the logic of stockpiling.

A device has recently been set up at the musée du quai Branly, called anoxia, that takes out the oxygen in the environment of objects to kill all forms of life contained in the objects. It is interesting to notice that this technology comes from the food industry. The company that invented this technique, Air Liquide, partially pays for its application to the museum as an operation of private sponsorship. All objects entering the storage must go through this room to be submitted to anoxia for one week, in order to make sure that no insects invade the storage. This is very similar to the biosecurity practices in laboratories, where all forms of life that are not meaningful for the experiment must be destroyed before manipulating the virus. The cultural life of objects starts at this threshold where its biological life is destroyed.

Conclusion

The method I have used in this paper is ethnographic. I have compared two sites confronted with a slow moving catastrophe under the guise of a sudden catastrophe: Hong Kong faced with pandemic flu and avian extinction, and the musée du quai Branly faced with the threat of cultural disappearance and the degradation of its objects. In both cases, I have described the ordinary work of collectors who perceive the invisible in the visible, and share their passion with experts in charge of risk assessment. Biosecurity practices, I argued, do not rely on the calculation of risk but on the imagination of a catastrophic future: hence the possibility of comparing laboratories and museums in the images they produce about the contagion of the bodies they care for. These images allow curators to mitigate the threat and to mourn the loss of living materials through the preservation of what remains.

I went into the details of biosecurity practices because they constitute three aspects of the life of collectors, who are the major actors in the story I told. Sentinels draw a link between humans and non-humans through the perception of a coming future, like mythology in traditional societies: simulation enacts this future in repeated practices of the present, much like ritual; and stockpiling is part of an economy of exchanges based on things of the past. These three techniques compose a world of biosecurity, common to laboratories and museums, science and art, that makes sense of contemporary slow and sudden catastrophes.

Notes

- 1) Burnet F.M. 1973 *The Natural History of Infectious Disease*. Cambridge: Cambridge University Press.
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- 4) Gell, A. 1998 *Art and Agency: An Anthropological Theory*. Oxford: Clarendon.
- 5) Pomian K. 1987 *Collectionneurs, amateurs et curieux*. Paris-Venise, XVIe-XVIIIe siècle, Gallimard, Paris.
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- 7) Lakoff, A. 2008. "The Generic Biothreat, or How We Became Unprepared". *Cultural Anthropology* 23 (3): 399-428.