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(Article begins on next page)

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The Origins of the Alleged Correlation between Vaccines and Autism.

A Semiotic Approach[1]

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Abstract

Our approach to the epistemology of post-truth is based on the idea that to fully comprehend *any* post-truth, going back to its origins (i.e., to the moment in which some faulty interpretations start to spread) can be not only relevant but illuminating.

One of the most renowned cases of post-truth concerns vaccines and their alleged relationship with autism. It all started in 1998, when *The Lancet* published a study suggesting a link between the measles, mumps, and rubella vaccine and some symptoms of autism. The case is relevant both because it is at the origins of contemporary anti-vaccinism and because it took twelve years to fully disprove what in 1998 was presented as a scientific truth: this means that the boundary between truth and falsehood has been blurred for a very long period of time.

For this purpose, we have applied the semiotic methodology to 20 articles from *The Independent*, 20 from *The Telegraph*, 20 from *The Guardian*, and 20 from *The Daily Mail*, published between 1998 and 2010. Unexpectedly, many elements that can be seen as 'post-truth seeds,' such as conspiracy theories and the joint presentation of multiple truths, have been found even in the most scientifically accurate newspapers.

Keywords: anti-vaccinism, media analysis, post-truth, semiotics.

1. Introduction

Our proposal is to demonstrate how the semiotic methodology of text analysis coming from the Paris School founded by Algirdas J. Greimas[2] can help answer a question we consider fundamental for the epistemology of post-truth: *how*, *where* and *when* do some false and misleading interpretations take hold and spread?

[1] Even though the whole paper has been jointly ideated by the authors, §§ 1, 2, 3, 4.1, 4.3, 5, 5.2, 5.3, 6 have been elaborated by Giovanna Cosenza, while §§ 4.2, 4.4., 5.1, 5.4 by Leonardo Sanna.

[2] For an overview of the Semiotic School of Paris, see the "Algirdas J. Greimas" entry in Bouissac (1998):https://www.oxfordreference.com/view/10.1093/acref/9780195120905.001.0001/acref-9780195120905-e-128?rskey=A81E2Y&result=128. All the web resources to which we will refer from here on were last consulted on March 15, 2020.

As it is known, the case of vaccines and their alleged relationship with autism is one of the most renowned and long-lived cases of science denialism and post-truth (Ferrari and Moruzzi 2020, 2021). As a starting point, the issue can be reduced to a basic dichotomy: on the one hand, there is a case of "truth," which currently[3] is accepted by the international scientific community and concerns the safety and effectiveness of the triple vaccine against the measles, mumps, and rubella (MMR); on the other hand, there is a "non-truth," which can be summarized as "the MMR vaccine causes (or at least *may* cause) autism and other health problems in children," a statement that, according to present scientific evidence, has never been proven.

It all began in 1998, when *The Lancet* published a study suggesting a link between the MMR vaccine and some symptoms of autism. In 2010, after an intense debate within the scientific community, the paper was retracted (§2). Nevertheless, from 1998 to the present, an increasing number of people throughout the world—especially in Europe—believe that not only the MMR, but all vaccines in general, are dangerous to human health, unduly generalizing from the MMR case in particular to all vaccines.[4]

Therefore, we have decided to examine some relevant British newspapers (§3), spanning two time periods: from 1998 to 2004 (§4) and from 2004 to 2010 (§5). As for the semiotic methodology, from the vast collection of conceptual tools that Greimas' theory offers for text analysis, we have focused on the *recurrent meanings* (*isotopies*),[5] *enunciation strategies*,[6] and *narrative structures*[7] to be found in the texts examined.

On the whole, the case is interesting primarily for its extraordinary longevity and internationality. Furthermore, it may be especially instructive when interpreting contemporary denialist tendencies on Covid-19 (§6).

2. The Facts

[3] It is necessary to specify that the safety and effectiveness of the MMR vaccine is widely accepted "currently," since from 1998 to 2010 it was doubted and questioned.

[4] The last Wellcome Global Monitor (June 2019), which is the world's largest study of how people around the world think and feel about science, reports that in Western Europe only 59% and in Eastern Europe only 40% of people somewhat or strongly agree that vaccines are safe. See https://wellcome.org/reports/wellcome-global-monitor/2018/chapter-5-attitudes-vaccines.

[5] For the concept of *isotopy*, see Greimas (1970), Pozzato (2013, ch. 3), Marmo (2015, §§8.1.2 and 9.3).

[6] To deepen the semiotic theory of the enunciation and the related notions of *objectifying* and *subjectifying strategies*, see Volli (2000, ch. 5), Fabbri and Marrone (2001, Part 1), Manetti (2008), Pozzato (2013, ch. 5), Marmo (2015, §11.2). For technical definitions of the terms, see Greimas and Courtés (1979), entries "enunciation," "débrayage," "embrayage," "enunciator/enunciatee."

[7] For more information on Greimas' narrative structures, see Pozzato (2013, ch. 2), Marmo (2015, ch. 10).

On February 28, 1998, a study on the MMR vaccine by British physician Andrew Wakefield (and other twelve co-authors) was published in *The Lancet*, one of the world's oldest and most prestigious general medical journals (Wakefield et al. 1998). According to that study, both gastrointestinal and autistic disorders appeared in twelve children aged 3 to 10, soon after they had received the MMR vaccine.

Almost immediately, the article generated intense debate within the scientific community, both because some epidemiological studies refuted the posited link between MMR vaccination and autism (Taylor et al. 1999; Dales et al. 1999) and because other researchers claimed they were unable to reproduce Wakefield's findings (Madsen et al. 2002; Black et al. 2002).

The debate became more and more heated not only among scientists, but also in the media, so that vaccination rates fell dramatically, especially in Britain and Ireland, prompting fears of a measles epidemic. The media attention reached its climax in February 2004, when a journalistic investigation by *Sunday Times* accused Wakefield of being dishonest because he had been funded by lawyers who had been engaged by parents in lawsuits against vaccine-producing companies (Deer 2004). A few days later, *The Lancet* published a short retraction of the interpretation of the original data by ten of the twelve co-authors of the paper (Murch et al. 2004).

Overall, it took about twelve years to adduce full scientific evidence against Wakefield's study. In February 2010, *The Lancet* completely retracted Wakefield's study, and in May, he was expelled from the UK Medical Register. Since then, Wakefield has become an anti-vaccination activist and continues to enthusiastically defend his study today.

3. The Newspapers

As is widely recognized within numerous disciplines and approaches, the mainstream media play an important role in shaping what social scientists, from Lippman (1925) onwards, call *public opinion* (Bentivegna 2020).[8]

Over the last twenty years, the circulation of printed newspapers has diminished significantly, and their authority on the web has been often questioned, particularly on platforms such as Facebook and Twitter (Boyd 2018; Millar 2019). Nonetheless, newspapers still play the important role that the epistemology of public opinion has generally assigned to them

[8] Both the notion of public opinion and the role of the media in shaping it have been widely discussed in the social sciences. It is not possible to list all the contributions to this debate here. However, see McCombs and Shaw (1972), Habermas (1989), Noelle-Neuman (1993), Glynn and Huge (2008). For a summary, Bentivegna (2020).

(Goldman 1999, 2008; Munn 2012; Watson 2018). *A fortiori*, from 1998 to 2010, when the debate on the vaccines was burning, newspapers were one of the most influential mainstream media.

That is why, in attempting to understand *when*, *where* and *how* (i.e., through which media) the belief that vaccines are (or may be) dangerous for human health arose, we have studied the most significant newspaper articles focusing on that issue (*how*) and published in the UK (*where*) in the years between 1998 and 2010 (*when*).

For semiotics, newspapers are complex texts that necessarily imply not only general ideologies but also subjective perspectives on the politics, economy, culture, and society in which, in a given period, they are produced and read (Eco 2001; Lorusso and Violi 2004).[9] Nevertheless, in professional practices, most journalists constantly strive to present what they consider "facts" as most *objectively* as possible. In order to do that, they implement, as we shall see, some of what the semiotic theory of enunciation calls *objectifying strategies*,[10] which tend to present as "true," "objective," and "corresponding to facts" what instead, for medical research, is only "probable." As is known, in medicine, the truth can never be reduced either to a 100% matching of facts or to yes-or-no certainties, as journalistic objectifying strategies would often suggest, since it rests on *statistical significance* and strict *verification protocols* deciding which claims can be considered "proven" and which cannot. Due to this fundamental difference between journalistic and scientific truth construction, as we shall see, even the most scientifically accurate newspapers may present an on-going scientific debate as a contrast between clear-cut and contradictory truths, in which all points of view appear equivalent, even though they are not.

Having considered all this, in selecting the newspapers, we have tried to balance both the ideological and the subjective features characterizing each one, by choosing articles from:

(1) *The Independent*: center-left, liberal, trying to be as politically and ideologically neutral as possible;
(2) *The Telegraph*: right-wing, traditionally supporting the Conservative Party;
(3) *The Guardian*: center-left, liberal, representative of the British middle-class;

[9] The myth of *objectivity*—which especially concerns Anglo-American journalism—has been criticized not only by semiotics, but also by social studies on journalism. See Tuchman (1972, 1978), Wolf (1985), Agostini (2004). As for British journalism, see Hampton (2008), Ramón Muñoz-Torres (2012).
[10] See note 6.

(4) *The Daily Mail*: middle-market, populist-conservative, frequently criticized for its printing of inaccurate science and medical research articles.[11]

In conclusion, the corpus we worked with is composed of 20 articles from *The Independent*, 20 from *The Telegraph*, 20 from *The Guardian*, and 20 from *The Daily Mail*.[12]

Our selection has followed two main qualitative criteria:

(1) the *representativeness* of each article compared to a wider sample of at least 40 articles per newspaper: we have selected the articles with the most recurrent semantic, narrative and enunciation structures we have found;

(2) the *availability* of each article on the web, despite the passing years: indeed, if an article is still accessible online, its semantic, narrative and enunciation structures can be easily and rapidly verified and compared, when necessary, with contemporary cases.

We have divided the corpus into two time periods. First, we have selected 10 articles per newspaper from 1998 to 2004, i.e., before the *Sunday Times* inquiry. Then we have chosen 10 articles per newspaper from 2004 to 2010, i.e., from the *Sunday Times* inquiry to the year in which Wakefield was banned from practicing medicine.

For brevity reasons, here, we will provide analytical details of only the articles from 1998 to 2004 we believe best represent each newspaper in those years. As for the 2004-2010 period, we will only summarize the main trends that emerged, since we have found that each newspaper has been remarkably consistent over the years.

4. From 1998 to 2004

4.1. The Independent

The oldest article published by *The Independent* on Wakefield's study, which is still available online, is "Doctors link autism to MMR vaccination" by Jeremy Laurance (February 27, 1998). Despite the title, which is definitely alarming, the overall article is fairly cautious in not taking a clear position either for or against the MMR vaccine.

This is evident from the very beginning: "Government experts last night urged parents to continue to take their children for immunization." In support of this appeal, a declaration by the then Deputy Chief Medical Officer of England is reported: "Our advice is to continue to vaccinate your children." Nonetheless, a disturbing message immediately follows: "In an

[11] This is the most widely recognized political-ideological characterization of the four newspapers. See the "Media" section of https://www.eurotopics.net/en/.

[12] The URLs of all the articles we have analyzed can be found, sorted by year, month and day, in the Appendix.

unrelated move, the department announced that all blood plasma used to make products from vaccines to clotting factors, would in future be imported from abroad to reduce the 'theoretical risk' of transmitting new-variant Creutzfeldt-Jakob disease." Even though the move is defined as "unrelated," the announcement significantly changes the sense of what preceded it, because it mentions Creutzfeldt-Jakob disease, a rare and fatal neurodegenerative disorder that may vaguely echo the neurological components of autism. Thus, the rapid transition from the alarming title to the government's reassurances, up to the final reference to a severe neurological disease, creates a sort of 'semantic fluctuation,' which overall presents Wakefield's study as quite worrying.

In short, the article is representative for three reasons:

(1) it embodies the *objectifying strategy* of *The Independent*, i.e., its attempt to always maintain a neutral position, by presenting all the conflicting parts in play;

(2) it also exemplifies the typical style with which the newspaper manages to maintain neutrality, i.e., by switching from one position to another;

(3) it illustrates how such semantic oscillation ends up associating a general sense of alarm, uncertainty and danger to both the MMR vaccine and the institutions defending and promoting it.

Indeed, the article introduces a fundamental property of any *conspiracy theory* on vaccines, from 1998 to present, as defined by several studies on science denialism (Cassam 2019; Ferrari and Moruzzi 2020, 2021): the distrust in—and the subsequent opposition to—the official position of public health institution. In semiotics terms, this characteristic manifests itself as an *isotopy*, i.e., as a set of recurring semantic features.

Moreover, the overall objectifying strategy displayed by the article ends up presenting all parts, even when mutually contradictory, as if they were *equally legitimate*, and therefore "true," which is another typical post-truth tendency (Leone 2016, 2017; Lorusso 2018).

Lastly, it is worth emphasizing the central role that the *title* plays in this case, like in any journalistic context, from newspapers to television and the web (Lorusso and Violi 2004). First, the title draws the reader's attention and is often the only text that distracted or hasty readers read; second, it anticipates and summarizes the content of the article (what is called *thematization* in semiotics); finally, it defines how the article should be read in relation to the agenda setting of the day and the period (which is *topicalization*). In the case just examined, the title is undeniably decisive in creating a generally upsetting impact. As we shall see in §5, frequently, the titles alone are enough to convey the whole meaning of the articles.

4.2. The Telegraph

The approach of *The Telegraph* is quite different. The oldest article about Wakefield's study still found on the web is "MMR doctor links 170 cases of autism to vaccine" by Lorrain Fraser (January 21, 2001). It directly reports Wakefield's words:

> Professor Wakefield said: "Last week in our clinic we saw 9 or 10 new children with exactly the same story, referred by jobbing pediatricians from around the country who said, 'This child developed normally, had a reaction to MMR and is now autistic'". He said: "Tests have revealed time and time again that we are dealing with a new phenomenon. The Department of Health's contention that MMR has been proven to be safe by study after study after study just doesn't hold up. Frankly, it is not an honest appraisal of the science and it relegates the scientific issues to the bottom of the barrel in favour of winning a propaganda war."

This is another example of an *objectifying strategy*: the newspaper renounces speaking with its own voice—we could say that it 'remains silent'—to let Wakefield speak directly and independently to readers, without any intermediation by the journalist. In semiotic terms, Wakefield is the *subject* of a narrative path (Greimas 1970, 1983, 1987): in 1998 he discovered that MMR causes autism and in 2001 he can announce that more evidence in favor of his discovery has been collected. Since he represents "scientific issues," while the Department of Health is represented as completely untrustworthy, the latter becomes an *anti-subject* not only against him but also against science and public safety in general, which are both represented by Wakefield in the continuation of the article as well.

The *value system* here at play can be summarized as follows: on the one hand, Wakefield represents «the truth» (as a semantic feature)[13] and «good» (the value to be pursued); on the other, health authorities represent «falsehood» (as a semantic feature) and «evil» (the threat to be fought). In other terms, in *The Telegraph* the conspiracy theory is not only introduced, but also narrativized.

4.3. The Guardian

The first article we propose from *The Guardian* is a comment by Sara Boseley titled "The evidence stacks up against Dr. Wakefield. But nothing is yet proved" (February 7, 2002). Boseley plays the role of what semiotics calls the "delegate enunciator" (Lorusso and Violi

[13] The convention of indicating semantic features between low quotation marks dates back to Eco (1976).

2004): she expresses her opinions in the first person but, as the Health Editor of *The Guardian*, she also represents the newspaper's voice.

Since from 1998 to 2002, Wakefield's study had already been repeatedly disputed by the scientific community, Boseley is legitimized to be initially uncertain and eventually skeptical towards science. At the beginning, we read:

> Scientists from a respectable institution had a paper published in one of the world's leading scientific journals which raised the possibility of a link between the MMR vaccination, a new form of bowel disease and autism. The bare facts were enough to panic every parent of young children. I was one of them. My second child was four and her MMR booster was due. I put it off. [...] At the time, I thought Dr. Wakefield and his team might have stumbled on a terrible truth.

The conclusion of the article is even stronger: Boseley admits that it is not easy at all to stay on the side of science: "In a skeptical era, it is not easy to trust the mainstream voice of science, but on this occasion—and reserving the right to change my mind as new evidence appears—I do."

Three days later, *The Guardian* gives voice to another delegate enunciator, even more renowned both in the UK and beyond: British writer Nick Hornby, by then the author of two best-selling novels, *High Fidelity* (1995) and *About a Boy* (1998). The article "Why parents are angry about autism" (February 10, 2002) is written in the first person and expresses the emotionally involved viewpoint of Hornby, whose autistic child was nine years old at that time.

Hornby starts with a personal experience: he has just had an argument with Islington Council about a parking ticket and is angry about having received a fine for not displaying the disabled parking permit on his car. This story has nothing to do with the MMR vaccine contention, but introduces, once again, the isotopy of «distrust in health institutions,» which is typical of *conspiracy theories*. In fact, Hornby has sent a letter to Islington Council explaining his reasons, but their "bureaucratic reply" makes it evident that nobody has actually read his letter. Hornby presents this story as "a minor, silly incident," which exemplifies the difficulties that parents of autistic children generally experience. Finally, he introduces the MMR issue:

> Let's assume for a moment that there is a link between the MMR vaccine and autism. I know this is an enormous assumption, and that no such link has been proven (nor, incidentally, has it been disproven, despite Government and media suggestions to the contrary), but the point is that a significant percentage of parents with autistic children—thoughtful, intelligent, observant people, otherwise immune to conspiracy theories and paranoid delusions—are entirely convinced that this

> vaccine has irreparably damaged the lives of their children. Can you begin to imagine their fury and hurt? They have done what this and preceding Governments have told them to do […], and as a result, they feel, they have ended up with permanently disabled children.

Wakefield and his studies are not mentioned at all. Since institutions have already been presented as deaf to the difficult everyday experiences of those who have an autistic child, the possibility that they are also responsible for autism itself is presented as a particular instance of a more general situation, even for parents "immune to conspiracy theories and paranoid delusions."

In both articles, emotions play a crucial role in what is a clear semiotic *subjectifying strategy*:[14] indeed, the only emerging perspective is that of the two parents. The appeal to strong emotions such as "panic," "anger," "fury," and "hurt" by the two delegate enunciators creates empathy in the readers/enunciatees, and makes the enunciators' subjective points of view the only important thing, while scientific truth becomes practically out of question. Moreover, the two articles seem to empathize with the anti-vaccinists, if not even to support them: as several studies on post-truth have shown, irrational and non-epistemic components, such as moral and social considerations, as well as emotions, play a crucial role in anti-vaccination positions, while issues concerning scientific truth are either presented as equivalent to subjective perspectives or left aside as irrelevant (Leone 2016, 2017; Lorusso 2018; Leone et al. 2020; De Cruz 2020).

Later, *The Guardian* became much more balanced and neutral, preferring an *objectifying strategy* which recalls that of *The Independent*. For example, looking at 2002 alone, the newspaper reported all potential positions in the debate over the MMR vaccine throughout the year, sometimes slipping towards anti-vaccinism ("MMR 'may cause 1 in 10 cases of autism'," June 28, 2002), sometimes siding with vaccinists ("Livingstone accused of MMR vaccine blunder," July 4, 2002), and sometimes ultimately emphasizing the division among researchers ("MMR Vaccine. The combined vaccine for children and its disputed harmful side-effects are continuing to divide medical experts," August 9, 2002).

In short, the overall position of *The Guardian* is quite similar to that of *The Independent*, i.e., balanced but alarming at the same time, since it legitimates multiple and mutually inconsistent truths. Occasionally, it also presents scientific truth as being on the same level as the most emotionally involved positions.

[14] See note 6.

4.4 The Daily Mail

From 1998 to 2004, the most significant articles published by the *Daily Mail* are part of an inquiry by British journalist Melanie Phillips, who in the 1990s had increasingly identified herself with social and political right-wing ideas. Her inquiry was published in three parts on March 11, 12, and 13, 2003, and was undoubtedly oriented, from beginning to end, in favor of those who questioned the safety of the MMR vaccine.

In the last article, "The Truth Revealed," which well exemplifies the whole inquiry, the credibility of health institutions is at stake once again. Phillips starts mentioning some "distortions" from the health authorities, represented, this time, by the British Committee on the Safety of Medicines (CSM). Subsequently, she highlights various contradictions among health authorities. For example, a quotation of the Chief Medical Officer ("Concerns that have been raised relating to autism and Crohn's disease are considered by the CSM and other expert bodies nationally and internationally to have been refuted") is immediately corrected by a pronouncement by CSM: "the Committee on the Safety of Medicines had expressly said it was impossible to refute them." In the rest of the article, institutional research is repeatedly portrayed as untrustworthy.

In Greimas' terms (1970, 1983, 1987), on the one hand, health institutions are presented as *anti-subjects* failing their *performance* stage (and the newspaper emphasizes their failure): indeed, they should conduct research into the safety of the MMR vaccine but fail to do so ("it was impossible to prove or refute…," "there was not sufficient evidence"); on the other, Wakefield is portrayed as the *subject* who tries to reveal the truth about vaccines and, in doing so, succeeds.

In conclusion, not only does the *Daily Mail* explicitly describe health authorities as unreliable, as conspiracy theories always do, but also Wakefield is proposed as the only bearer of scientific truth.

5. From 2004 to 2010

As we know, on February 22, 2004, *The Sunday Times* published the results of a six-month inquiry by reporter Brian Deer on Wakefield's study.[15] The investigation was a sort of

[15] More details on the award-winning investigation by Brian Deer can be found at https://briandeer.com/mmr/lancet-deer-2.htm.

watershed moment, which could have completely changed the approach of all newspapers. As we shall see, this change did not come to fruition.

We have examined articles written from 2004 to 2008 not only on the MMR issue, but on vaccines in general, in order to verify if the overall media discourse on vaccines shifted, in that time frame, from the MMR case to broader considerations on all vaccines. As we shall see, it did. Actually, in the period concerned, we have found three recurring types of articles on vaccines: those on MMR, those on swine flu, and those on the HPV vaccine. The position expressed by each newspaper on the MMR case has been expanded to all vaccines in general.

5.1. The Independent

All the articles published by *The Independent* between 2004 and 2010 confirm our assessment of the 1998 article: the newspaper consistently tries to apply an *objectifying strategy*, which is coherent with its general attempt to be as neutral as possible on every subject.

The first article after the *Sunday Times* investigation ("Lancet backs away from MMR Controversy," February 21, 2004) directly reports the words of Dr. Richard Horton, editor of *The Lancet*:

> If we knew then what we know now, we certainly would not have published the part of the paper that related to MMR, although I do believe there was, and remains, validity to the connection between bowel disease and autism, which does need further investigation, but I believe the MMR element of that is invalid.

Here *The Independent* assumes Horton's point of view, which does not completely discredit Wakefield's study. Over the following years, the newspaper was always consistent in its lack of issuing a single disruptive statement against Wakefield, preferring to remain as neutral as possible.

The same approach characterizes *The Independent*'s position on the HPV vaccine and can be found not only within single articles but also among different articles. Between 2006 and 2007, a campaign to vaccinate girls aged 11 to 13 was launched, but in a short while, doubts about the safety of the HPV vaccine were raised by several parties. Even in this case, the objectifying strategy of *The Independent* created ambiguous interpretation paths, from pro-vaccine opinions such as those expressed in "Vaccine cuts cervical cancer deaths by 75%" (September 4, 2006), to the most skeptical ones, such those in "Is the new cervical vaccine

cancer as good as it's claimed?" (June 12, 2007), up to a pro-vaccinist stance again, such as that emerging from the article "Cervical cancer vaccine to be given to all girls aged 12 and 13" (October 27, 2007).

Similar conclusions can be drawn from the articles on the swine flu pandemic in 2009. In that year, *The Independent* moved from alarmist views such as those of "Swine flu: a health warning" (May 2, 2009) and "'Vaccinate families against swine flu first'" (August 20, 2009), to open criticism aimed at health institutions for being too alarmist, when, at the end of 2009, the swine pandemic turned out to be less serious than expected ("Swine Flu: The pandemic that never quite arrived," December 23, 2009). This fluctuation produced, on the one hand, the same mistrust in health institution we have illustrated above and, on the other, the overall idea that numerous scientific truths on the same topic may coexist.

5.2. The Telegraph

The Telegraph also applied an objectifying strategy, but it used it to express more explicit views. Indeed, what emerges from the 2004-2009 articles is a sort of 'silent' stance against vaccines.

The first article published after the *Sunday Times* inquiry, "Doctors demand apology for MMR claims in Lancet" (February 29, 2004), is a good example. The stance taken on the news is the same as that presented by *The Independent*: the editor of *The Lancet* speaks out against Wakefield, saying that he would never have published the study if he had been aware of the author's conflict of interest. However, similarly to what has been illustrated in §4.2, *The Telegraph* also gives ample room to Wakefield, who this time speaks through the voice of his lawyers. But contrary to what *The Independent* did, in this article, *The Lancet*'s voice is not the more important one, since lawyers neutralize the journal's criticism with the following words:

> The plain implication of the statements you have made is that our client, for nearly six years, withheld not only from *The Lancet* but also his colleagues the fact that he had also been engaged by the Legal Aid Board to conduct research. This, as you know, is not true. There was no secret and our client made no secret of his work for the Legal Aid Board.

As for other vaccines, over the years, *The Telegraph* consistently expressed the isotopy of «mistrust». Clear examples of this choice are found in "Secret report reveals 18 child deaths following vaccinations" (February 13, 2006), which mentions a presumed secret government report, in which some children were suspected to have died as a consequence of vaccine side

effects, and in the article "Chickenpox vaccine is bad for children" (November 9, 2007), written by Dr. Richard Halvorsen, who is still known today for being in favor of "freedom of choice" when it comes to vaccination.[16]

An even stronger stance against the HPV vaccine has been constantly taken by *The Telegraph* over the years examined, as is clear from articles such as "Schoolgirl, 12, paralyzed after receiving cervical cancer jab" (December 14, 2008), and "14-year-old dies after being given cervical cancer jab" (September 28, 2009), whose terror-inducing titles are self-evident. The sensationalism of the two titles is only in appearance mitigated by the following "Cervical cancer vaccine 'most unlikely' to have caused death of girl" (September 29, 2009), since this article only serves to reiterate mistrust in health authorities.

Finally, as for the swine flu, the value system proposed by *The Telegraph* is always the same, as can be deduced from the article "Who should get the swine flu vaccine?" (July 29, 2009): on the one hand, there are health authorities putting people's lives at risk with the vaccine, and expressing «falsehood» (the evil against which to fight), on the other, there are anti-vaccinist doctors, healthcare workers, and ordinary people, questioning the safety of the vaccine and expressing «the truth» (to be pursued as a positive value).

5.3. The Guardian

The initial reaction of *The Guardian* to the *Sunday Times* investigation was similar to that of *The Independent*, though more explicitly ambiguous and even contradictory.

Indeed, the question of the title "Was the original MMR unethical?" (February 26, 2004) receives a direct answer: "Not entirely." Then, the newspaper highlights that "*The Lancet* […] does not regret publishing the core findings," and goes on to report that its editor, Dr. Richard Horton, has founded, with other editors, a committee in order to help scientific journal editors in cases of fraud, deceit and incompetence. Several months later, similar ambiguity characterizes the article "MMR parents win legal victory" (December 26, 2004), which reports that the Legal Services Commission (LSC) has decided to grant legal aid to some families who are attempting to sue MMR vaccine manufacturers.

Some years later, this ambiguity came to an explicit contradiction. On the one hand, we have "The media's MMR shame" (June 16, 2006), affirming that, since England is experiencing its biggest measles outbreak in 20 years, journalists "should be hanging their heads in shame." On the other hand, the article "I told the truth all along, says doctor at heart of autism row"

[16] For more information: http://www.drhalvorsen.co.uk/?LMCL=nu0q9m.

(July 8, 2007) gives ample space to Wakefield, who speaks in the first person in a long report of the only interview he has conceded to *The Observer*.

Over the years, analogous incongruities are found throughout the entire editorial stance of *The Guardian* on other vaccines. On the HPV vaccine, for example, "Schoolgirl dies after cervical cancer vaccination" (September 29, 2009) was immediately corrected a few days later by announcing that the "Girl who died after cervical cancer injection had tumour in her chest" (October 1, 2009). Finally, as for the swine flu vaccine, the article "Swine flu vaccine supplier has to pay back millions" (October 11, 2009) associates pharmaceutical industries to the semantic feature of «fraud» which is typical of anti-vaccination movements, while "Swine flu mass vaccination programme launched" (October 21, 2009), evidently in favor of the vaccine campaign, does not neglect to remember that anti-vaccinists are also inside health institutions: "NHS staff have traditionally been reluctant to participate in mass immunisations. Only around 20% normally receive the seasonal flu vaccination."

In conclusion, doubts about vaccine safety are clearly and repeatedly conveyed by *The Guardian*.

5.4. The Daily Mail

The most important *Daily Mail* article after the *Sunday Times* inquiry is "Who is right about MMR?" (March 11, 2004). Its uniqueness deserves special attention.

The article is divided into two parts: in the first, *Daily Mail* political journalist Quentin Letts tells the story of his six-year-old son Claud, who had been diagnosed with a mild form of autism after having the MMR vaccine; in the second, Laurie Laird, a mother who has launched a pro-vaccine campaign after her seventeen-month-old daughter caught measles, tells her story.

Both parents speak in the first person about the anxiety, fear, and distress they experienced when their children were sick. Both stories are emotionally charged and engaging, thanks to a strong *subjectifying strategy*: "We adore Claud. Before MMR, he was starting to speak. […] After MMR, […] it was as though someone had pressed the mute button", the journalist says, while the mother: "I'm terrified now that my new baby, Angharad, will catch measles." The result is that two opposite truths—and opposite value systems—are put on the same level, as two conflicting and equally-strong stances: that of those connecting the MMR vaccine to the risk of autism and that of those preferring to run that risk in order to avoid the severity of the measles.

Apart from this unique case, the other *Daily Mail* articles on Wakefield consistently take his side, such as "Dr. Wakefield was shamefully discredited" (April 28, 2004), "MMR safe?

Baloney. This is one scandal that's getting worse" (October 31, 2005), "Scientists fear MMR link to autism" (May 28, 2006), and "We won't allow MMR cover-up say parents of tragic toddlers" (June 18, 2006), whose titles are all self-evident.

As for other vaccines, in the article "Are vaccines a waste of time?" (June 20, 2007), Dr. Richard Halvorsen appears again (§4.2), since *The Daily Mail* extracts a long significant passage from his just-published book (Halvorsen 2007), where he takes a stand against the government's vaccination program and synthetizes the issue in a question: "The Government's defense of the MMR vaccine—that no clear link had been proven between the MMR and autism—turned out to be extremely misleading." Here again, the value system is explicit: institutions are the anti-subjects who hide the truth, while Halvorsen is the hero who informs parents honestly and transparently.

In the years examined, the *Daily Mail* mainly focuses on HPV, while it almost ignores the discussion about swine flu. On this topic, it is always overtly alarming, from the article "Alert over jab for girls as two die following cervical cancer vaccination" (January 25, 2008), to "Concerns over safety of cervical cancer vaccine after 1,300 girls experience adverse side-effects" (March 9, 2009), up to "NHS Trust suspends cervical cancer vaccinations after girl, 14, dies within hours of jab" (October 2, 2009). Once again, semantic oppositions and the whole value system are self-evident in the titles themselves.

6. Conclusions

As many studies on science denialism have emphasized, conspiracy theories have always characterized anti-vaccination movements, together with other features such as appeals to fake experts and/or to isolated, highly-selected and often discredited sources (Diethelm and McKee 2009; Cassam 2019; De Cruz 2020; Ferrari and Moruzzi 2020, 2021). From a semiotic perspective, anti-vaccine *conspiracy theories* are characterized, as we have seen, by the isotopy of «distrust in health institutions» and by stories in which anti-vaccinists are the heroes and health authorities the enemies to be fought.

What has emerged from our analysis is that, between 1998 and 2010, conspiracy theories have been so pervasive, reiterated and all-encompassing with respect to various ideologies, political positions and subjective points of view that for twelve years they have characterized even the most neutral and scientifically accurate newspapers. In other words, they have clearly become the prevailing *frame*, both in the *semantic* sense of Eco (1976, 1984, 1986) and in the wider *cognitive* perspective of Lakoff (1987, 1996, 2004). As a result, for years, even the most accredited media have offered epistemic validation to conspiracy groups (Richter 2011).

The durability and pervasiveness of the conspiracy frame not only accounts for its survival to the present day, but may also help us interpret some recent denialist tendencies surrounding Covid-19. The current lack of scientific evidence on how to prevent Covid-19 contagion and treat its patients, the uncertainty of the World Health Organization, the incredible diversity of opinions even among the most accredited scientists, their frequent appearances in the media along with journalists, actors and other celebrities, the subsequent continuous confusion between scientific, pseudoscientific and journalistic discourses are all elements that closely resemble—in a disturbing way—what happened among the coverage of the MMR vaccine between 1998 and 2010.

References

Agostini, A. 2004. *Giornalismi*. Bologna: Il Mulino.

Bentivegna, S. 2020. Public Opinion. In *The Palgrave Encyclopedia of Interest Groups, Lobbying and Public Affairs*, edited by Ph. Harris, A. Bitonti, C.S. Fleisher and A. Skorkjær Binderkrantz: https://link.springer.com/referencework/10.1007/978-3-030-13895-0#bibliographic-info.

Black. C. et al. 2002. Relation of Childhood Gastrointestinal Disorders to Autism: Nested Case-control Study using Data from the UK General Practice Research Database. In *British Medical Journal* 325 (7361): 419–21.

Bouissac, P. 1998. *The Encyclopedia of Semiotics*, Oxford: Oxford University Press.

Boyd, K. 2019. Epistemically Pernicious Groups and the Groupstrapping Problem. In *Social Epistemology* 33 (1): 61–73.

Cassam, Q. 2019. *Conspiracy Theories*, Cambridge: Polity Press.

Dales, L. et al. 2001. Time Trends in Autism and in MMR Immunization Coverage in California. In *Journal of the American Medical Association* 285: 1183–5.

De Cruz, H. 2020. Believing to Belong: Addressing the Novice-Expert Problem in Polarized Scientific Communication. In *Social Epistemology* 34 (5): 440–52.

Deer, B. 2004. Revealed. MMR Research Scandal. In *The Sunday Times*, February 22, 2004. https://www.thetimes.co.uk/article/revealed-mmr-research-scandal-7ncfntn8mjq.

Eco, U. 1976. *A Theory of Semiotics*. Bloomington: Indiana University Press.
———. 1984. *The Role of the Reader*. Bloomington: Indiana University Press.
———. 1986. *Semiotics and the Philosophy of Language*. Bloomington: Indiana University Press.
———. 2001. On the Press. In *Five Moral Pieces*. New York: Harcourt, Inc.: 31–64.
Fabbri, P. and G. Marrone eds. 2001. *Semiotica in nuce. Volume II*, Rome: Meltemi.

Goldman, A. 1999. *Knowledge in a Social World*. New York: Oxford University Press.
———. 2008. The Social Epistemology of Blogging. In *Information Technology and Moral Philosophy*, edited by J. van den Hoven and J. Weckert, pp. 111–122. New York: Cambridge University Press.

Glynn, C.J. and M.E Huge. 2008. Public Opinion. In *The International Encyclopedia of Communication*. Chichester: John Wiley & Sons.

Greimas, A.J. 1966. *Sémantique structurale*. Paris: Larousse (Eng. trans. *Structural Semantics*. Lincoln: University of Nebraska Press. 1983).
———. 1970. *Du sens*. Paris: Seuil.
———. 1983. *Du sens 2: essais sémiotiques*. Paris: Seuil.
———. 1987. *On Meaning*. Minneapolis: University of Minnesota Press.
Greimas A.J. and J. Courtés. 1979. *Sémiotique. Dictionnaire raisonné de la théorie du langage*. Paris: Hachette (Eng. trans. *Semiotics and Language: An Analytical Dictionary*. Bloomington: Indiana University Press. 1982).

Ferrari, F. and S. Moruzzi. 2020. *Verità e post-verità*. Bologna: Bononia University Press.
———. 2021. Enquiry and Normative Deviance. The Role of Fake News in Science Denialism. In *The Epistemology of Fake News*, edited by S. Bernecker, A.K. Flowerree and T. Grundmann, Oxford: Oxford University Press (forthcoming).

Habermas, J. 1989. *The Structural Transformation of the Public Sphere*. Cambridge, MA: MIT Press.
Halvorsen, R. 2007. *The Truth about Vaccines*. London: Gibson Square Books.

Hampton, M. 2008. The "Objectivity" Ideal and its Limitations in 20th Century British Journalism. In *Journalism Studies* 9 (4): 477–93.

Lakoff, G. 1987. *Women, Fire, and Dangerous Things*. Chicago: University of Chicago Press.
———. 1996. *Moral Politics*. Chicago: University of Chicago Press.
———. 2004. *Don't Think of an Elephant!* White River Junction: Chelsea Green.

Leone, M. ed. 2016 *Complotto. Lexia*. 23–24. Rome: Aracne.

Leone, M. 2017. Fundamentalism, Anomie, Conspiracy: Umberto Eco's Semiotics Against Interpretive Irrationality. In *Umberto Eco in His Own Words*, edited by T. Thellefsen and B. Sørensen, pp. 221–229. Berlin: De Gruyter.

Leone, M. et al. 2020. Semiotic Approaches to Conspiracy Theories. In *The Routledge Handbook of Conspiracy Studies*, edited by M. Butter and P. Knight, pp. 43–55. London: Routledge.

Lippmann, W. 1925. *The Phantom Public*. New York: Harcourt Brace.

Lorusso, A.M. and P. Violi. 2004. *Semiotica del testo giornalistico*. Rome–Bari: Laterza.

Lorusso, A.M. 2018. *Post-verità*. Rome–Bari: Laterza.

Madsen, K.L. et al. 2002. A Population-Based Study of Measles, Mumps, and Rubella Vaccination and Autism. In *The New England Journal of Medicine*, 347: 1477-82. https://www.nejm.org/doi/full/10.1056/NEJMoa021134.

Manetti, G. 2008. *L'enunciazione. Dalla svolta comunicativa ai nuovi media*. Milan: Mondadori Università.

Marmo, C. 2015. *Segni, linguaggi e testi. Semiotica per la comunicazione*. Bologna: Bononia University Press.

Millar, B. 2019. The Information Environment and Blameworthy Beliefs. In *Social Epistemology* 33 (6): 525–37.

Munn, N.J. 2012. The New Political Blogosphere. In *Social Epistemology* 26 (1): 55–70.
Murch, SH. et al. 2004. Retraction of an Interpretation. In *The Lancet* 363: 750.

McCombs, M. and D.L. Shaw. 1972. The Agenda-setting Function of the Mass Media. In *Public Opinion Quarterly* 36: 176–87.

Noelle-Neuman, E. 1993. *The Spiral of Silence*. Chicago: Chicago University Press.

Pozzato, M.P. 2013. *Capire la semiotica*, Rome: Carocci.

Ramón Muñoz-Torres, J. 2012. Truth and Objectivity in Journalism. In *Journalism Studies* 13 (4): 566–582.

Richter, T. 2011. Cognitive Flexibility and Epistemic Validation in Learning from Multiple Texts. In *Links Between Beliefs and Cognitive Flexibility*: *Lessons Learned*, edited by G. Clarebout, J. Elen and E. Stahl, pp. 125–140, Dordrecht: Springer.

Taylor, B. et al. 1999. Autism and Measles, Mumps, and Rubella Vaccine: No Epidemiologic Evidence for a Causal Association. In *The Lancet* 353: 2026–9.

Tuchman, G. 1972. Objectivity as Strategic Ritual: An Examination of Newsmen's Notions of Objectivity. In *The American Journal of Sociology* 77: 660–79.
———. *Making News*. New York: The Free Press.

Volli, U. 2000. *Manuale di semiotica*, Rome–Bari: Laterza.

Wakefield, A.J. et al. 1998. RETRACTED: Ileal-lymphoid-nodular Hyperplasia, Non-specific Colitis, and Pervasive Developmental Disorder in Children. In *The Lancet* 351 (9103): 637–41.

Watson, L. 2018. Systematic Epistemic Rights Violations in the Media: A Brexit Case Study. In *Social Epistemology* 32 (2): 88–102.

Wolf, M. 1985. *Teorie della comunicazione di massa*. Milan: Bompiani.

Appendix

The Independent

1. February 27, 1998: https://www.independent.co.uk/news/doctors-link-autism-to-mmr-vaccination-1147081.html
2. January 25, 2001: https://www.independent.co.uk/life-style/health-and-families/health-news/if-mmr-doesnt-cause-autism-then-what-on-earth-does-704224.html
3. February 8, 2002: https://www.independent.co.uk/life-style/health-and-families/health-news/mmr-vaccine-abandoned-japan-rise-disease-has-killed-85-9182966.html
4. November 2, 2003: https://www.independent.co.uk/life-style/health-and-families/health-news/focus-the-truth-about-mmr-76226.html
5. February 21, 2004: https://www.independent.co.uk/life-style/health-and-families/health-news/lancet-backs-away-from-mmr-controversy-70367.html
6. September 20, 2004: https://www.independent.co.uk/life-style/health-and-families/health-news/health-check-how-was-the-mmr-scare-sustained-for-so-long-when-the-evidence-showed-that-it-was-33294.html
7. March 3, 2005: https://www.independent.co.uk/life-style/health-and-families/health-news/study-finds-mmr-jabs-not-linked-to-cases-of-autism-527041.html
8. June 12, 2006: https://www.independent.co.uk/voices/editorials/leading-article-a-risky-move-that-may-revive-parents-fears-6098421.html
9. September 4, 2006: https://www.independent.co.uk/life-style/health-and-families/health-news/vaccine-cuts-cervical-cancer-deaths-by-75-per-cent-5330427.html
10. June 12, 2007: https://www.independent.co.uk/life-style/health-and-families/health-news/is-the-new-cervical-cancer-vaccine-as-good-as-its-claimed-5333422.html
11. August 31, 2007: https://www.independent.co.uk/life-style/health-and-families/health-news/parents-urged-to-vaccinate-their-children-as-measles-returns-463676.html
12. October 27, 2007: https://www.independent.co.uk/life-style/health-and-families/health-news/cervical-cancer-vaccine-to-be-given-to-all-girls-aged-12-and-13-5328837.html
13. March 27, 2008: https://www.independent.co.uk/life-style/health-and-families/health-news/mmr-moment-of-truth-for-man-behind-the-scare-801222.html
14. April 12, 2008: https://www.independent.co.uk/life-style/health-and-families/health-news/mmr-doctor-admits-he-was-unaware-of-child-ethics-rules-808254.html
15. May 2, 2009: https://www.independent.co.uk/news/uk/home-news/swine-flu-a-health-warning-1677640.html
16. August 20, 2009: https://www.independent.co.uk/news/uk/home-news/vaccinate-families-against-swine-flu-first-1775013.html
17. September 29, 2009: https://www.independent.co.uk/life-style/health-and-families/health-news/teenage-girl-dies-after-cervical-cancer-jab-1794771.html
18. September 30, 2009: https://www.independent.co.uk/extras/big-question/the-big-question-is-the-cervical-cancer-vaccine-safe-and-should-girls-stop-taking-it-5498879.html
19. December 23, 2009: https://www.independent.co.uk/life-style/health-and-families/features/review-of-the-year-2009-swine-flu-1847990.html
20. March 25, 2010: https://www.independent.co.uk/life-style/health-and-families/health-news/doctor-who-linked-mmr-jab-to-autism-is-struck-off-1981943.html

The Telegraph

1. January 21, 2001: https://www.telegraph.co.uk/news/uknews/1318772/MMR-doctor-links-170-cases-of-autism-to-vaccine.html
2. February 22, 2001: https://www.telegraph.co.uk/news/uknews/1323647/MMR-causes-bleeding-disorder.html
3. February 6, 2002: https://www.telegraph.co.uk/news/1383938/Why-should-children-have-MMR-vaccine.html
4. October 6, 2002: https://www.telegraph.co.uk/news/uknews/1409278/Measles-virus-is-found-in-boys-brain-after-MMR.html
5. August 1, 2003: https://www.telegraph.co.uk/comment/letters/3594520/Family-matters.html

6. October 31, 2003: https://www.telegraph.co.uk/news/uknews/1445548/MMR-scare-scientist-warns-of-impending-measles-epidemic.html
7. February, 2004: https://www.telegraph.co.uk/news/uknews/1455603/Doctor-demands-apology-for-MMR-claims-in-Lancet.html
8. June 5, 2004: https://www.telegraph.co.uk/comment/personal-view/3606826/I-didnt-want-the-MMR-and-now-my-baby-has-measles.html
9. August 7, 2004: https://www.telegraph.co.uk/news/uknews/1468838/Mercury-free-vaccines-for-babies-welcomed.html
10. December 23, 2004: https://www.telegraph.co.uk/news/uknews/1479642/Doctor-jailed-for-faking-MMR-blood-test-results.html
11. March 9, 2005: https://www.telegraph.co.uk/news/uknews/3315651/MMR-is-not-linked-to-autism-say-Japanese.html
12. February 13, 2006: https://www.telegraph.co.uk/news/uknews/3336455/Secret-report-reveals-18-child-deaths-following-vaccinations.html
13. November 9, 2007: https://www.telegraph.co.uk/comment/3643888/Chickenpox-vaccine-is-bad-for-children.html
14. December 14, 2008: https://www.telegraph.co.uk/news/health/news/3758983/Schoolgirl-12-paralysed-after-receiving-cervical-cancer-jab.html
15. July 29, 2009: https://www.telegraph.co.uk/comment/personal-view/5934247/Who-should-get-the-swine-flu-vaccine.html
16. September 28, 2009: https://www.telegraph.co.uk/news/health/news/6236699/14-year-old-dies-after-being-given-cervical-cancer-jab.html
17. September 29, 2009: https://www.telegraph.co.uk/news/health/news/6244806/Cervical-cancer-vaccine-most-unlikely-to-have-caused-death-of-girl.html
18. January 29, 2010: https://www.telegraph.co.uk/news/health/news/7091767/Andrew-Wakefield-the-man-behind-the-MMR-controversy.html
19. August 30, 2010: https://www.telegraph.co.uk/news/health/news/7970315/Man-disabled-by-MMR-vaccine-awarded-90000-after-13-year-fight.html
20. May 25, 2010: https://www.telegraph.co.uk/news/health/news/7761015/Dr-Andrew-Wakefield-vows-to-appeal-decision-to-strike-him-off-medical-register.html

The Guardian

1. March 28, 2000: https://www.theguardian.com/lifeandstyle/2000/mar/28/healthandwellbeing.health4
2. January 12, 2001: https://www.theguardian.com/uk/2001/jan/12/2
3. February 7, 2002: https://www.theguardian.com/uk/2002/feb/07/society.health
4. February 10, 2002: https://www.theguardian.com/society/2002/feb/10/publichealth5#_=_
5. June 28, 2002: https://www.theguardian.com/society/2002/jun/28/research.medicalscience1
6. July 4, 2002: https://www.theguardian.com/politics/2002/jul/04/uk.nhs1
7. August 9, 2002: https://www.theguardian.com/world/2002/aug/09/qanda.health
8. November 1, 2003: https://www.theguardian.com/society/2003/nov/01/highereducation.medicineandhealth
9. December 11, 2003: https://www.theguardian.com/education/2003/dec/11/science.highereducation
10. February 26, 2004: https://www.theguardian.com/science/2004/feb/26/thisweekssciencequestions1
11. December 26, 2004: https://www.theguardian.com/uk/2004/dec/26/health.politics
12. June 16, 2006: https://www.theguardian.com/commentisfree/2006/jun/16/whenjournalismkills
13. July 8, 2007: https://www.theguardian.com/society/2007/jul/08/health.medicineandhealth1
14. March 27, 2008: https://www.theguardian.com/uk/2008/mar/27/health.healthandwellbeing

15. December 2, 2008: https://www.theguardian.com/society/2008/dec/02/health-children
16. October 11, 2009: https://www.theguardian.com/world/2009/oct/11/swine-flu-vaccine-baxter
17. October 21, 2009: https://www.theguardian.com/world/2009/oct/21/swine-flu-mass-vaccination
18. September 29, 2009: https://www.theguardian.com/uk/2009/sep/28/hpv-cervical-cancer-vaccine-death
19. October 1, 2009: https://www.theguardian.com/society/2009/oct/01/cervical-cancer-vaccination-tumour-natalie-morton
20. May 24, 2010: https://www.theguardian.com/society/2010/may/24/mmr-doctor-andrew-wakefield-struck-off

The Daily Mail

1. December 5, 2000: https://www.dailymail.co.uk/health/article-5511/Would-MMR-vaccine.html
2. January 24, 2001: https://www.dailymail.co.uk/health/article-17509/Why-Japan-banned-MMR-vaccine.html
3. December 20, 2001: https://www.dailymail.co.uk/health/article-90643/The-real-scandal-MMR-debate.html
4. June 12, 2002: https://www.dailymail.co.uk/health/article-123482/New-MMR-link-autism.html
5. March 11, 2003: https://www.dailymail.co.uk/columnists/article-229997/MMR-THE-TRUTH.html
6. March 12, 2003: https://www.dailymail.co.uk/columnists/article-229996/This-baby-suffered-brain-damage-epilepsy-MMR-jab-So-did-doctors-ignore-warnings-unsafe-mmr-THE-TRUTH.html
7. March 13, 2003: https://www.dailymail.co.uk/health/article-171346/MMR--truth-revealed.html
8. March 11, 2004: https://www.dailymail.co.uk/columnists/article-211412/Who-IS-right-MMR.html
9. April 28, 2004: https://www.dailymail.co.uk/columnists/article-259519/Dr-Wakefield-shamefully-discredited.html
10. June 7, 2004: https://www.dailymail.co.uk/health/article-305671/Doctor-sacked-giving-baby-wrong-vaccine.html
11. October 31, 2005: https://www.dailymail.co.uk/columnists/article-367132/MMR-safe-Baloney-This-scandal-thats-getting-worse.html
12. June 18, 2006: https://www.dailymail.co.uk/news/article-391163/We-wont-allow-MMR-cover-say-parents-tragic-toddlers.html
13. May 28, 2006: https://www.dailymail.co.uk/news/article-388051/Scientists-fear-MMR-link-autism.html
14. July 20, 2007: https://www.dailymail.co.uk/health/article-468890/Are-vaccines-waste-time.html
15. October 2, 2007: https://www.dailymail.co.uk/health/article-485173/Are-flu-jabs-waste-time.html
16. January 25, 2008: https://www.dailymail.co.uk/health/article-510221/Alert-jab-girls-die-following-cervical-cancer-vaccination.html
17. March 9, 2009: https://www.dailymail.co.uk/health/article-1160516/Paralysis-epilepsy-blurred-vision-1-300-girls-reaction-cervical-cancer-vaccine.html
18. October 2, 2009: https://www.dailymail.co.uk/news/article-1216714/Schoolgirl-14-dies-given-cervical-cancer-jab.html
19. January 30, 2010: https://www.dailymail.co.uk/news/article-1246775/Doctor-centre-MMR-row-Andrew-Wakefield-faces-struck-GMC-ruling.html

20. May 25, 2010: https://www.dailymail.co.uk/news/article-1280840/Andrew-Wakefield-Doctor-heart-MMR-vaccine-row-struck-off.html
21. August 28th 2010: https://www.dailymail.co.uk/news/article-1307095/Family-win-18-year-fight-MMR-damage-son--90-000-payout-concerns-vaccine-surfaced.html