

A Predictable Unpredictability.

The 2009 H1N1 pandemic and the concept of “strategic uncertainty” within global public health

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Abstract:

This essay will examine the seemingly new paradigm shift within global public health from the use of a scientific “certainty” to a biological and situational “uncertainty” as one of the foundations of response to infectious disease outbreaks. During the recent 2009 H1N1 influenza outbreak, national and international public health officials often referred directly to the “uncertainty” surrounding both the virus itself and of the course, duration and severity of the pandemic. The vague and flexible concept of “uncertainty” – especially as it was employed by top virologists and epidemiologists in relationship to questions about the predictability of the influenza virus – provided the scientific foundation for much of the rationale behind both national and international health responses to the global pandemic. Public health officials, epidemiologists, and scientists often deployed a type of “strategic uncertainty” as an effective tool for gaining or retaining trust and scientific authority during the H1N1 pandemic.

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“Every outbreak is unique. Every new strain of virus is unique and until the outbreak has progressed you don’t know what it’s going to do and so it’s a matter of making decisions with incomplete information.”

Richard Besser, CDC Daily Press Briefing, April 2009

Uncertainty has arguably become somewhat of a “hot topic” issue of late, debated and discussed in both policy and academic circles, as well as in popular media. One need only look to the 2009 global economic crisis, ongoing scientific research on the effects of man-made climate change, the recent elections in the United Kingdom, or the 2010 BP oil spill off the Gulf Coast of the United States to see examples of “uncertainty” playing out in the so-called real world. Especially observable throughout the latest novel influenza outbreak that began in the spring of 2009, uncertainty is as rife within global public health as it is in world economics. This ostensibly new, or reinvigorated, concept of uncertainty remains as pervasive inside the World Health Organization (WHO) as it is inside the International Monetary Fund (IMF) or the World Bank. This type of omnipresent and sustained uncertainty, it seems, is now ubiquitous to modern life. Dealing with such extended and global crisis situations has predicated a new type of response as well as need for a new type of analytic.

Borrowing from anthropologist Paul Rabinow’s elements for doing an anthropology of the contemporary, I begin my inquiry into the use of “uncertainty” during the 2009 H1N1 pandemic “midstream” and with “tentative parameters” of both the situation and what is at stake (2008, 8). Throughout the pandemic, I worked as a qualitative researcher on a large, interdisciplinary project. The Global Infectious Disease Response: Emergent Networks, Distributed Sense-making (ENDS) project is an attempt to observe public health agencies from the inside out in order to discover – in real time, so to speak – how information is shared and processed during an outbreak, as well as how the various people working within public health make sense of uncertainty. Throughout the pandemic, beginning in October 2009 and continuing until May 2010, I performed ethnographic research in two diverse field sites in different countries. During that time, I worked within a national public health agency alongside epidemiologists, observed inside a laboratory that dealt with influenza samples, and interviewed dozens of virologists, epidemiologists, analysts, modelers, and public health officials. I was an observer of people observing the influenza pandemic, making me – as Paul Rabinow suggests via Niklas Luhmann – a second-order observer of the various first-order observations of the many professionals with whom I interacted (2008, 62–66).

All through the months in which I worked closely with and spoke to various scientists and policymakers, the term “uncertainty” was rarely used in normal day-to-day conversations, during teleconferences, or in the various meetings I attended. However, the people around me often discussed information gaps, or what they didn’t yet know, and the sheer unpredictability of the virus itself. In the many informal conversations between colleagues that I observed, the talk frequently turned to questions regarding the severity of the virus and its biological makeup and origins, the problems in obtaining crucial clinical information from affected areas, or about the difficulty in ascertaining the “denominator” of cases— or the total of how many individuals had been infected with the virus. There was much that was unknown about the emergent outbreak, and efforts were constantly being made to ascertain as much information about the virus as possible in order to lessen this uncertainty.

Uncertainty is, of course, nothing new within the realm of science – epidemiology and virology included. The scientific process was crafted, at least in part, to deal with the rather slippery reality of uncertainties in the world beyond the laboratory. Scholars involved with or working inside the field of science and technology studies (STS) have often focused on the ways in which uncertainty in science is artfully turned into “socially-constructed” facts (see Callon 1999[1986]; Knorr-Cetina 1999; Latour/ Woolgar 1979; Shapin/Schaeffer 1985). Science produces facts and theories about the world through the practice of examining the realm of the unknown. Examinations of the daily practice of science have highlighted just how adept scientists are at utilizing the scientific method both to garner and to retain a certain authority in relationship to their subjects and fields. Indeed, I will argue throughout this essay that scientific authority persists not despite uncertainty, but because of it. Uncertainty is the fertile ground for further scientific research and funding. Sustaining a partial uncertainty, grounded as it were in the ontological unpredictability of viruses, while being capable of both effectively managing that uncertainty and continuing the work of producing scientific facts – or certainty – about the virus, helped professionals working in global public health to maintain the current or reigning research paradigm. It is this strategic utilization of uncertainty to positive effect that is the focus of my examination of the 2009 H1N1 pandemic throughout this article.

In line with this thinking, then, one might make a valid point by arguing that an examination of uncertainty within public health is anything but new. Scholars of the themes of risk and preparedness have often pointed out how uncertainty is used within public health and policy circles to undergird planning and research paradigms to cope with possible future biological threats or devastating pandemics (see Lakoff/Collier 2008). This type of uncertainty is conceptually related to a risk that

occurs at some point in the future, but not one that is unfurling in the present moment. I will argue below that the meaning of uncertainty itself has shifted. Uncertainty as it pertains to risk and preparedness for a possible infectious disease event differs qualitatively from uncertainty as it pertains to risk in the present moment or immediate future during an infectious disease event. There is little risk of undermining scientific authority when admitting the future cannot be predicted (partially due to the fact that the specific infectious agent cannot be known in advance). Intuitively, one would surmise that there would be a much greater loss of authority as a result of admitting that the present moment was unpredictable because the disease agent itself, as well as the parameters of the developing situation, was not fully understood. This is why, in the not-so distant past, public health professionals were often loathe to openly discuss uncertainty. Throughout the early months of the 2009 H1N1 influenza pandemic, however, top public health officials regularly explained the uncertainty of the developing situation and appealed to the general public's understanding and patience. These pleas were often coupled with scientific explanations of the complex, ever-changing and ambiguous situation, with the influenza virus itself being cast as "predictably unpredictable" in its biology, behavior, and spread. Public health professionals habitually and liberally used the concept of "uncertainty" in official communications to justify immediate response measures or to preempt and clarify any future changes in recommendations and actions. In effect, then, scientific authority was at least partially maintained through the strategic deployment of biological uncertainty regarding the H1N1 virus itself.

In what follows, I will first examine how biological science has effectively underpinned the rhetorical casting of the virus itself as innately "unpredictable." Analyzing scientific articles, media stories, quotes from top scientists and epidemiologists, and data gathered throughout my own ethnographic fieldwork, I will attempt to highlight how the influenza virus's predictable unpredictability – a term scientists and epidemiologists frequently used to describe the virus both in conversations with me and in the press (Altman 2009; Sepkowitz 2009) – is connected to the creation of a sustained uncertainty within influenza science. I will then move on to look at how other "information gaps" are linked to uncertainty during an influenza outbreak, analyzing a random selection of media reports and interviews as well as relying on my own experience working within a public health agency during the so-called second wave of the 2009 H1N1 pandemic. Finally, I will argue that the fostering and public expression of scientific uncertainty was used strategically to either gain or retain trust during the 2009 H1N1 pandemic. The frequent deployment of what I will term

“strategic uncertainty” [1] was, and largely remains, an effective method of retaining authority and control during an outbreak of infectious disease. Management of a sustained and partial ambiguity [2] or uncertainty in relationship to the production of scientific knowledge about the influenza virus itself becomes a tool here – with “strategic uncertainty” at the forefront of a new “epidemic order” in global public health.

The scientifically predictable unpredictability of influenza

As soon as rumors and media reports regarding an unusual, late-season outbreak of influenza in Mexico began to circulate in March 2009, international scientists and epidemiologists working on influenza in public health focused upon a set of objectives that related to gaining a better understanding of the virus itself. First, public health agencies sought to obtain samples of the virus; next, virologists began to subtype those samples in order to ascertain which specific strain of influenza virus was causing the outbreaks; concurrently, evolutionary virologists began an immediate, international and collaborative effort to genetically sequence and analyze the virus in order to better understand its origins. Many public health experts believed that knowing more about the genetic makeup and origins of the influenza virus might help them to make not only better predictions about the severity and spread of the virus, but about the scope of the burgeoning pandemic. Thus, gathering information about the biology of the virus itself was crucial not only to the analysis of events as they unfolded in Mexico and in the southernmost states of the United States, but to the ability of public health experts to predict the immediate future.

By the end of April, it was evident to many of the virologists and epidemiologists who specialized in influenza that something big in scale was unfurling. An influenza pandemic was at hand. The question then became, how bad would it be? At this stage, data regarding the severity of the H1N1 virus mattered. Severity, however, is not a concept that is easily defined, especially as it related to the 2009 H1N1 pandemic. Generically speaking, understanding severity involves knowing something about a virus’s virulence and transmissibility, as well as the ability to calculate the percentage of severe cases or deaths out of the total number of persons infected. Information that pertained to severity was hard to come by, especially in the first weeks of the pandemic, and people I spoke with often complained about the absence of “good data” on the total number of infections. The “problem of the denominator” and better data regarding the biological attributes of the virus itself were often cast in the conversations I had with public health experts about the early days of the pandemic as the key pieces of information

[1] My use of strategic uncertainty here is distinct from the term as originally coined within economic theory by Van Huyck, Battalio, and Beil (1990). As Donald Moynihan has explained it, strategic uncertainty in economic and management theory typically refers to a specific type of uncertainty that “arises because networks contain multiple actors who retain some measure of strategic autonomy, creating uncertainty about what choices they will make” (354). Thus, “strategic” is a qualitative term used to describe the type of uncertainty being experienced by actors in a network, “as the various actors seek to maximize their position in the network but know little about the intentions of other actors” (Moynihan 356). Strategic uncertainty as I utilize it here refers instead to the strategic deployment of uncertainty, where strategic is a descriptive term used in relationship to an actor’s intentions when discussing uncertainty. My usage here relates, then, to how uncertainty itself becomes a rhetorical device or narrative tool for retaining scientific authority during the pandemic.

[2] I first began thinking about the role of ambiguity in public health after a correspondence with Dr. Linsey McGoey regarding a 2009 workshop she organized at the University of Oxford’s Said Business School, entitled “Strategic Unknowns: The usefulness of ambiguity and ignorance in organizational life.” The conference examined the various political, economic and social uses of ambiguity and ignorance in a variety of fields and sites. The economic concept I use throughout this essay, “strategic uncertainty,” is in many ways an outgrowth of my engagement with the idea of the “strategic unknown.” Ambiguity here is used to refer to the opacity inherent to the production of scientific information, whereas uncertainty is used to denote an ontological property of the knowledge produced about the virus itself.

that epidemiologists needed in order to recommend an appropriate set of responses and often chronically lacked. One of the biggest problems seemed to be the “unpredictability” of the virus. This rather predictable unpredictability would become central to the story that was developing about the 2009 H1N1 pandemic.

In an analysis of the characteristic stories or “narratives” constructed about infectious disease outbreaks, scholar Patricia Wald has suggested that: “As epidemiologists trace the routes of microbes, they catalog the spaces and interactions of global modernity” (2008, 2). Going further, she adds that “the outbreak narrative is itself like the epidemiological map and the electron microscope, a tool for making the invisible appear; it borrows, it attests to, and helps to construct expertise” (Wald 2008, 39). Following Wald’s lead, then, I argue that it is necessary to read closely and begin to critically examine the “narratives” about unpredictability and uncertainty at the heart of the 2009 H1N1 pandemic. By doing so, we can begin to unpack how the representation of the virus as unpredictable was strategically utilized – operating at least in part as a rhetorical tool – to maintain scientific authority throughout the pandemic.

From the start, uncertainty about the virus was rife. [3] Some of the first media articles published about the outbreak highlight how the virus itself was being cast as intrinsically unpredictable. One of the earliest stories on the pandemic in *Science* suggested that: “Much confusion surrounds the origins of the virus, why it seems to cause severe disease in Mexico and not elsewhere, and the overall threat it poses to the world. ‘Right now, there’s more unknown than there is known,’ says microbiologist Francis Plummer” (Cohen/Enserink 2009a, 572). This particular article, first published on May 1, goes on to quote the then-acting CDC Director Richard Besser as attesting to the fact that decisions were being made based on “incomplete information” (Cohen/Enserink 2009a, 573). The very next week, *Science* again reported that although information was being collected and shared internationally – and at an unprecedented speed – there continued to be many “mysteries” about the virus (Cohen 2009). A segment on the developing situation first broadcast on May 1 and then published on NPR reported that: “Experts still lack critical information about the virus” (Silberner/Greenfieldboyce 2009). An article in *The New York Times* during the first week of the outbreak emphasized the fact that even the WHO had admitted uncertainty about the virus, stating that: “The World Health Organization said over the weekend that the new swine flu virus had the potential to cause another pandemic, but that it had no way of knowing whether it actually would” (Altman 2009). Within the same article, the virus itself was being blamed for the uncertainty, while the authority of the scientists was upheld. The

[3] I do not mean to suggest that uncertainty about the influenza virus or the pandemic itself was wholly manufactured. The public health experts that I interviewed felt that there was much “uncertainty” about both the virus and the events themselves – especially during the first few months of the pandemic. What I find most interesting – and what I will focus on within this article – is how they spoke about or deployed that biological uncertainty to positive effect, and how uncertainty was partially managed by transforming it back into certainty about the unpredictability of viruses.

journalist explained that: “For all that scientists have learned about influenza since the catastrophic pandemic of 1917-19, one thing has not changed: the predictably unpredictable nature of the viruses that cause it” (Altman 2009).

The virus in these narratives is often described as a “mystery” – the implication being that unpredictability is an ontological property of the virus itself. That unpredictability, in turn, leads to an operative condition for “uncertainty” for public health. It is not inconsequential that the situation with influenza is consistently cast as inherently unpredictable; there is no end to uncertainty in this formulation. Indeed, there is also no clear beginning, as the virus was consistently put in a comparative frame with other pandemic influenza viruses from the past. A scientific article published online in Science on May 11 stated that “although substantial uncertainty remains, clinical severity appears less than that seen in the 1918 influenza pandemic but comparable with that seen in the 1957 pandemic” (Fraser et al. 2009, 1557). Here, scientists have begun to analyze the “uncertainty” of the 2009 H1N1 virus in relationship to other viruses with the same or greater amounts of “unpredictability.” The scientists collectively argue that: “There are uncertainties about all aspects of this outbreak, including the virulence, transmissibility, and origin of the virus, and this in turn results in uncertainty in judging the pandemic potential of the virus and when reactive public health responses, such as recommendations to stay at home or to close schools, should be implemented in individual countries” (Fraser et al. 2009, 1557). Uncertainty is mentioned no less than five times throughout the text of the article, but still voices a confidence that “uncertainty should diminish rapidly in coming weeks as more data on severe cases in the United States and other countries become available” (Fraser et al. 2009, 1560).

By the end of May, two months after the beginnings of the pandemic, the statements about the unpredictability of the virus by and among scientists were already legion. Science reported that data on the virus remained “fuzzy” and quoted a prominent epidemiologist saying that: “There’s nothing more predictable about flu than its unpredictability” (Cohen 2009a, 997). In the same article, renowned virologist Robert Webster argued that: “You can’t lay down rules for flu viruses – they’ll break them every time. It’s almost as though the virus reads them and says, ‘I’ll do the damn opposite’” (Cohen 2009a, 996). As Ann Schuchat of the CDC stated: “We’re at early days in understanding this virus. [...] It is early days, and with influenza, we always want to be humble and know that things can change and it can be unpredictable” (Silberner/Greenfield/Boyce 2009).

A little less than a year later, by late February 2010, the public consensus seemed to be that the pandemic was all-but over. Infection rates were low and a so-called second wave had never really

materialized. Hundreds of thousands of vaccines the world over were left unused. But even so, uncertainty regarding the virus and the H1N1 outbreak not only lingered in the scientific realm, it seemed to be actively promoted. Reporting on a news teleconference, a Health Day article quoted several top epidemiologists as warning against a too-easy “dismissal” of H1N1, or having a “false sense of security.” A professor of public health argued during the conference that: “The flu is very hard to predict and what you think you know is only what happened before. There can always be a surprise” (Gardner 2010). Science called H1N1 the “virus of the year” and suggested that it would “go down in history more for causing confusion than catastrophe” (Enserink/ Cohen 2009, 1607). And Carl Zimmer, a prominent science writer, wrote in his blog for Discover Magazine that the flu strain was “nothing if not surprising,” both in the form of its emergence and the fact that by February 2010 – the middle of the traditional flu season in the northern hemisphere – H1N1 had “dwindled away to very low levels and stayed there” (2010). In other words, the virus was unpredictable not only for its makeup and its severity, but for the pattern of its spread and disappearance. Zimmer argued that the virus “continues to move enigmatically ahead of our understanding” (2010).

Of course, scientists and public health experts are not only accustomed to coping with the various difficulties in dealing with uncertainty, but well-versed in the more overt strategic and political uses of uncertainty as a device for the retention of authority. In an article on uncertainty published in the American Journal of Public Health in 2005, the co-authors working in public health stressed that: “In our current regulatory system, debate over science has become a substitute for debate over policy” (Michaels/Monforton 2005, 45). The focus of the article is the use of uncertainty by defendants in environmental health lawsuits or public hearings, but the issues discussed in relationship to the environmental arena can also shed light on similar types of arguments and debates regarding infectious disease (vaccine debates and the charge of undue influence within the WHO as pertinent examples). The authors acknowledge that while much of public health policy is grounded in uncertainty, public health practitioners must recognize that fact while still using the “best evidence available” for their decision-making.

Responding to the charge [4] that the WHO exaggerated the threat from the H1N1 virus, the WHO writes that: “[...] influenza viruses are unstable and can undergo rapid and significant mutations, making it difficult to predict whether the moderate impact would be sustained. This uncertainty, which persuaded WHO and many national health authorities to err on the side of caution, was further enforced by the behavior of past pandemics, which varied in their severity during first and second

[4] On June 3, 2010, the British Medical Journal published a feature article on alleged conflicts of interest within the WHO during the 2009 H1N1 response. In the article, BMJ features editor Deborah Cohen and investigative journalist Philip Carter suggested that the WHO’s reputation had been damaged by their lack of transparency and reluctance to publicly disclose the names of the key scientific advisors on influenza during the pandemic response. Some of these scientists have been shown to have connections with or to have taken payments from pharmaceutical companies responsible for manufacturing not only influenza vaccines, but drugs used in the mitigation of flu (such as Relenza). The quote used below was part of the WHO’s official response to the BMJ article published on June 10.

waves of international spread" (WHO 2010). In the response to its critics, the WHO discusses its evidence and data, but openly discusses the underlying biological uncertainty of the virus itself. This adept rhetorical move distances the organization from the source of the uncertainty, instead locating it within the realm of nature or biology. More research on the virus will thereby be required in order to better understand the severity of influenza outbreaks in the future. The scientific authority of the WHO is thus kept intact, even in the face of a sustained uncertainty.

In part, these "strategic" deployments of uncertainty work because the uncertainty is often displaced onto "nature" or on "society" (Shackley/Wynne 1996) – entities such as the virus itself or the general public – both perceived as inherently out of the control of the laboratory or field epidemiologist. Trevor Pinch's seminal work on certainty in solar neutrino science (1981) showed how scientists often pointed to other disciplines or fields working on the same problem as the source of uncertainty. The scientists' confidence, or certainty, in their own work or discipline remained unshaken under this formulation. In the case of virologists, epidemiologists and other public health experts during the 2009 H1N1 pandemic, uncertainty was primarily displaced upon the virus itself, with the virus being cast as biologically unpredictable. This unpredictability works, however, because unpredictability in the case of influenza is ultimately predictable. Thus, the creation of certainty about uncertainty becomes an effective method of retaining scientific authority during the pandemic. In the next section, I will explore how uncertainty concerning the virus itself expanded out into conversations regarding the overall ambiguity of the present situation, risk and the process of decision-making during an outbreak of infectious disease.

Expanding uncertainty: "information gaps," risk, prediction and expert knowledge

Much of the language used in the section above by public health professionals to describe the influenza virus during press interviews focused on terms such as "uncertainty" and "unpredictability," but a more generic uncertainty was also revealed in relationship to other "information gaps." Scientists and public health officials often privately grappled with what they viewed as a constantly changing and largely ambiguous situation. In the private meetings or conversations that I observed, public health experts often used phrases such as "we think" or "it seems" rather than "we know" or "it is" to reflect their own doubts about the type and quality of the information they had access to or were deriving from the various graphs, tables, charts, maps and case counts that were in circulation throughout the

2009 H1N1 pandemic. Although much of the locus of doubt remained centered on the “biology of the bug,” uncertainty quickly expanded out to include other aspects of the pandemic.

While working within a national public health agency in the fall of 2009, I attended several meetings or teleconferences that pertained to the 2009 H1N1 pandemic. By October, the public health experts that I worked with were feeling the full effects of the “damned if they do, damned if they don’t” paradox within public health (Altman 2009) – the precariousness of either sounding a false alarm or under-reacting in the wake of the discovery of a widely-circulating and novel influenza virus. The key to certainty during a pandemic is accurate information or data – data which epidemiologists everywhere lamented they were lacking, especially during the early weeks of the pandemic. Information was being circulated in a transparent manner. In fact, many public health experts felt that they were “drowning” in data, but that little of it was “actionable” or usable. By using the term “actionable,” public health experts were expressing their frustration that official case counts and other “numbers” being shared did not provide any clarity on the overall situation during the pandemic. At stake was the ability to predict the immediate future and issue recommendations for action.

In interviews with public health experts during the latter stages of the 2009 H1N1 pandemic [5], I often brought up the topic of uncertainty in relationship to information gaps and risk in order to understand – in more specificity – what public health experts meant when they utilized the term. These conversations often shed much-needed light on how uncertainty was deployed, both in a general sense and in the bounded realm of influenza research and prevention. I discovered that there was a disparity between what people working in public health meant by the usage of the term and how uncertainty was perceived in the popular media or the general public. The tension between understanding uncertainty and the ability to make predictions during an outbreak was often highlighted. During discussions about uncertainty, public health experts frequently described what they saw as essential to understanding the unpredictability of an outbreak of influenza. These conversations did not necessarily center around the unpredictability of the virus – although that never really disappeared as a concern – but around the comprehension of risk vis-à-vis the inbuilt unpredictability of an influenza pandemic. In essence, the public health experts I spoke with told me time and time again that there would never be “certainty” during an outbreak of influenza, no matter how much they knew about the virus or the current situation.

The following excerpt from one of my interviews reveals the underlying “problem” with using objective data to make predictions during a pandemic:

[5] Throughout this essay, I have changed the names and locations of all informants in order to keep their identities concealed. This set of interviews occurred both inside and outside of the United States, in what many in global public health consider to be highly-competent local and national public health agencies. Influenza science is in actuality quite a small world, so to speak, and confidentiality requirements have forced me to be rather vague about the locations in which I conducted my ethnographic research. However, it is worth noting here that it is not my intention to reify the idea of “global” public health, but rather to unpack the object “global” public health as it was understood by those with whom I worked. The narratives and practices surrounding daily influenza surveillance, prevention, and response activities at specific research sites were part of the overall production of what aggregated into my object of study here – or the narratives regarding “uncertainty” within Global Public Health.

“TM: I’m not sure I understand uncertainty. And I don’t think I understand probability and risk.

Michael: Well, even scientists really don’t understand risk. [laughter]

TM: Statistics are a hard thing . . . I mean, intellectually, they are easy to understand, but they are not an easy thing to apply.

Michael: That’s right, that’s right. And uncertainty is the real big one, because, you know, whenever you see the media reporting numbers, it’s just ‘numbers as truth.’ But actually there’s always a lot of uncertainty about what numbers really mean. When they go up and down, people would like to have a lot of interpretation about why they go up or down. But quite often, it can be random variation.”

What becomes important here is the understanding of the “numbers” or various epidemiological data as it relates to uncertainty, risk and the ability of public health professionals to predict the immediate future during a pandemic. Numbers here are not as “objective” as one might first conjecture, despite the fact that they are the lingua franca of epidemiological science. If these numbers ultimately form the basis for many of the decisions being made during a pandemic, then what does it mean when the public health experts themselves admit that the data is itself imbued with a certain amount of uncertainty? Uncertainty here is pre-packaged in; it adheres to the data.

An internationally recognized scientist cautioned me about the dangers of using such information to make predictions about how a pandemic might unfold. As Professor Sam Jones explained to me:

“You can look into the past, but you can’t look at the future. To make a prediction about the future, you’ve got to get the virus, put it into a ferret or some other animal model, see if it kills them, look at how many [...] look at mortality and what virulence and what transmissibility and then you can make some sort of prediction.”

Again, uncertainty about the course of a pandemic is rhetorically tied to the actions of the virus itself. The virus here needs to be observed directly in order to know something about how it works. The past only provides a guide for what may happen during the present, but can never predict the future. Everything here is about comparison – either with the past or with other locations during the same time period. Without comparison, there can be no sense-making in the present tense. A chronic lack of comparative data – just think of the debate over the number of fatalities compared with the total number of cases, or the “denominator debate” – often leads to confusion about the immediate future

and a continuation of uncertainty. As one top public health official currently working in Asia explained it to me:

"We always talk about objective evidence and objective data. In the real world, they don't come in handy. There's always going to be important data gaps, knowledge gaps, even interpretation gaps. So it's never a perfect situation in which to make decisions."

In a real sense, then, what this last quote uncovers is the construction of a type of sustained uncertainty within public health in relationship to infectious disease outbreaks. No matter how much data (quantity) or how "objective" the data (quality), there will always be a "subjective" (interpretation) gap that leads to uncertainty during an outbreak. When I asked if this type of uncertainty would be repeated – ad infinitum – into the future, the official responded that it certainly would. Thus, information not only about the influenza virus, but other epidemiological data produced during an outbreak, simply feeds back into the uncertainty loop.

In response to the criticisms from the British Medical Journal in June 2010, the WHO rejected wholesale the idea that the pandemic had been "hyped" in collusion with vaccine manufacturers. In the briefing note released on June 10, the WHO reiterated the evidence-based claim that severity of an influenza outbreak is variable – and can change in regards to time, place and population. At first glance, the briefing looks like a typical case of post-hoc fact formation, with the WHO presenting documentation to bolster its case. Looking more carefully, however, one can see evidence of strategic uncertainty being expertly deployed. Severity is difficult to pin down because it requires a case-by-case interpretation of the data. It is the formulation of uncertainty as part of the permanent process of public health that interests me. How has uncertainty become one of the key components of global public health's rationale for its response to the 2009 H1N1 pandemic? More importantly, what does this collective turn toward or partial embracing of uncertainty signal? In the next section, I will begin to answer these questions by exploring how uncertainty is deployed as a strategic tool to retain scientific authority.

Strategic uncertainty and the maintenance of scientific authority during a pandemic

By the end of 2009, little "uncertainty" was still being expressed – either publicly or privately – concerning the duration, severity or overall course of the H1N1 pandemic. The 2009 H1N1 pandemic

had, by all accounts, turned out to be similar in severity to that of a “normal” or “mild” flu season. Facts were known; a collective sense of scientific “certainty” regarding certain aspects of the pandemic – about the biological makeup of the virus, information concerning severity and its potential duration, and the immediate risk it posed to society – had all-but resumed. Many of the scientists and epidemiologists that I interviewed as late as May 2010, however, expressed a continued uncertainty relating to the H1N1 virus itself. From a virology standpoint, some public health experts worried openly that there might be an antigenic shift or a recombination event that could transform the H1N1 virus into something more ominous. In conversations throughout the latter stages of the pandemic, public health experts consistently used this uncertainty – the predictable unpredictability of the influenza virus – to support not only their past and future decisions, but their present actions as well. In what follows, I will use the U.S. CDC and the WHO’s deployment of uncertainty about the H1N1 virus during different phases of the pandemic to suggest that a new type of strategic uncertainty was being used within global public health as an effective rhetorical tool to retain scientific authority during this infectious disease event.

From the very beginning of the pandemic in April, CDC officials began to communicate uncertainty about the situation (see first section above). The then-Acting Director of the CDC, Richard Besser, stated that the agency’s overall objective during the event was to “tell everything we knew, everything we didn’t know and what we were doing to get the answers” (Maher 2009, 152). In an article on the crisis communication style of Richard Besser, the journal *Nature* praised Besser’s management of the situation, noting how Besser’s overt use of uncertainty helped to shape the tenor of the entire U.S. response. The article quotes several prominent members of the international public health community as attesting to Besser’s overall skill in “communicating uncertainty” (Maher 2009). Even noted expert on the 1976 influenza pandemic, Harvey Fineberg, argued that the CDC’s communication of uncertainty during the pandemic under Besser was exemplary (Maher 2009). Although the *Nature* article also argues that Besser had miscalculated the “political ramifications” (Maher 2009, 152) of the CDC’s more aggressive early actions (such as recommendations on school closures), the fact that Besser himself was able to parlay his communication of uncertainty into several lucrative job offers should be seen as objective evidence that his strategic use of uncertainty was effective. In his current job as the health analyst for Good Morning America on ABC, Besser “still projects uncertainty” (Maher 2009, 152).

My own interviews with public health experts outside of the United States support this view of the CDC’s handling of the pandemic. The CDC was rarely overtly criticized. Instead, the CDC’s strategy of

“saying what you don’t know” had been actively replicated in other locations. Public relations experts have actively coached public health experts in the art of crisis communication, advocating honesty and transparency over the projection of absolute authority. In a private conversation about the focus on uncertainty throughout the pandemic, scholar and former journalist Thomas Abraham suggested to me that the CDC – as the reigning “gold standard” of epidemiological science with a global reputation to match – had utilized the concept of uncertainty more often, and with more impunity, than other national or international health agencies had dared. It is interesting to note here, then, that the CDC has not come under the same scrutiny or criticisms as the WHO for its response to the pandemic.

In June 2010, the British Medical Journal published an investigative article that suggested the WHO’s lack of transparency in its decision-making process and its cadre of experts’ various links to pharmaceutical companies had led to various “conspiracy theories” about the WHO’s handling of the 2009 H1N1 pandemic (Cohen/Carter 2010). Also at stake was the WHO’s decision in May of 2009 to change its definition of a pandemic, striking a key phrase that had described a pandemic as an outbreak causing an “enormous” number of deaths. The authors of the article blamed, in part, the WHO’s poor communication of risk, quoting one expert in risk communication as stating that: “The problem is not so much that communicating uncertainty is difficult, but that uncertainty was not communicated” (Cohen/Carter 2010). Responding to criticisms that the WHO “overreacted” and “inflated risk” during the early weeks of the outbreak, the United Nations’ influenza expert Keiji Fukuda argued that the pandemic was not over yet, and that the risk was “real” (United Nations News Service 2010).

Uncertainty during an infectious disease outbreak is by its very nature undisciplined and anxiety-provoking. Uncertainty is not easily managed, either within the confines of a laboratory dealing with the virus or in the world-at-large coping with an outbreak. All of the various scientific and epidemiological graphs, tables, maps and lists of numbers showing lab-confirmed H1N1 cases that were produced throughout the pandemic to track the peaks and valleys of the flu season were partial attempts by public health experts to alleviate some of the uncertainty surrounding the influenza virus itself. This creation and circulation of knowledge about the immediate or distant future – or “anticipatory knowledge” – is an attempt to wield authority over uncertainty, to make the unpredictable more predictable, to “project” competence and power, to create order out of potential disorder (Nelson/Geltzer/Hilgartner 2008). As scholars of the 2009 H1N1 pandemic have pointed out elsewhere, both politicians and public health officials have opted for two rhetorical moves, often in the

same sentence, that functioned to sound an alarm and to reassure the public about epidemic events (Nichter/Briggs 2009, 191). In practice, the scientists must walk the fine line between under and overstating uncertainties in relationship to a politically-charged issue (Shackley/Wynne 1996, 278). Reports on the 2009 H1N1 pandemic constituted metapragmatic accounts (Nichter/Briggs 2009) – or accounts of the accounts – of how epidemiologists, clinicians, and others produced and circulated knowledge. Looking critically, then, at the narratives around the uncertainty of influenza, we can see that a certain type of “anticipatory uncertainty” is being deployed. Wald has argued that “the epidemiological narrative is, like the microscope, a technology” (2008, 19). The construction of sustained uncertainty – both now and in the immediate future – provides scientists with a certain flexibility, a maneuverable bracketing of the future that is used to help control the present moment, a narrative tool for both gaining and retaining scientific authority during an outbreak of infectious disease. What cannot be known now can be further researched, it can be known later. In this deft move, a certain amount of biological uncertainty does not trouble scientific authority, but helps to further generate it.

In an article looking at uncertainty in relationship to climate science and environmental policy, Shackley and Wynne suggested that uncertainty has its uses, especially for scientists; uncertainty acts as an “alibi,” a way to support further research funding, and as a hedge against the “encroachment” of policymakers into their realm of expertise (Shackley/Wynne 1996, 277). Uncertainty is negotiated in the semi-public interactions between scientists, policymakers, and politicians (Shackley/Wynne 1996, 277). Brian Campbell has argued the very existence of uncertainty is evidence of “continual interpretation and negotiation” (1985, 430), and that scientists who are asked to perform the role of expert in public hearings commonly “state that there is uncertainty, and that this type of argument can be managed and accepted as authoritative” (Campbell 1985, 431). Campbell argues that this “maneuvering in relation to uncertainty demonstrates a strategic importance of the issue of uncertainty to expert arguments” (1985, 445). I take his use of strategic seriously, as well as his suggestion that the strategic use of uncertainty reveals the politics inherent in policy science. For Campbell, uncertainty is not the cause of policy debates, but the result of such arguments (1985, 447). Uncertainty is a flexible tool that aids in negotiation of authority. The 2009 H1N1 pandemic might be seen as a “boundary-ordering device” (Shackley/Wynne 1996, 280), where uncertainty helps to redefine the authority of both scientists and epidemiologists. In essence, the strategic use of uncertainty allows the construction of a type of

“certainty about uncertainty” (Shackley/Wynne 1996, 281). In turn, the policymakers can use uncertainty in a strategic way to “deflect unwelcome attention and criticism of the policy process” (Shackley/Wynne 1996, 283). All of this does nothing to undermine the authority of science. Indeed, the strategic use of uncertainty strengthens that authority. Science is once again seen as the only method to close a critical “information gap”, and the authority of the current scientific paradigm further strengthens the reigning “policy order” (Shackley/Wynne 1996, 287).

Claiming that there is uncertainty is in no way an admittance that the scientist is in no position to judge – quite the contrary (Campbell 1985, 449). In fact, the strategic deployment of uncertainty guarantees that the scientific authority will be maintained, casting the scientist/epidemiologist as the only person qualified to judge an uncertain situation. They know better, if they do not know all. They have the tools to know further, to gather more information. In essence, if uncertainty somehow necessitates a return to certainty, then the strategic use of uncertainty ensures that science will be the discipline asked to shepherd us back to more solid, or certain, ground. But as Campbell points out, the “problem” of uncertainty cannot be dealt with quantitatively; it is a “social” problem (1985, 450). It was the rhetorical trick of deploying uncertainty during the 2009 H1N1 pandemic that has so deftly maintained the need for more qualitative data to interpret the pandemic.

STS scholar Susan Leigh Star has studied the ways in which “local uncertainties” are transformed into “global certainty”, or facts (1985). In Star’s epistemology, belief is a core facet of the ability of working scientists to transform uncertainty into certainty. As Star points out at the beginning of her analysis, “scientists constantly face uncertainty” (1985, 392). This is, of course, no less true thirty years later than it was when Star first began to study uncertainty as a phenomenon. However, Star’s article also reflects the sea change in scientists’ relationship to uncertainty. Star’s work centers on how various types of uncertainty were completely elided from published scientific work through six mechanisms for creating global certainty: attributing certainty to other fields; maintaining that technical failures were to blame, rather than the internal processes of science; the creation of ideal types; shifting evaluation criteria to mask uncertainty; generalizing results in an ad hoc manner; and using internal debates or arguments over how to perform research to “subsume” uncertainty about whether to perform research (Star 1985, 407–412). All of this “management of uncertainty” in the local setting had to “satisfy local constraints and create global certainty” (Star 1985, 413).

In effect, what Star argued in the 1980s was that local uncertainty formed the basis of a global certainty about scientific facts or the value of entire global research paradigms. This was one of the

reasons why scientific theories about the world could persist well into the future. The transformation of uncertainty into certainty was the most efficient tool for sustaining a scientific paradigm indefinitely. In 2010, however, the meaning of uncertainty itself has begun to shift. Uncertainty is no longer the “dirty secret” of science. To reflect this, I want to take Star’s old argument and flip it to argue that sustained uncertainty is now what ultimately holds the global influenza research paradigm together. Strategic uncertainty does not necessarily need to be transformed into certainty in order for it to form the basis of a robust research paradigm. The CDC and WHO public responses to the 2009 H1N1 pandemic are examples of how effective the deployment of strategic uncertainty can be for the retention of authority during an outbreak of infectious disease.

Conclusion: strategic uncertainty and the creation of knowledge in global public health

Uncertainty is the only certainty there is, and knowing how to live with insecurity is the only security.

John Allen Paulos, A Mathematician Plays the Stock Market

As medical anthropologists and observers of global public health, we are often no strangers to the deployment of strategic uncertainty ourselves. In recent editorials on the 2009 H1N1 pandemic, anthropologists have effectively argued that what biological and epidemiological approaches to infectious diseases lack is a social or cultural component (see Atlani-Duault/Kendall 2010; Singer 2010). These prominent scholars are not so much critiquing influenza science or global health response per se, but rather suggesting that their own area of expertise should be more efficiently utilized in order to fill up any critical gaps in data about how different socioeconomic groups or cultures cope with pandemics and public health measures. They are arguing for inclusion in the larger scientific paradigm based on their own social scientific authority, deploying the concept of uncertainty to strengthen the case for their own discipline’s analysis of pandemics. Anthropology here is conceptualized as another effective tool for dealing with present and future uncertainty.

This essay has been, in part, an attempt to ask a new kind of question about certainty and uncertainty within global public health. Can we be “certain” about “uncertainty”? How might uncertainty be sustained and utilized in relationship to the maintenance of scientific authority? Is this a new form of uncertainty or simply a new and more robust use of it? And, perhaps most importantly,

how is the fuzzy line between biological “certainty” and “uncertainty” continuously renegotiated and/or maintained by the various scientists, epidemiologists, and other public health professionals working within public health?

Building out from the German philosopher Ludwig Wittgenstein’s last statements on certainty, the concepts of certainty and of knowledge are not all that different (1969, 3e). Under Wittgenstein’s formulation, certainty occurs the moment when someone “declares how things are” (1969, 6e). During the recent 2009 H1N1 influenza pandemic, public health experts declared vociferously and repeatedly that the situation was somehow fundamentally, naturally, biologically uncertain. In this essay, I have attempted to examine how the meanings of words like uncertainty have shifted, how other concepts have changed along with them (Wittgenstein 1969, 10e), and how they might then be used to craft a new type of epidemic order. If we take seriously Wittgenstein’s postulation that “a meaning of a word is a kind of employment of it” (1969, 10e), then we must begin to further examine how the scientists and epidemiologists working in global public health utilize the term uncertainty in daily practice: what it might signify when it is used casually in relationship to ongoing scientific work and attempts to gather epidemiological data; what it might signify when it is deployed within the public sphere; and, finally, how it might be utilized strategically vis-à-vis scientific authority. This is not to argue, however, that present-day scientific authority rests solely upon the maintenance of uncertainty. Now, as ever, scientific expertise is firmly located in the ability to produce facts, or certainty, about the world in which we live. My goal in this short space has been to point out how a new configuration of scientific authority within global public health straddles the ever-tenuous line between certainty and uncertainty, and to examine how biological uncertainty was deployed at key moments during an infectious disease outbreak to bolster that authority. As Wittgenstein pointed out before his death, one cannot begin to doubt without being certain, without first believing a set of propositions to be true. In other words, and to pack Wittgenstein’s propositions back out into the realm of public health, one cannot have biological uncertainty about a particular virus without first having created a baseline of scientific knowledge about an entire class of influenza viruses.

In this essay, I have argued that the creation of a sustained uncertainty regarding the biological properties and characteristics of the H1N1 virus and its strategic deployment merely presupposes the need for the creation of further biological knowledge about the virus. This is how the trick works, and why the admission of uncertainty is no hindrance to the retention of authority in science or in global public health. The new epidemic order shows us that we cannot produce knowledge without uncertainty.

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