

Familiarising Science: A Western Conspiracy And The Vaccination Revolt In Northern Nigeria

BANKOLE FALADE

ABSTRACT

The revolt against the oral polio vaccine in northern Nigeria offers a case study for investigating how a scientific phenomenon transforms common sense. Moscovici's (1961) social representations theory provided a framework to examine arguments for and against the vaccine, while a content analysis of media articles was used to identify the actors and themes in the controversy between 2001 and 2009. In the controversy, a suspected contamination of the vaccine was seen by northern elites as part of a Western conspiracy against the developing world and Islam. In addition, for some Muslim clerics, vaccination is against Islamic teachings on disease. The representations were sustained by cultural resonance, sponsor activities and media practices and show the role of categories from the past in situations where there is no consensus on meaning. The study found that apart from international events like the wars in Iraq and Afghanistan, local issues associated with developing economies – such as inadequate infrastructure, policy and transparency – also influenced the representations. The study found that while the scientifically determined risks from the vaccine were almost absent in the debate, both camps used scientific and common sense arguments to justify their positions. The findings reaffirm Durkheim's (1912) thoughts that science needs the authority of the society to be part of common sense.

Keywords: vaccination, religion, resistance, representations, western conspiracy

Correspondence should be addressed to Bankole Falade Universität Bielefeld, Fakultät für Linguistik und Literaturwissenschaft . Email: Bankolefalade@hotmail.com.

...it is hardly the case that concepts, even when they are constructed according to all the rules of science, derive their authority only from their objective value. It is not enough for them to be true for them to be believed. If they are not in harmony with other beliefs, other opinions, in a word with the whole gamut of collective representations, they will be denied; minds will be closed to them; they will be as if they never were.

—Durkheim (1912, Pg 333, 334)

In 2003, in the midst of a nationwide campaign to eradicate poliomyelitis, some states in northern Nigeria banned the use of the oral polio vaccine (OPV), citing its contamination by sterilising hormones.. The revolt, which continued until 2004, split the society into two opposing camps that debated what constitutes true (or correct) scientific information, with each group blaming the other for spreading the disease. The controversy has attracted critical academic commentary as being irrational and anti-science, but some of these criticisms have been informed by rather narrow perspectives of knowledge and attitudes (see Yahaya, 2007). These criticisms are also founded on cognitive determinism, which ignores their social and changing aspects. The cognitive approach, which equates factual knowledge with appreciation – the more you know it (science), the more you love it – also overlooks research findings which show that the more knowledge people have, the more critical they become about an issue (Gregory, 2001). It also ignores the fact that science is not unanimous (Lidskog, 1996).

An alternative paradigm from social psychology draws extensively from Durkheim's (1912) notion of collective representations. For Durkheim, it is not enough to be scientifically proven to attain the characteristics of truth, as it is equally important for new concepts to be in harmony with existing beliefs (see above quote). However, this, he argues, does not make the society illogical or incoherent; to think logically is in some measure to think impersonally and while impersonal reason is another name for collective thought, impersonality and stability are the two characteristics of truth. Collective representations then form the truth and it is from Durkheim's seminal work that Serge Moscovici (1976, 2008) developed the concept of social representations. Collective representations were appropriate in understanding thoughts in pre-modern times, but the notion is too stable to account for contemporary societies characterised by a diversity of social segments and a flood of developments in science and technology, among others (Gaskell, 2001). The social representations approach is about the relationship between

stability and change in societies where a plurality of understandings and forms of organisation of thought, all of them social, co-exist (Moscovici, 1976). Moscovici's social representations theory (SRT) offers better conceptual grounds for science in society research, which is not only about what is scientifically true, but what is both true and socially acceptable – why, when and how.

SRT examines how new social knowledge evolves and addresses the general issue of how scientific and technological innovations progress through society, as well as the more general problem of how novelty relates with the old and the transformation it suffers in the process (Castro and Gomes, 2005; Jovchelovitch, 2008). The theory also proposes that the motivations which underpin risk perception are not based upon a need for accurate information but rather, a desire in people to protect themselves – and the groups with which they identify – from threat (Joffe, 1999, 2003). This article explores how SRT furthers our understanding of how the OPV programme changed common sense understandings of poliomyelitis in northern Nigeria, by narrating the roles of the various actors and social contexts as well as discussing the contributions of scientific and non-scientific arguments to the transformation of knowledge. Specifically, the article seeks answers to the following questions:

1. What were the representations of OPV?
2. How did these representations evolve and change over time?
3. What influence did international and local contexts have on the debate?
4. How did the media cover the debate between 2001 and 2009?

The battle for change is fought with words, and the press – being one of the privileged theatres where conflict is staged – is best suited to finding out the way in which language is used, what distinctions are made and how the distinctions are contested and defended (Castro and Gomes, 2005), as social reality is negotiated, constructed and reconstructed. The press cuttings approach was also adopted by Moscovici (1976) in his study of the reception of psychoanalysis in France in the '60s. This is not to disregard the value of cognitive approaches such as surveys of knowledge, attitudes, trust, etc., as they are part of a pioneering wider study of science culture in Nigeria (Falade, 2014) of which this article represents one of many possible methods. A study of science in society needs to be approached using a triangulation of methods. This is the main limitation of this study as what is presented here focuses only on the analysis of information circulating in society and the conclusions are restricted to such. The study, nevertheless, has

great potential for insightful contributions to the understanding of health and illness in developing societies, illuminating the ‘why’ and ‘how’ of resistance to new scientific approaches to disease.

THE REVOLT AGAINST OPV IN NORTHERN NIGERIA: 2001–2009

The sequence of events that led to the revolt, being historical, is better narrated using media clippings. I separated the events into pre-revolt, revolt and post-revolt stages; however, as in Ungar’s (1998) studies, the shift from one stage to another is an emergent process that strengthens over time, but is never absolute.

Pre-Revolt Stage

The international drive to eradicate poliomyelitis began in 1988 with the Global Polio Eradication Initiative (GPEI) spearheaded by the World Health Organization (WHO), Rotary International, the United States Centre for Disease Control and Prevention (CDC) and UNICEF. This move followed the successful eradication of smallpox in 1980 and the goal was to rid the world of polio by 2000. In line with the aims of the GPEI (polioeradication.org), African leaders in 1996 launched the ‘Kick Polio Out of Africa’ campaign. That year, polio was rampant in 41 African countries, but by 2002, most countries – including several states in southern Nigeria – were declared free of the disease (WHO, 2005). As part of the global effort, national immunisation days were set aside in Nigeria by the federal government. This campaign was resisted from the onset by some religious leaders in the north who described the exercise as being against Islamic injunctions (Ogundipe, 2001). Rumours of contamination with the AIDS virus were also widespread (Abuh, 2002).

Revolt Stage

The crisis took a drastic turn in July 2003 when two very influential Islamic groups, the Supreme Council for Shari’ah in Nigeria (SCSN) and the Kaduna State Council of Imams and Ulama, announced that the vaccine contained anti-fertility substances and was part of a Western conspiracy to reduce the population of the developing world (Madugba, 2003). Notably,

however, governors in the south campaigned for the use of the vaccine (Nkwopara, 2004) – thereby distancing themselves from the Western conspiracy theme.

The medical community was divided over the safety of the vaccine. The WHO and Nigeria's Ministry of Health insisted the safety of the vaccine was confirmed by a test carried out by a Muslim pathologist, Dr Abdulmumini Rafindadi, at the Ahmadu Bello University, Zaria, which found the drug to be free of anti-fertility hormones (Murray, 2003). But another test ordered by the Jama'atu Nasril Islam, a Muslim group, and conducted in India by Dr Haruna Kaita of the same university reported contaminants that could cause infertility (Kazaure, 2004). The boycott was, however, limited to OPV as the public continued to receive the cerebrospinal meningitis vaccine (Akintola, 2003) and other drugs of Western origin.

The revolt peaked in the last quarter of 2003 when some states in northern Nigeria banned the use of OPV, citing its contamination by sterilising substances (Sabiou and Shobayo, 2003). The ban raised worldwide fears of the reversal of the gains already made and between 2003 and 2005, several previously polio free countries – including Nigeria's neighbours Ghana, Benin, Chad, Niger, Burkina Faso and Togo – were re-infected (UNICEF, 2009).

The northern states gradually lifted the ban. Jigawa State said it lifted it because polio had claimed the lives of 27 children (Ibeneme and Anthony, 2004). The revolt ended in June 2004 when Kano, the last boycotting state, called it off (Fagbemi, 2004) following an agreement on a source of production of the vaccines not associated with contamination.

Post-Revolt Stage

The lifting of the ban by the northern states did not, however, result in the immediate eradication of the disease. In August 2006, an estimated 467 new cases were reported (Peter-Omale, 2006) and in 2009, in Niger State alone, about 15 fresh cases were reported (Falola and Adedeji, 2009).

THEORETICAL PERSPECTIVE

The social representations theory (Moscovici, 1976, 2008) examines the uptake of science by the public from the perspective of common sense making. The SRT separates science and common sense into 'reified' and 'consensual' universes (specialists and non-specialists). In the consensual universe, society is seen as a group of individuals who are equal and free; whereas in the reified

universe, each member participates only in his or her area of acquired competence (Moscovici, 1984). The question the theory then addresses is how individuals and groups in the consensual universe make the unfamiliar words, ideas, or beings from the specialists familiar? Moscovici's argument is that the images, ideas and languages shared by a group always seem to dictate the initial direction by which it tries to come to terms with the unfamiliar. Social thinking, Moscovici argues, owes more to convention and memory than to reason. He also suggested two mechanisms for the thought process: anchoring and objectification. Anchoring is a process which draws something unfamiliar and disturbing into our system of categories and compares it to the paradigm of a category which we think to be suitable; while objectification identifies the iconic quality of an imprecise or abstract idea and reproduces it in an image. Thus, Freud's psychoanalysis, to the communists in France in the '60s, was an instrument of an imperialist invasion of French culture and an ideological rearmament of American imperialism. For Catholics, it was anchored in religion as the practice was analogous to a sinner confessing before a priest (Moscovici, 1984). SRT is about 'the capacity of looking beyond the observables and of the daring abductive jump that opens new perspectives and widens our horizons about how society is shaped by individuals and how individuals are shaped by society' (Jesuino, 2008, pg 408). For Jovchelovitch (2008), the theory brings to the fore the continuum between life and knowledge, between a psychology of rationality and cognition and a psychology of experience, emotion and society.

The controversy in Nigeria was about an unfamiliar scientific phenomenon penetrating the life worlds of different social groups and the interest, from the SRT perspective, lay not in whether there was a knowledge deficit or whether the public was being irrational, but in finding out about the five 'W's and the 'H' (Who, Why, What, When, Where and How), the role of context and how common sense was transformed. SRT provides broader social explanations than the risk assessment and knowledge/attitude paradigms (Allum, et al, 2008; Slovic, 1999) for how events in common sense are initially abducted (see also Harman, 1965; Walton, 2005) in the search for meaning.

Furthermore, Batel and Castro (2009) argue that conceptualising reification and consensualisation as communicative formats has implications for theory and practice, as it provides the analytical tools capable of diagnosing how communication unfurls in practice. They

concluded that the two notions are good descriptors of two very distinct ‘ideal type’ communicative formats with different consequences, instead of static notions referring to sharply differentiated universes. This view is also supported by Jesuino (2008, pg 394), who argues that ‘we are all scientists just as we are all laypersons’. Another issue of importance to this longitudinal research is a plausible explanation for the longevity of a representation in public debate. Gamson and Modigliani (1989) postulated three classes of determinants that combine to sustain a particular theme in public discourse. They identified sponsor activities, media practices and cultural resonance. This research has adopted both the communicative formats and the three classes of determinants as methodological tools to examine the arguments for and against vaccination and their longevity over the study period.

METHODS

Representations of science are found in the media, which plays an important role in spreading news in society. This role also makes it a library of common sense; thus media archives are good sources for tracking representations and how they change within and across cultures. The study adopted the use of media themes as the basic unit in the categorisation of the articles. A theme (content) as used in this study is a prominent and/or recurring issue in the debate or, as Moscovici (2008, pg 198) proposes ‘a single content that is formulated in various different ways’. A group of media themes can, however, be categorised as media frames; but not all themes can be classified as frames (McCombs, 2005), making the framing paradigm (Entman, 1993) unsuitable for this study. Framing is also limited by its vagueness and ambiguity in definition (Scheufele, 1999; Gamson et al., 1992). This study thus adopted themes, a basic unit of analysis formulated in various ways which can, if needed, be recoded into other conceptual approaches.

From the library of *The Guardian* newspaper in Lagos, Nigeria, a corpus of 701 newspaper clippings from all major Nigerian newspapers was obtained, showing articles on immunisation from 2001 to 2009 arranged by date of publication. The corpus contained articles from *The Guardian*, *The Punch*, *This Day*, *Champion*, *Tribune*, *Vanguard*, *New Nigerian* and *Daily Times*. The timeline in figure 1 shows some of the issues in the international and local

contexts of the study and how the dates align with the revolt. The fallout of the infamous 1996 Pfizer drug trial was ongoing in the courts and there was a war in Afghanistan. The invasion of Iraq began on 20 March 2003, at the peak of the controversy.

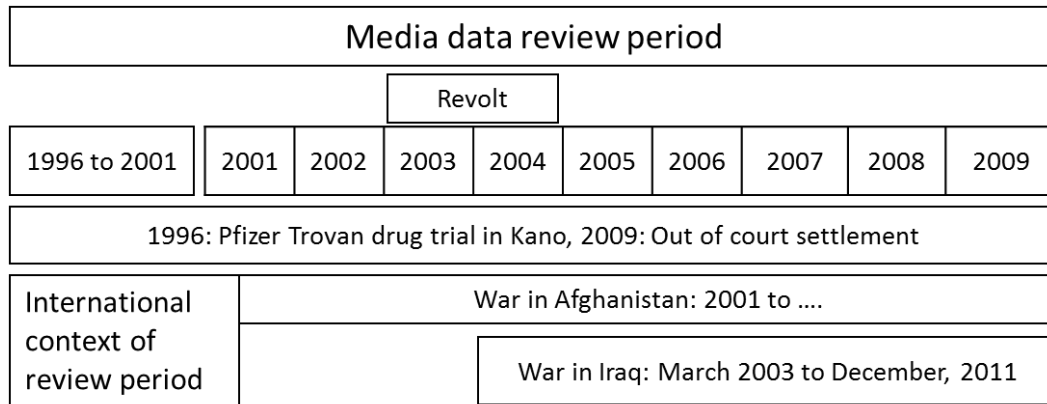


Figure 1. Timeline of media sample and local and international context

Actors And Themes

The corpus of 701 clippings was examined for consistency and 54 *Daily Times* and two *New Nigerian* articles were removed because they featured only in the years 2003 to 2005. Of the remaining 643, every third article, which made up a sample size of 212, was selected for statistical content analysis. The analysis examined the intensity of coverage and the relative presence (or absence) of the themes over the study period. The themes identified were: religious/un-Islamic; Western conspiracy; effective vaccine; risk issue; coverage/logistics (local infrastructure); and ‘other themes’ (corruption, etc.). Official corruption is rife in Nigeria hence its importance in how the public view government activities. A Transparency International report in 2003, while the controversy was ongoing, showed that over 80% of Nigerians believed corruption affected their lives (Transparency International, 2003). The actors identified were grouped into the federal government and its agencies; states and local governments; religious and traditional leaders; world bodies (international agencies); and ‘other actors’ for the rest.

The themes can be recoded into those that support the process and those that act against it; but equally important for this study is to see how the individual themes relate with actors and their evaluation using bi-plots in a multidimensional approach (Greenacre, 2010). The articles

were evaluated on a positive and negative scale, drawing on Castro and Gomes’s (2005) argument that with a relevant social issue, there is <belief A> and <belief non-A>. I designed four categories of evaluation for the coding as shown in Table 1: N2 being stories that ask the reader to reject; N1 for mixed stories, but which are slanted against OPV; P1 for mixed stories, but which are slanted in favour; and P2 for stories that ask the reader to accept.

Table 1. Evaluation of articles (Moscovici, 2008; Castro and Gomez, 2005)

<Belief A> (Facilitate vaccination)		<Belief non A> (Inhibit vaccination)	
P2 (High Positive)	P1 (Low positive)	N1 (Low negative)	N2 (High negative)

The evaluation involved a reading to determine the appropriate magnitude: +7 would be very positive national events, while -7 would refer to very negative national issues and the zero mid-point would be a neutral article; -7 to -5 was recoded as N2; -4 to -1 as N1; 0 to +4 as P1 and +5 to +7 as P2. The role of the actors was also part of the evaluation and the researcher’s familiarity with the context allows a reading of the text beyond its manifest content (see Berelson, 1952) to the impact of the messages from such actors on their audience. The clustering of a group of variables in a geometric space using correspondence analysis and the distances between them represents a collective identity for sense making.

A sub-sample of 21, made up of every tenth article out of the 212, was selected for intrapersonal reliability (Bauer, 2000) or stability, involving testing and re-testing for intra-observer inconsistencies (Krippendorff, 2004). Primary themes showed 81% agreement with a Scott’s *pi* of 0.72, with actors at 86% agreement with a Scott’s *pi* of 0.76. For the evaluation variable, Spearman *rho* was 0.987, exact agreement 0.38%; plus or minus 1 point range was 0.86% and plus or minus 3 point range was 100%. The results show agreement beyond chance (Banerjee et al., 1999).

CONTENT ANALYSIS

Intensity Of Coverage and Disease Incidence

The amount of newspaper coverage was compared with the number of wild polio virus cases reported by WHO in the review period (WHO, 2011) and there were similarities in the patterns

of both coverage and disease incidence. Both rose steadily to a first peak in 2004; but while newspaper reports showed a marked decline in 2005, which coincided with the lifting of the ban, disease incidence continued to rise, although with a slight decrease in gradient until another peak in 2006 as illustrated in figure 2.

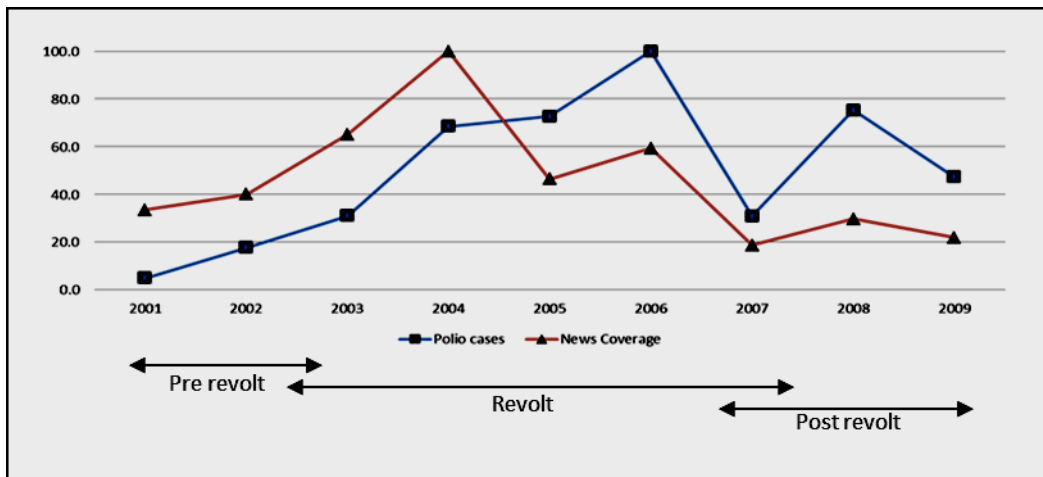


Figure 2. Percentages of wild polio virus cases and volume of newspaper coverage

The drop in media coverage in 2005 may have masked the fact that infection cases were rising. Indicating the direction of causality is, however, always difficult. Was the media merely responding to increasing disease incidence, or contributing to resistance with increased coverage as Mazur and Lee (1993) argue in their quantity of coverage theory? However, the trend analysis provides data to support an argument that the media provide a fairly good mirror of public anxiety, but that there is a lag in response time.

As observed earlier, there are three phases in the coverage of the controversy: pre-revolt, revolt and post-revolt (see figure 2). What could be interpreted as the pre-revolt stage emerged early and alarmingly in the review period with reports of the vaccine being un-Islamic and tainted with the HIV/AIDS virus. The un-Islamic and conspiracy theory continued in 2002, with conflicting test results from scientists and the involvement of elite religious leaders, until the debate climaxed in the publicly announced boycott of 2003. The last boycott was called off in 2004 by Kano State and the main revolt period can thus be identified as occurring between 2003 and 2004. But the un-Islamic theme was not resolved until sometime in 2007. After this, a single

meaning emerged in the press and the issue of coverage, which had been in the debate all along, became the focus of attention. The post-revolt stage followed the resolution of both un-Islamic and conspiracy theories in the media.

Table 2. Themes and year of occurrence in column percentages (N=212)

	2001	2002	2003	2004	2005	2006	2007	2008	2009	Total
Un-Islamic	5.6	9.5	2.9	2	0	0	0	0	0	2.4
Conspiracy	0	4.8	11.8	23.5	8.7	0	0	6.7	0	9.4
Effective	77.8	66.7	47.1	68.6	87	40	11.1	33.3	27.3	56.6
Risk issue	5.6	0	5.9	0	0	0	0	0	0	1.4
Coverage	0	9.5	29.4	3.9	0	53.3	88.9	60	72.7	25.9
Others	11.1	9.5	2.9	2	4.3	6.7	0	0	0	4.2
	100	100	100	100	100	100	100	100	100	100
No of themes	4	5	6	5	3	3	2	3	2	

Table 2 shows that there were about four themes or meaning systems in 2001, rising to six in 2004 and declining to two by 2009, the end of the review period. The table also shows that while the effective vaccine theme was dominant (56.6%) throughout the review period, there were concurrent concerns about logistics affecting the coverage of the immunisation programme (25.9%). Surprising, too, was the low frequency (1.4%) of debates about risk from the vaccine. The risk covered by the media had to do with expired drugs and not the scientifically assessed risks from vaccine associated paralytic poliomyelitis (VAPP), estimated at one in every 2.7 million first doses; circulating vaccine-derived polio virus (cVDPV), and immuno-deficient vaccine-derived polio virus (iVDPV). Coverage and the effective vaccine campaign became the dominant issues in the media after 2005 (see <http://www.youtube.com/watch?v=uxA6-9MapMw>).

The relationship between the evaluation, actors and themes for the period 2001 to 2009 was explored to construct a biplot (figure 3). The cross tabulation of evaluation with themes was significant (Chi square = 99.9; $P = 0.01$ and Cramer's $V = 0.4$); and with actors too (Chi square =

63.1; $P < 0.01$ and Cramer's $V = 0.3$). All the values demonstrated enough variation in the data for correspondence analysis. The cross tabulations were combined into a concatenated (or staked) table (Greenacre and Blasius, 1994). The geometric representation showed that sectional leaders, conspiracy theories and risk from the vaccine share a set of co-occurring attributes; and these were more likely to be associated with high negative values acting as barriers to vaccination. World bodies, other actors and federal government also share some features, and were more likely to be associated, with positive values facilitating acceptance; while coverage and other themes were oscillating between low negative and positive, acting at times as inhibitors and at other times as facilitators. The masses showed that the federal government and effective vaccine theme had the highest values followed by states and coverage – denoting their level of importance in the analysis. The masses also showed the dominance of the low positive evaluation. Dimension one separated the positive from the negative evaluation and accounted for 64% of the inertia explained. A two-dimensional solution explained 91.4% of the inertia.

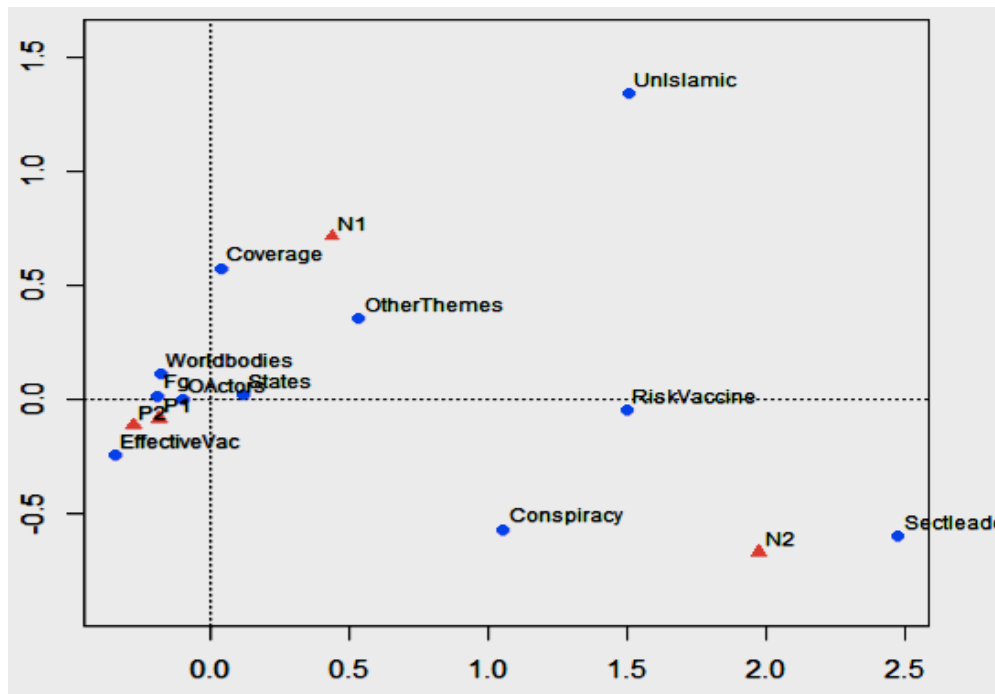


Figure 3 Geometric figure showing actors, themes and evaluation

QUALITATIVE ANALYSIS

Representations In Context

Life in northern Nigeria imbues the citizen with multiple identities. In one context, he worries about poor distribution of infrastructure for health delivery (Ademiluyi and Arowolo, 2009) and corrupt officials (Transparency International, 2003) and the implications for government policies and actions; in another, he might be a Muslim (or Christian) concerned with events in Iraq and Afghanistan. All these are part of experience and have implications for anchoring an unfamiliar health intervention. Local culture played a prominent role in the revolt over the smallpox vaccine in Brazil (Needell, 1987) and the tetanus toxoid in Cameroon (Feldman-Savelsberg et al., 2000). Cultural differences were also reflected in the controversy over the diphtheria-tetanus-pertussis and measles-mumps-rubella vaccines in the UK and US (Baker, 2003; Burgess et al., 2006). This section of the analysis examines the themes in the debate and the communication strategies of actors based on the two discursive formats (Batel and Castro, 2009) and the three classes of determinants (Gamson and Modigliani, 1989).

Vaccination Is Un-Islamic

The religious/un-Islamic theme emerged early in the review period when Islamic preachers publicly campaigned against the exercise. ‘Cleric declares immunization un-Islamic’ (Atofelekun, 2001) was the headline of an article in which a cleric in Niger State declared immunisation to be against Islamic injunctions. Another preacher in Sokoto State went further to ask Islamic scholars to show those verses in the Holy Quran and the Hadith that justify the exercise of preventing a disease (Oyerinde, 2002).

This theme is anchored on religious convictions concerning disease. It highlights a disagreement between religion and science, regarded as the two pillars of truth (Gaskell et al., 2010). This disharmony, according to Durkheim’s (1912) thesis, means the new idea stands to be rejected. But is this disharmony a result of religion and science being incompatible, or what Luhmann (1990) refers to as obstacles in the communication between both spheres? The longitudinal analysis showed that the theme became less prominent in later years.

Western Conspiracy

The Western conspiracy argument was about a grand design by Western countries against Islam to render children infertile. In an article titled ‘North rejects polio vaccine because of US’

(Abraham, 2003), Alhaji Bunu Gwandu declared that ‘America has no good intentions towards Muslims and whatever emanated from the US stood dubious for any Muslim notwithstanding the value.’ A cleric, Mohammed bin Uthman, told the BBC that the infamous field trial by Pfizer in Kano in 1996 (see Malakoff, 2001), the Bosnian war and the economic embargo on Iraq, all of which led to the deaths of many Muslim children, continued to shape his views.

In an interview in Kano the state governor, Ibrahim Shekarau, insisted on the anti-fertility hypothesis (Ogundipe, 2004):

It is a lesser of two evils, to sacrifice two, three, four, five even 10 children than allow hundreds of thousands or possibly millions of girl child likely to be rendered infertile. Tests carried out by scientists in the state last year found traces of hormones. We want explanations ...

Kano-based medical doctor and president of the SCSN, Dr Datti Ahmad, said the American government planned to depopulate the Third World (Shiklam, 2004). The polio incidence in the country, according to Ahmad, was about 146 per annum compared with the hundreds of thousands that were being vaccinated (Abuh, 2004).

This theme shows the role of experience in familiarising the unfamiliar. An unfamiliar vaccine was anchored on past experiences with the West in Bosnia and Iraq, and locally on Pfizer’s infamous drug trial in Kano. The recall of the wars and the Pfizer episode appeal to common sense, while the infertility theme is based on scientific evidence. These events, by abductive reasoning, translate to a Western conspiracy against Muslims. Abductive reasoning, or inference to the best explanation (Harman, 1965; Walton, 2005; Jesuino, 2008), is probably the most common type of reasoning used in everyday deliberation as well as in legal arguments; but it is inherently tentative and can turn out to be misleading. The reference to scientific evidence of infertility and the polio incidence ratio also shows that the opposing discourse is not devoid of scientific arguments.

Effective Vaccine

The effective vaccine theme centred on the public’s acceptance of the OPV and also on denying reports of contamination.

Professor Idris Muhammed had early in the debate emphasised the impossibility of the vaccine being tainted with the HIV virus and dispelled the Pfizer link (Adoba, 2001):

No medical or scientific basis can justify their coexistence; it is simply not possible. It is ironical that the Pfizer trial could be used to militate against immunization when in fact if we had immunized our people against meningitis disease in the first place there would have been no opportunity for any Pfizer or any other drug company to conduct a clinical trial.

The federal authorities set up another verification committee in February 2004. The committee found the vaccine safe for use but also reported trace amounts of estradiol, a sex hormone, in some samples. The committee, however, concluded that the 'trace amounts of estradiol in question was much smaller than what is found in recycled drinking water in several developed countries' (Bichi and Babatunde, 2004).

Also, in 2007, some prominent Islamic leaders, after a tour of Egypt, accepted that vaccination was supported by Islam. The group said in a statement: 'Immunization is Halal in Islam based on the teachings of the Quran and the Hadith'. The Emir of Gombe, Alhaji Shehu Abubakar, who was part of the team, admitted to journalists that he was a 'doubting Thomas' who was now convinced of its compatibility (Fred-Adegbulugbe, 2007).

The effective vaccine arguments were also based on both scientific evidence and appeal to common sense. Professor Muhammed's argument was that the controversy over Pfizer's drug trial would have been avoided had the country been self-sufficient. The Islamic leaders and traditional rulers' statement that immunisation is Halal also showed that the obstacle (Luhman, 1990) between the two pillars of truth was surmountable.

The final verification committee did confirm traces of estradiol, a form of oestrogen regulating female reproductive cycles in samples of the vaccine. Synthetic oestrogens are found in contraceptives (Ludicke et al., 2001) and has also been linked with male reproductive disorders and endocrine related cancers, among other diseases (Sharpe and Skakkebaek, 1993; UNEP, 2012). These findings support the argument that the emotions stirred up by the controversy were not entirely unscientific and, as Turner and Sharpe (1997) argue, it will be

foolhardy to dismiss the possible involvement of oestrogen in infertility even when we have no data. The absence of evidence, they argue, is not evidence of absence. Their argument is supported by the initial lack of data to justify the association between bovine spongiform encephalopathy (BSE) and Creutzfeldt–Jakob disease (Bellaby, 2003).

Risk From Vaccine

The risk theme was designed to capture risks that may be attributed to taking the vaccine and was well illustrated by a story alleging that more than 300 children between the ages of one and six had been killed by expired vaccines, which left many more paralysed (Yusuf, 2003). There were other stories with similar alarming risk frame: ‘Govt agency distributes expired typhoid vaccines’ (Owuamanam, 2003).

This theme has shown the relative absence of the scientifically determined risk of contracting VAPP in the debate in the context of a mass immunisation campaign involving tens of millions of doses. Kano’s chief health officer, Aisha Kiru, said given the low level of education, informing the public of the risk may lead to a mass rejection of the vaccine (Da Costa, 2007). The theme shows that the controversy was a process of sociocultural transformation of knowledge informed by experience and laden with fear and emotions. Risk assessment, if at all present, may be just one part of the picture. Heller (2002) similarly found that concerns over food quality and culture were the main drivers of public attitude to genetically modified crops in France. It has also been found that knowledge can be moderated by emotional heuristics (Lee et al., 2005).

Inadequate Coverage

Local contextual issues associated with developing economies also played a prominent role in the transformation of knowledge, acting as barriers to positive experience with the vaccine. There were reports of fund shortages with gaps of about \$30.7 million (Isine, 2007). A United States Agency for International Development (USAID) report also attributed coverage issues to persistent unavailability of vaccines and non-availability of immunisation cards (Akpe, 2003). There were also problems encountered in the field owing to the inadequacy of population

projection figures. The Sokoto State director of primary health care regretted that they were working with wrong population estimates (Olayinka, 2006).

Because of the nature of the OPV, under-coverage may contribute to the spread of the disease. The OPV provides more gastrointestinal immunity than the inactivated polio vaccine (IPV) and is less expensive; however, it contains live but weakened strains of the polio virus in contrast to the more expensive IPV, which has been weakened and also attenuated with formaldehyde. Vaccine viruses excreted in the stool of the person vaccinated with OPV can become new sources of infection in areas with poor hygiene facilities. Also, a child needs about three doses of OPV to be fully immunised and not getting all three means the child is still at risk. Coverage problems are barriers to the spread of experience with scientific interventions and the transformation of common sense – and in the case of the OPV, may even contribute to the spread of the disease.

The ‘others’ theme

The ‘others’ category covered other issues aside from those above which had an effect on the campaign. One article reported a national workers’ industrial action that disrupted the third national immunisation exercise (Bolarinwa, 2001). Other newspaper headlines reporting rumours of corruption included ‘Unanswered questions about NPI’s N2billion gift’. In the article, Health Minister Alphonsos Nwosu said government was investigating how a grant of EU20 million was converted to Nigerian currency without the permission of the NPI (Uzendu, 2002).

The ‘others’ category showed that the polio campaign was not spared the vagaries of local bureaucratic culture which may have also contributed negatively to experience with the vaccine.

By applying Gamson and Modigliani’s (1989) three classes of determinants to the various themes, we can make plausible assumptions on why one way of looking at the disease came into prominence and also, how it faded into obscurity in the study period. They postulated three broad classes: sponsor activities, media practices and cultural resonance. The Western plot frame was propagated by leaders of very influential Islamic groups and Dr Ahmad, a renowned medical doctor, who went on an intensive media campaign at home and abroad. The media was the platform for the debate over which side was spreading a rumour and which one was spreading

the disease; and the Western conspiracy theme resonated well with the public in the wider international context of ongoing wars and local experience with Pfizer. This is like planting a seed: no matter how good the seed (representation) is, it can only sprout if the soil (culture) is favourable. How long it survives post-sprouting now depends on the weather (media practices), which fluctuates between favourable and unfavourable, and further activities by the planter (sponsor activities). All three act together to determine the dominance and longevity of a representation in public discourse. There were indeed several vaccines circulating in Nigeria at the time of the revolt and the difference was how each was talked about by the actors, the media and the theme's place in culture.

DISCUSSION

For Durkheim (1912), science cannot rely on its objective value alone to change common sense; it needs to appeal to public opinion. This was also the view of Habermas (2003) that the task of forming a judgement lies with common sense, not scientific evidence. The transition from science to common sense is, however, not always unproblematic, as the process of changing age-old traditions and beliefs often leads to different representations of the object by different social groups. This study has shown that the SRT remains a valid conceptual approach to studying the transformation of new science into common sense.

Psychoanalysis was anchored as an instrument of American imperialism by communists in Moscovici's study, based on the group's convention at the time. The wars in Bosnia, Afghanistan and Iraq also significantly influenced the early representations of the OPV as part of a continuing Western conspiracy against Muslims. The 'un-Islamic' representation, likewise, bore the hallmarks of common sense views about the relationship between God and disease. Both representations typify the role of old categories in pushing new meanings and objects through society (Castro and Gomes, 2005); the need to understand an issue that has no clear and consensual meaning (Lorenzi-Cioldi and Clemence, 2001); and a want in people to protect themselves and the groups with which they identify from threat (Joffe, 1999). The study has shown that the revolt was not a clash between civilisations or the rejection of science, but of incorporating new ideas into common sense and the sociocultural upheavals it at times produces.

The study has also shown that the controversy was not about the scientifically determined risk of contracting poliomyelitis from the vaccine itself, although there were concerns about expired vaccine related deaths. This was in contrast to controversies surrounding vaccines in developed economies, which have always been around exposure to such risks (see Baker, 2003; Burgess et al., 2006; Classen and Classen, 1997). The content analysis approach also revealed underlying issues of coverage and rumours of corruption, which also contributed negatively to experience with the vaccine.

Finally, are scientific and lay epistemologies complementary or opposites? Can we gaze at the stars like the astrologer Thales of Miletus and also see the well at our feet? Is there a need to see a sharp divide between the two, or a desire to see them alike (Jovchelovitch, 2008)? This study has shown that the two sides in the change process adopted both scientific and common sense arguments, indicating that they are not sharp opposites and can be used by both lay and expert spheres. The side of the divide on which one stands depends on the context; you can in one moment be a computer engineer and the next a patient in a hospital. As Jesuino (2008) argues, we are all scientists just as we are all lay persons. Common sense in modern societies, as this study has shown, is more scientifically informed than its traditional forms. Science, on its part, has become increasingly complex and specialised, further widening the gulf with common sense. The conclusion is that science needs common sense just as society needs science – but the decision to accept science as social reality remains with common sense.

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BANKOLE FALADE a journalist and social psychologist is a research fellow at the Faculty of Linguistics and Literary studies, University of Bielefeld, Germany where he is comparing the science content of German and British newspapers.

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