Bird flu hype: The spread of a disease outbreak through the media and Internet discussion groups

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Bird flu, otherwise known as avian influenza, has attracted widespread public and global attention. The H5N1 avian influenza virus was first documented as infecting humans in Hong Kong in 1997, and many of those infected died subsequently from the virus that had been transmitted from poultry to humans. It took several years, however, before a hyped up type of public debate about bird flu began in around 2004. This article examines the hype surrounding public debates about bird flu in medical journals, newspapers and public discussion forums from 1997 to 2006. The article focuses on the development of the frequencies of published texts, and the terminology used in the three databases. The quantitative results will be accompanied by hermeneutic interpretation of the main sub-topics within the debates. These (preliminary) results contribute to research dealing with the emergence of hypes, and spread of public debates more generally.

Keywords: bird flu, H5N1, pandemic, hype, framing

1. Introduction

In recent years we have all been confronted, on an almost daily basis, with news about bird flu, its spread across the globe, the efforts to develop vaccines and drugs against the disease, new research results on the various mutations of the H5N1 strain of this avian influenza virus, as well as the risk of bird flu potentially turning into a human influenza pandemic, comparable to the Spanish Flu in 1917-1918. Bird flu, officially known as avian influenza, is simultaneously a medical (e.g. vaccine development, epidemiology), economic (prevention and research costs, preparing for pandemics), technological (modeling and visualizing epidemic scenarios) and political issue (allocation of resources, spending on vaccines, treatments, such as Tamiflu, infrastructure), to mention only some aspects of the discourses informing public debates. These various discourses sometimes use different terminologies: while one can expect that the scientific term, H5N1, is preferred in scientific articles, the popular term, bird flu, is expected to be more widely used in the newspapers and open discussion groups, for example.

Bird flu had been reported on and off in the media since about 1997, but this reporting gained enormous momentum in 2005, to such an extent that one can call this “bird flu hype”. This was partly triggered by the publication of two articles in *Nature* and *Science* (Taubenberg *et al*. 2005, Tumpey *et al.* 2005) that demonstrated the structural similarity between the pathogenic strain of the H5N1 virus and the Spanish Flu virus that had cost the lives of an estimated 40 million humans in 1917-1918. At the same time, in autumn 2005, the H5N1 virus was found in European poultry for the first time, suspected to have been spread by migratory birds. The framing of bird flu as a potential source of a future influenza pandemic, a pandemic “in waiting‘’, fomented public debate in newspapers (see Nerlich and

Halliday 2007) and on the Web – on official web pages of international health organizations as well as in various discussion forums and blogs.

This article will examine the evolution of bird flu hype in medical articles, newspaper items and discussion groups on the Web from 1997 to 2006, and therefore concentrate mainly on quantitative results showing the overall development of the debate in the three domains. The analysis aims to tackle the following questions: How did the debate about bird flu develop in medical articles, newspapers and discussion fora? How does the terminology used differ in these three domains? Did medical journals prefer the scientific term H5N1 instead of the popular term bird flu?

The article is organized as follows. The first section will provide a theoretical overview of previous research dealing with the role of frames, metaphors and hypes in public debates. This is followed by a discussion of the collected data, and analysis of the debate and the use of the terms “bird flu” and “H5N1” in medical journals, newspapers and Web discussion groups. The concluding section summarises the results and points to new avenues of research.

2. Theoretical background

This article builds upon previous research concerned with the dynamics of public debates, in particular public hypes. Some studies have been interested in hypes as exaggerated promises, in particular with relation to biotechnology and genetics (Caulfield 2004, Bubela and Caulfield 2004); others have used insights from the sociology of expectations (e.g. Brown 2003) to analyse how negative hype in the form of ‘early warnings’ was used to mobilise governments and individuals to prepare for an avian influenza pandemic in waiting (see Nerlich and Halliday 2007).

In this article we draw on three lines of research in particular, all of which have approached public debates as complex combinations of various discourses and have investigated elements or tools that provide coherence in debates, such as media hypes (van Ginneken 2003, Vasterman 2004), metaphors as tools of communication (Maasen and Weingart 2000, Hellsten 2002), and the role of frames in public debates (Gamson and Modigliani 1989, Benford and Snow 2000, Scheufele 1999, Scheufele and Tewksbury 2007).

First, in media studies, “media hypes” have been studied as waves of news, generated by self-reinforcing processes in news production (Ginneken 2003, Vasterman 2005). Initial coverage of an external event, such as a natural catastrophe or newly defined risks, suddenly gains increasing attention in the mass media. Due to positive feedback loops, the news flow begins to accelerate, generating more news stories on the topic. In this process the connection between the coverage and the external events gradually fades and the coverage takes on a life of its own.

Simultaneously, the topic becomes increasingly covered from a certain perspective at the cost of other possible perspectives, and this dominant viewpoint, or frame, rapidly spreads across different forms of media communication. In this process, the hype itself, i.e. previous reports on the topic, seem to lower the threshold in the mass media for publishing more news items on the topic. Hype seems to trigger more interaction between the various participants of the debate, which in turn adds further fuel to the hype. In other words, hype feeds on this interactive momentum. Such circular reaction, where the media starts to react to its own activity instead of to external events is a specific type of communication process. These hypes appear and disappear in a whim, and relatively minor incidents may trigger a nationwide avalanche. (Vasterman 2004)

Second, in the sociology of knowledge, metaphors have been considered as “media of exchange” (Bono 1990) and “messengers of meaning” (Maasen and Weingart 2000) between different disciplines, discourses and other social contexts. Metaphors and other

framing devices have similar functions in public debates: they make communication and interaction possible by providing a "common ground" for making sense of the communicated concepts and ideas. Previous research on metaphors (Hellsten 2002) has approached them as both flexible and robust tools of communication, comparable to boundary objects (Star and Griesemer 1989) that serve as translation tools across various subsystems, or discourses, in society, and may therefore facilitate the interactions between these systems.

Third, the important role of frames in public debates has been studied in a wide variety of research traditions. In the context of social movements, Gamson and Modigliani (1989) have focused on frames as "interpretative packages". These packages consist of rhetorical devices, such as metaphors, visual images and symbols. Most of these frames are metaphorical narratives about the world. Further, Gamson and Modigliani (ibid.: 2) claim that "[p]ublic discourse is carried on in many different forums. Rather than a single public discourse, it is more useful to think of a set of discourses that interact in complex ways." Bird flu, for instance, is a medical, a political and an economic issue at the same time, and these different discourses approach the issue from their specific perspectives, and may use different terms to discuss it.

Even same terms may mean different things in different discourses (Hellsten 2000, Leydesdorff and Hellsten 2005, Leydesdorff and Hellsten 2006). In this article we will focus on the use of different terms. In the bird flu debate, medical articles are expected to prefer the scientific term, H5N1 while the popular term, bird flu, is expected to be more widely used in the newspapers and open discussion groups. This will be analysed in detail below.

In the complex nexus of various competing discourses, metaphors and frames help to reduce complexity by providing a coherent narrative and perspective. Frames, such as *catastrophe*, popular in certain environmental and medical debates (Nerlich and James 2009), or the frame of *scientific progress as a journey,* used in a wide range of recent debates on genetics and genomics (e.g. Hellsten 2002, Hellsten and Nerlich 2008), repress elements that do not fit and emphasize aspects that are salient within the frame. According to Entman (1993: 52, see also Schon and Rein 1994), framing is a way to select some aspects of an issue at the cost of other aspects in order to promote a particular way of perceiving it. Further, political communication has been concerned with the role of framing for media effects (Scheufele 1999 and 2007, Nisbet and Mooney 2007). These three lines of previous research all focus on the dynamics of public issues and consider the role of communicative tools that may provide coherence and wider context for making sense of that issue.

Furthermore, recent efforts to automate the scanning of certain public issues and broad topics (Thelwall *et al.* 2006, Thelwall, Prabowo and Fairclough 2006, Thelwall and Hellsten 2006, Hellsten *et al*. in press) have shown how different sets of words may reflect various frames used in a debate. We will discuss frames used in public discourses about a possible pandemic of avian influenza among humans, which themselves can be "indexed" by a variety of terms such as avian influenza, avian flu, pandemic flu, H5N1 or, most commonly, bird flu. This article uses frequency analysis to study the spread of bird flu hyype through medical publications, media and blogs between 1997 and 2006.

3. Bird flu as a "new" threat

The public discussion surrounding bird flu is not a unique event, but rather part of a series of other discourses associated with new diseases and epidemics, such as mad cow disease, and the related Creutzfeld-Jacobs Disease in humans in the 1980s and 1990s in the UK, and the SARS epidemics in 2003. These previous epidemics provide a background for the current debate on bird flu in the public, and therefore deserve a brief discussion in this article.

The avian influenza virus, H5N1, first infected a human in 1997 in Hong Kong. In this initial phase, 6 of the 18 human infections were lethal. In 2003 the virus infected humans in Hong Kong, Thailand and Vietnam, this time 32 out of the 42 infections were fatal. At the

same time several outbreaks of the disease in poultry in Korea, Vietnam, Japan, Thailand, Cambodia and Indonesia, and Malaysia were reported. The first human victim in Cambodia was reported in February 2004, one year after the outbreak of the disease in poultry, and in Indonesia during July 2005, almost one and half years after the infection in poultry. In the summer of 2005 a new risk emerged when Russia reported an outbreak of bird flu in poultry in Siberia after finding dead migratory birds in July 2005. Within one month Kazakhstan, Tibet and Mongolia also reported the discovery of dead migratory birds carrying the infection. The virus subsequently spread, allegedly, through migratory birds to Turkey, Romania and Croatia in October 2005 and onwards to Germany, France and the United Kingdom.

The research conducted by the World Health Organization (WHO) revealed that the Spanish Influenza that had killed approximately 40-50 million people in 1918 had been caused by a mutated avian influenza virus, similar to H5N1 (www.who.org). These two features: the fast spread of the diseases via migratory birds and findings of a common "avian" link between H5N1 and the 1918 pandemic increased public perception of the risk and threat posed by the disease. By February 2006 the virus had spread via migratory birds to Nigeria, Azerbaijan, Bulgaria, Greece, Italy, Slovenia, Austria, Germany, France and Hungary, but no human infections were reported, although cats and pigs have occasionally been infected with the virus.

The threat of the bird flu has continued to receive attention in the news media (although the issue seems to be fading out slowly in 2008), and new research on the virus is published at a steady pace. Although the number of cases where humans are infected remains low, the mortality rate is still high. In June 2008 the cumulative number of confirmed cases of H5N1 was 384 of which 243 were fatal (http://www.who.int/csr/disease/avian_influenza/country/en/). In the next section, we will discuss the uses of the terms bird flu and H5N1 in the context of previous "new" diseases and epidemics.

4. Public hype and bird flu

Bird flu has gained wide publicity in the traditional mass media, not only in newspapers, radio and television programmes, but also in the various Web based media, such as discussion groups. The Google search engine, for example, reported over 5,980,000 results on "bird flu" and 1,720,000 results on H5N1 as of August 17, 2007[1]. Moreover, these numbers cover only English language web pages that are indexed in the database. One can call this hype, as the coverage is disproportionate compared to the likely threat posed by the disease.

For this article, published documents in medical journals, newspapers and on-line discussion groups were consulted between the years 1997 and 2006. First, medical journal articles were collected, indexed in the *PubMed* database, which contains articles published in over 5,000 biomedical journals (http://pubmed.gov), searching in title words, search phrases and terms[2]. Second, newspaper items were downloaded using the "world major newspapers" option that is available on the *LexisNexis* Academic database (www.lexisnexis.com). Third, postings in *Google discussion groups* (http://groups.google.com) were downloaded. Two separate searches in all the three databases were conducted: one using the popular phrase "bird flu" and the second using the scientific term "H5N1". The term "avian influenza" was not used in the searches because the terms H5N1 and bird flu were expected to call up the same publications. All these databases contain texts published in all languages, not only English. This was considered important for the analysis because bird flu first appeared in Hong Kong, and only later moved into Europe. In the next section we will take a closer look at the bird flu and H5N1 debate in these three domains.

4.1 *Bird flu as a biomedical issue*

In biomedical articles, the scientific term H5N1 is expected to be most popular because of the more precise meaning of the term. The term H5N1 denotes the specific subtype of the bird flu virus that has infected humans since 1997, and that is commonly referred to as bird flu.

As expected, in medical journals, the term H5N1 has been more frequently used throughout the virus's emergence, but the popular term "bird flu" has gained ground from 2004 onwards (Figure 1). In 2006 over 100 articles use the term bird flu compared to merely 18 in 2004.

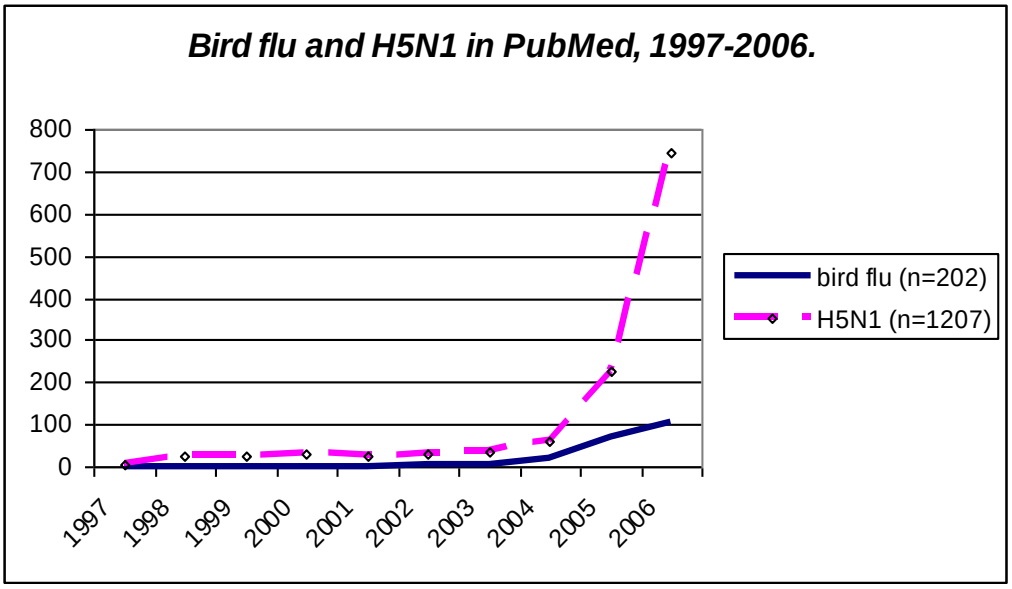

Figure 1: The annual frequencies of medical articles using the terms bird flu or H5N1, indexed in the *PubMed* database between 1997 and 2006.

Up until 2003 the amount of medical articles published on this topic remained steady at around 20-30 articles per year, mainly using the term H5N1. Post-2003 this number exploded from 77 published in 2004 to 848 articles published in 2006. This more than exponential growth in published articles points to an increasing interest in the H5N1 virus in medical research, and perhaps, a scramble for increasing funding opportunities allocated to epidemiological research.

In more qualitative terms, in biomedical journals, a large part of the publications deal with research on characterizing various aspects of the H5N1 virus and its mutations, based on samples of the virus collected from different locations as well as analyses of the structural properties of the virus (e.g. Guan *et al.* 2003). Interestingly, until 2004 the term "bird flu" is far less used than the scientific term H5N1, indicating that a mainly scientific topic morphed into an issue of popular concern around that time.

From 2003 onwards, a new sub-debate within the broader issue on bird flu emerges. In addition to scientific studies reporting on the virus itself, an increasing number of reviews, intended for wider audiences beyond the field of biomedicine, appear in the database (e.g. review by Okabe 2003). In 2005, yet a new type of sub-topic appears: summaries of the existing research on the virus as well as condensed overviews of the state-of-the-art in bird flu research (e.g. Cox 2005). At the same time, the popularity of the simpler term "bird flu" increases. In this sense, the medical writing on H5N1 and bird flu starts to feed on itself and it also starts to fragment. Surprisingly, the "pandemic" frame plays only a minor role in

creating hype, as scientists have predicted the emergence a pandemic ever since the first human infections were confirmed in 1997.

In summary, the sharp increase in the number of biomedical publications is predominantly related to the increase in summaries and reviews of the various social aspects of the disease, instead of an increase in actual, biomedical research into the H5N1 virus. This change partly explains the sudden emergence of the popular term “bird flu” within the *Pubmed* indexed articles. Bird flu therefore began to be used ambiguously as referring either to H5N1 in poultry, or to H5N1 transmitted from poultry to humans (both happening here and now) or to a potential pandemic of bird flu where the virus has mutated and become transmissible between humans and spreads globally (something that has not happened so far).

4.2 *Bird flu as media issue*

In the newsprint media, as indexed under the “world major newspapers” option in the *LexisNexis* Academic database, the amount of publicity given to the topic is roughly ten times higher than in the biomedical publications discussed above. The *LexisNexis* database lists altogether over 30,000 newspaper items during the period of 1997-2006 (Figure 2).

As expected, the use of the search term “bird flu” is more popular than the scientific term H5N1 in the newspapers, returning 22,299, and 8,608 results, respectively. Please, note that the numbers are partly overlapping since the same news item may contain both the term H5N1 and bird flu.

The number of published newspaper items increases rapidly from 2003 onwards. Between September and October 2005, the coverage on bird flu and H5N1 increased from 412 monthly news items to 2,495 items in “the world major newspapers”, indexed in the *LexisNexis* newspaper database (Figure 2).

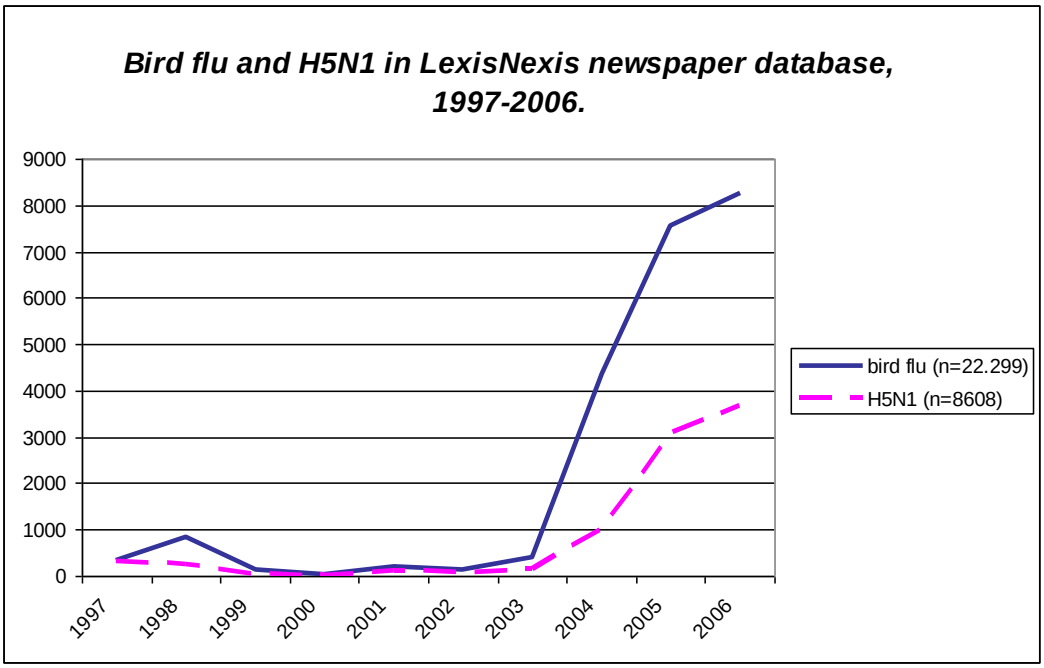

Figure 2: The annual frequencies of newspaper items using the terms bird flu and H5N1 as represented in the world major newspapers, indexed in the *LexisNexis* database from 1997 to 2006.

To take a closer look at the rise in publications during 2005, an 18-months period from January 2005 to June 2006 was separately studied (Figure 3). There is a clear increase in the number of news items in October 2005 when the virus was first found in poultry in Turkey, Romania and Croatia and a parrot that had died from H5N1 was found in the UK quarantine centre. In addition, at the beginning of October 2005 research demonstrated that the 1918 Spanish Flu pandemic had been caused by another type of avian flu virus and in November 2005 President Bush allocated $7.1 billion to pandemic preparedness, spurred on by the Hurricane Katrina debacle where "early warnings" by scientists had been ignored. A second increase in reporting occurred in February 2006 when H5N1 virus infected poultry in Bulgaria, Greece and Italy as well as in Nigeria. This indicated that the virus may spread through migratory birds crossing Europe despite the use of poultry quarantines.

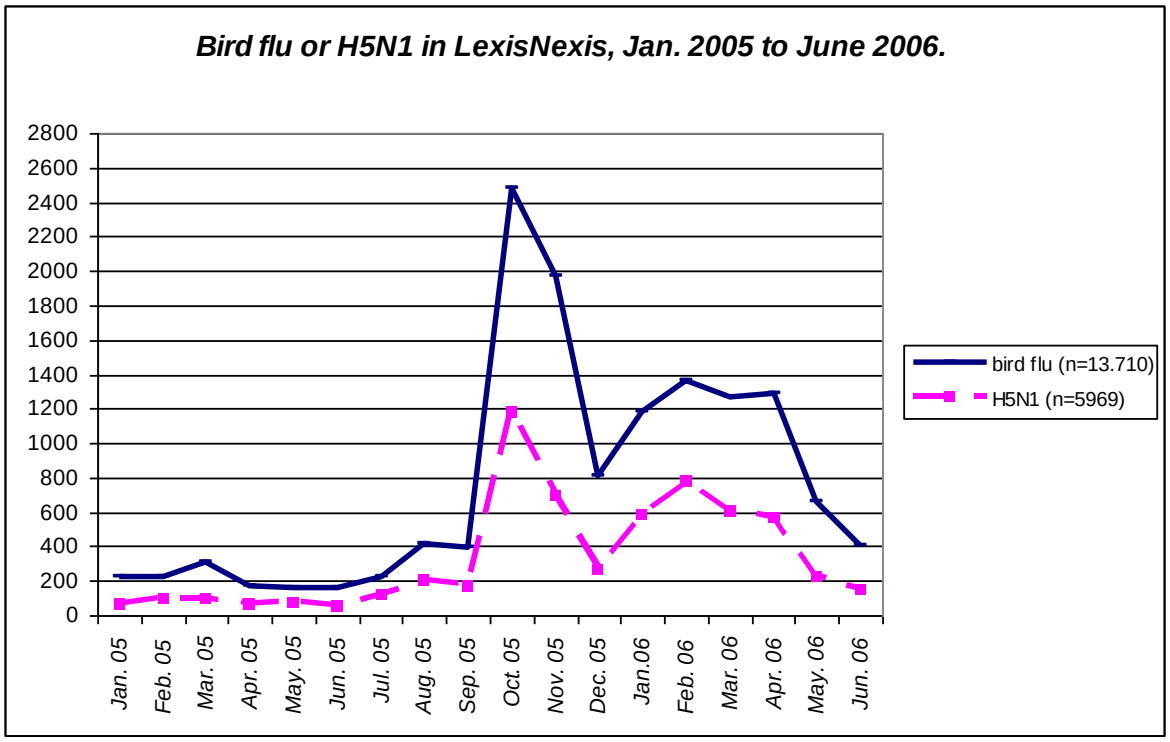

Figure 3: The monthly frequencies of newspaper items using the terms bird flu or H5N1 indexed in the *LexisNexis* database from January 2005 to June 2006.

The main sub-themes of the bird flu debate primarily deal with external events. The news reports begin to follow issues related to a possible pandemic, such as vaccination and drug developments, suggestions and discussion on how to contain the potential pandemic as well as political decisions regarding pandemic preparedness. The news, in this sense, generates a coherent frame around the issue and subsequent news propagates this perspective.

In the next section, we will take a look at the development of the debate in *Google* discussion groups that are open to the wider public.

4.3. *Bird flu as a topic of public interest*

This section examines the wider discussions of bird flu, and focuses on postings found in *Google* discussion groups between1997 and 2006, including all groups and all languages. The relatively small amount of biomedical publications is dwarfed by prolific newspaper coverage, which sees the amount of items on the topic fluctuating between several hundreds to 7,500 news items per year. In the discussion groups the amount of postings is again almost an order of magnitude bigger. While in 2004 the number of postings on bird flu or H5N1 was just over 5,100 (5,170), in 2005 it was almost 21,000 (20,940) and in 2006 there were over 28,000 (28,560). Furthermore, a peak of bird flu hype can be observed between September 2005 (1,006 postings) and October 2005 (8,150 postings).

The share amount of postings using the terms bird flu or H5N1 has been enormous, almost 30,000 postings for the year 2006 alone, that is over 78 postings per day (Figure 4).

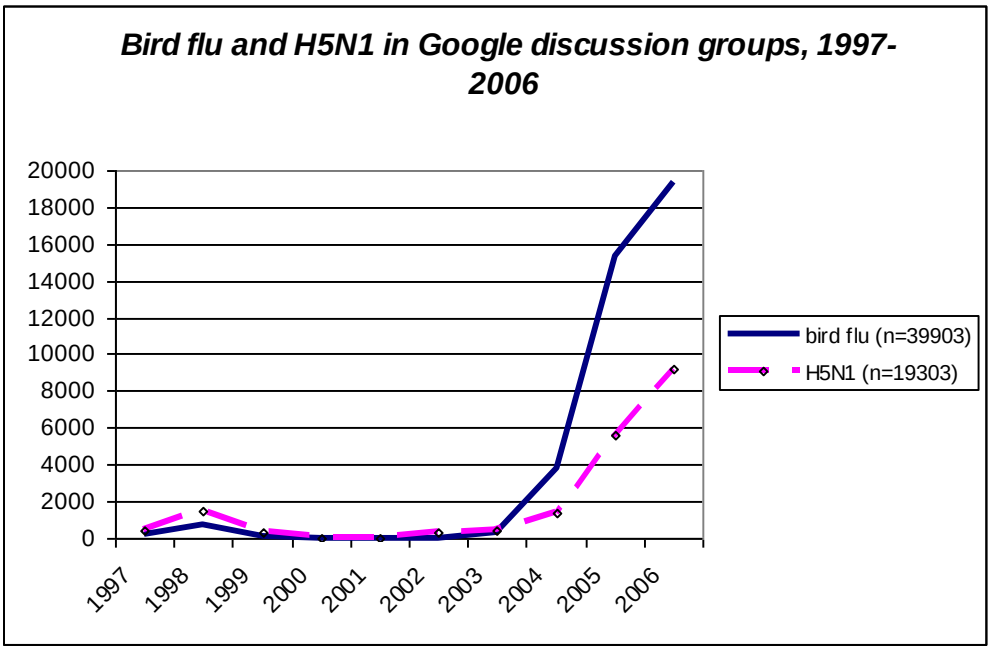

Figure 4: The annual frequencies of postings using the terms bird flu or H5N1 indexed in the *Google discussion groups* from 1997 to 2006.

Interestingly, the term H5N1 was more popular until the year 2003, when the sudden explosion of postings began. In the discussion groups, most postings approach the topic from three general perspectives. First, as a new pandemic "that will kill us all", within a catastrophe frame, listing bird flu, for example, as one of the major threats to human kind, similar to global warming, or in lists of other "world disasters". In some postings bird flu is mentioned in the context of a number of other diseases such as the Gulf War Syndrome, Toxic Shock Syndrome, SIDS (Sudden Infant Death Syndrome), Chronic Fatigue Syndrome, Mad Cow Disease, and the Ebola virus.

The tone in such postings is mystical and catastrophic, often connected to biblical images of Armageddon or Nostradamus' predictions. Another category approaches bird flu from alternative points of view, often colored by humorous undertones. For example, some postings take the perspective of the millions of poultry to be culled in order to stop the spread of the virus, such as the posting entitled "CHICKEN HOLOCAUST ABOUT TO TAKE PLACE" (posted in 1997) that points to the grave injustice that was about to take place in Hong Kong where 1.5 million innocent chickens are about to be murdered in cold blood in order to stop the H5N1 flu virus. It goes on to ask if it is morally right to hold all of these 1.5

million chickens responsible for the poor health habits of a few. The tone in such postings is often cynical or humorous.

The third very common, general category of postings are those that forward recent information on bird flu, gathered from the news media and other sources instead of providing new opinions on the topic. The amount of such postings explodes in the fall of 2005 when constant updates about the spread of the virus to Europe via migratory birds gain momentum. The overall tone in this type of postings is informative.

The rise in postings seems to be a result of parallel and related topics of discussions, i.e. the discussion fragmenting into several sub-categories. In the discussion groups the pandemic frame is clearly connected to the term bird flu, as only few postings connect the term H5N1 with pandemic.

5. Discussion

This article has discussed the preliminary findings of the development of the debate about bird flu and H5N1 in medical articles, newspapers and discussion groups, mainly focusing on the frequencies of publications in these domains. The amount of published items exploded in 2004 in all three databases, but what does this mean in more qualitative terms? It seems that the fear of a potential pandemic served as a powerful tool in creating a coherent frame of reference around the debate, most notably in newspapers, but also in the public discussion groups and, to a lesser extent, in biomedical journals. At the same time, the scientific H5N1 debate morphed into a bird flu debate, also embracing the social aspects of the disease. In the discussion groups, the dynamic seems to be quite the opposite, the debate becoming increasingly focused by a coherent frame of reference, namely that of pandemics, in this similar to the newspaper coverage. From 2004 onwards, and peaking in 2005, bird flu began to be framed as a potential influenza pandemic that deserves more research, and there are calls for the further development of vaccines and drugs against the virus, as well as political and ethical decisions regarding preparedness and how to deal with outbreaks of bird flu as potential pandemics.

Medical, journalistic and public domains have, each, focused on a specific set of interests within the broad topic of bird flu. The themes in medical articles have shifted from virology to reviews and overviews which also examine the social aspects of the disease, and in this sense the discussion seems to have fragmented or broadened over time. Until 2004 the newspapers mainly reported on recent (external) events with relation to the various aspects of the bird flu, such as killing poultry as a preventive measure to stop the spread of the virus. In the newspapers, the debate seems to become more homogeneous instead of fragmented as the pandemic frame provides a coherent perspective onto the topic. In public discussion groups the topics and sub-themes are extremely rich, with the concept of bird flu gaining metaphoric status to the extent where the term can be used to refer to almost any catastrophic topic or risk, often connected to end of the world scenarios.

The framing of “bird flu” as a potential pandemic seems to have functioned as a boundary object (Star and Griesemer 1989) that has enabled discussions on the potential threat of a new influenza pandemics (comparable to Spanish Flu). Thereby, the public debate on bird flu as a potential pandemic has, possibly, served as a ground for allocating more research funding into biomedical research concerned with this particular H5N1 virus, and enhanced the development of vaccinations and medication against this virus by pharmaceutical companies, especially with relation to Oseltamivir, an antiviral drug that is used in the treatment and prophylaxis of both influenza virus A and influenza virus B, which is currently marketed by Hoffmann-La Roche (Roche) under the trade name Tamiflu.

In summary, this paper has had two main results. First, it has shown that describing bird flu as a potential pandemic can serve as a powerful way of framing the topic in a way that restricts the complexity of the debate, both in the newspaper coverage and in discussion

groups. Public opinion about bird flu in turn seems to have boosted a an increase in research funding into biomedical research into the structure, spreading and other characteristics of this virus in medical sciences, as well as enhanced the development of vaccines and medicines against this bird flu virus by pharmaceutical companies. The hype around Tamiflu coincides with the sudden peak of articles published in October 2005 during the period of bird flu hype, but this would deserve a separate article.

Second, in the context of research interested in tracing public hypes and their consequences, the paper also seems to demonstrate that sudden and parallel increases in communications in various discourses (e.g. medical journals, newspapers and discussion groups) point toward connected fluctuations in public debates, and, possibly to a purposeful use of public hypes to advance scientific research in a specific field (influenza virus research) as well as commercial interests (development of medications) (see also Brown 2003). However, the results of this article are only indicative of various trends in framing the bird flu debate.

The main limitation of the current study is that, currently, there are no methods available that could be used for detecting the connections between the biomedical, journalistic and public discussions about bird flu and H5N1. In order to undertake a further study of the dynamics of public debates, there is an urgent need for new methods that would allow for the analysis of cross-domain connections between the various discussions on one topic, such as bird flu. Other, similar types of public hypes should also be investigated to detect whether there are systematic patterns across different public hypes.

Some of the potentially interesting questions are: What made the bird flu virus (which is far less threatening than many other viruses, such as Ebola) so attractive for public discussion considering that the infection rate of the H5N1 virus is low, compared to other infectious diseases, such as MRSA or measles, which are lethal to a much higher number of humans every year? Why and how did the debate about this virus turn into a public hype? Did public hype increase the funding of scientific and commercial research into this virus? In short, the politics of public hypes seems to deserve more attention in scholarly research interested in the dynamics of public debates.

Notes

1. A number of popular scientific journals, such as Fortune, are also indexed in the PubMed.

Acknowledgements

Iina Hellsten would like to warmly thank Dr. Rudy Prabowo for his comments on earlier drafts on bird flu, and gratefully acknowledges the funding provided by the EU under its 6th Framework to the project Critical Events in Evolving Networks (CREEN), NEST-2003-Path-1, 012684. Earlier versions of the paper have been presented in the Association of Internet Researchers conference (AoIR) in September 2006 in Brisbane Australia (together with Dr. Rudy Prabowo) and in the New Network Theory conference held in June 2007 in Amsterdam. Brigitte Nerlich gratefully acknowledges funding from the Economic and Social Research Council for the project “Talking cleanliness in health and agriculture”; grant number: RES000231306.

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