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Fukushima and its treatment in the press

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Abstract

The purpose of this paper is to understand the treatment of complex environmental issues by the press, both general and special interest publications, to determine how different types of press fulfil their mediator role to inform the public. The adopted approach is qualitative and based on discourse analysis in a short corpus, composed of papers published in four publications from the USA and dealing with the immediate coverage of the Fukushima disaster. The analysis of the corpus evidences that the treatment of specialised information is remarkably similar in both types of press. The discourse conveys little specialised knowledge, popularisation is generally absent and explanations are meaningful in the context of the paper only. This paper's main value resides in the discourse analysis approach adopted to understand the issue of specialisation and popularisation in the press, combined to an understanding of the professional environment of journalists in the USA.

Key words: press, popularisation, terms, definition, reported speech, discourse

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Biographical notes: Caroline Peynaud is an Assistant Professor at Grenoble Alpes University. She teaches economic English in the Department of Applied Modern Languages. Her research focuses on the discourse of the US press as a specialised variety of English.

Introduction

The environment is a complex domain involving fields such as physics, chemistry, biology, health, geography, economics and social issues (Biros, 2011: 59). Due to that complexity, it is especially difficult to grasp for the general public, which makes the issue of the access to environmental information essential. The main access non specialists have to such scientific issues is through the press, be it the special interest press or the general interest press. The special interest press has been defined as a type of press dealing with specialised topics but addressed to non specialist readers (Laffont and Petit, 2007 : 4).

The press is generally thought-of as having a mediation role, that is to say conveying specialised information to a non specialised audience (Moirand, 2004: 84; Merhy, 2010: 30; Charaudeau, 2005: 48), although this claim is qualified in a further section. On such a technical and complex event as the Fukushima disaster, it is particularly important to clarify the specialised information for the readers. However, the audience and editorial line of the general interest and special interest press are highly different. Therefore, it is likely that they do not take up the role of mediator in the same way. The purpose of this study is to understand how these different types of press, with different degrees of specialisation, treat specialised information to convey it to a non specialised audience.

In order to understand this issue, a small-scale study has been conducted on how the Fukushima disaster was handled by four publications: two general interest newspapers, the *New York Times* and the *Washington Post*, and two online publications specialised in environmental issues, *Inside Climate News* and *the Environmental Magazine*. To that aim, the study focuses on the technical terms used in the corpus and on the way in which those terms are explained to the readers in the articles.

1. Methods

1.1. Context: the press as a mediator

Journalists writing about science are generally considered as intermediaries whose role is to convey specialised knowledge produced by expert communities to the general public (Moirand, 2004: 4, Beacco, 1999: 143). Specialised knowledge is knowledge produced in a specialised domain, defined as a social group united by a common activity and purpose (Petit, 2005: 141). The social group thus produces a specialised variety of English, reflecting the culture, the work and the needs of the discipline or occupation it stems from (Resche, 2013:14).

The specialised variety of English may be complex to grasp for a lay audience, as it is the case for an event such as the Fukushima disaster, which involves scientific and technical knowledge. In this case, the media should provide explanations to enable better understanding for lay readers: this is what is generally understood as their mediation role (Merhy, 2010: 30; Charaudeau, 2005: 48). Mediation may have various purposes, one of them being popularisation, defined as the process of conveying technical knowledge to make it accessible to non specialists (Beacco & Moirand, 1995: 33 ; Charaudeau & Maingueneau, 2002: 604). However, the press's role as a populariser has often been questioned (Moirand, 2004: 21; Peynaud, 2013: 350) since journalists tend to focus on the social impacts of technical events rather than on their technical aspects as such.

The role of journalists as mediators is uneasy to define and understanding it implies taking into account some elements of press culture. The main difficulty lies in the positioning of journalists towards their readership, especially since the readership of newspapers having a wide circulation such as the *New York Times* or the *Washington Post* is very diverse. By definition, to be economically sustainable, these newspapers should address a public as wide as possible and, even though socio-professional data makes it possible to draw a portrait of

typical readers, it is virtually impossible to determine what their disciplinary or professional specialisations may be. Thus journalists should ideally try to find balance between explaining notions very simply for non specialists and giving specialists accurate new elements they may be interested in.

The issue is raised in a different way for the special interest press, which deals with issues related to a specific field of interest, like history, movies or cars. In this case, it may be assumed that readers have a previous interest in the topic. The mediation process in this type of press thus consists in adding knowledge to a previous interest. The positioning is clearer in this case. As a consequence, the discourse is likely to be more technical, to fit the audience's interests. This assumption is however questioned in the following sections.

Further to the readers, the second issue related to mediation in the press is that of the authors and their status. Indeed, journalists consider themselves as transparent intermediaries who should convey specialist knowledge without modifying it (Peynaud, 2013: 332). However, immediate transmission is merely an ideal since there is always rephrasing, if only to insert specialist knowledge within the highly regulated format of a press article. It is thus essential to understand who the authors are and what their relationship to the specialised domain is.

In the corpus that has been collected^[1], especially in *The Environmental Magazine*, the identities of the authors are not always disclosed. The names and specialisations of the authors whose names are mentioned have been collected in the following table:

Article	Name of the author	Specialisation
EM4	Lindsey Bloomberg	Science student
EM6	Roddy Sheer	Journalist specialised in environmental issues
ICN2	Alistair Doyle	Journalist specialised in environmental issues
ICN3	Leonora Waler	Journalist specialised in environmental issues
NYT1	Matthew Wald	Journalist specialised in environmental issues
EM6	Doug Moss	Journalist specialised in environmental issues
WP1	Steven Mufson	Journalist specialised in environmental issues
NYT2	William J. Broad	Journalist specialised in science
WP3	Brian Vastag	Journalist specialised in science
ICN1	Kevin Krolicki	Asia correspondent
NYT4	Hiroko Tabuchi	Asia correspondent
WP1	Chico Harlan	Asia correspondent
NYT5	David E. Sanger	International politics
NYT3	Anahad O'Connor	Psychologist, well-being and weight loss
WP3	Rick Maese	Sports
WP4	Susan Kinzie	Commonwealth

Table 1. List of journalists and their specialisations

It appears that specialisations are varied and to understand this issue even further, the biographies of the authors were analysed when they were available. It appears that journalists specialised in science may have to report on all sorts of topics, as the biography of William J. Broad explains:

writes about everything from exploding stars and the secret life of marine mammals to the spread of nuclear arms and the inside story on why the Titanic sank so rapidly.

(William J. Broad. *New York Times*.)

On the opposite, journalists specialised in environmental issues only write about environment, but not only from a scientific point of view since they may handle economic or international issues and may thus have their pieces published in various sections other than Science.

However, even journalists who display their specialisation in science may have a complex positioning regarding specialisation. For example, William J. Broad graduated in science history (*ibid.*), which gives him previous knowledge of the field, but does not make him a scientist. Another journalist, Matthew Wald, graduated in urban design and holds a professional certificate in automobile mechanics. Thus he has no previous specialisation, although he has certainly acquired a lot of experience throughout his thirty years of environmental reporting.

Finally, the journalists specialised in Asian issues may tackle all types of events occurring in the region such as the economy, politics, fashion or culture. Some may have more specific beats, but none of the journalists in the corpus are specialised in environmental issues in Asia.

Overall, although some authors have specialisations in science, they are journalists first, before being characterised by any other type of specialisation, and it is questionable whether they can produce a specialised discourse in environmental issues, as a specialised discourse is supposed to be produced by specialists of the field (Sager *et al.*, 1980: 21). However, it may be assumed that, since their role is to convey specialised knowledge from specialists to the general public, some specialisation may appear in the articles. The main purpose of this study is to analyse that transmission process, be it for newspapers addressing the general public or for magazines addressing a more informed audience.

1.2. Theoretical and analytical framework

The study was carried out in the framework of terminology and discourse analysis. Discourse is defined as the use of language in context (Charaudeau & Maingueneau, 2002: 185) while discourse analysis is referred to as a diverse field of study analysing discourse as a device linking textual organization to a specific context (Maingueneau, 1997: 13), which may encompass a variety of methods to approach discourse.

Terminology may seem antagonistic to discourse analysis as it has been defined as the study of terms as units of specialised meaning belonging to a network of terms in a specific domain, studied out of textual context (Resche, 2013: 25). However, terms may also be analysed in context, as Resche advocates:

From a linguistic point of view, terms can be studied in combination with other items in the context of phraseology; they can also be analysed from the angle of syntax especially when diverging uses are observed between general and specialised discourse.

(*ibid.*: 37)

To understand how the press treats specialised information, terms will be studied quantitatively to determine which terms are chosen by which type of press and in what context they are used.

The use of terms in the press moreover raises the issue of *déterminologisation*, defined as “the semantic stretching that occurs when a term draws the attention of the public” (Meyer & Mackintosh, 2000: 1999). As a term becomes increasingly common in the public sphere, not only does the public become aware of its meaning, but the meaning is also slightly modified to become accessible to the greater number. To find out how likely a term is to be *déterminologised*, GoogleNews has been used as a basis for comparison, since frequency in the press is a sign for *déterminologisation* (*ibid.*). The frequency of these terms in the corpus then makes it possible to understand whether journalists preferably use *déterminologised* terms in their articles. This analysis is based on the fact that journalists generally read other media and are influenced by them in their writing. As Charron and de Bonville (2002: 32) explain, journalists “spend a large part of their time getting informed about what other journalists say, show or write, in order precisely to determine the content of their own production”, which makes writing press articles a fundamentally intertextual activity. Journalists are thus aware that some terms are more frequent than others in the news.

In the end, with a view to showing to what extent terms are explained by journalists, the textual context of the terms has been studied qualitatively to understand whether terms are explained or defined and which terms are. Quotes are examined in this context, since many definitions and explanations appear in reported speech.

1.3. Corpus collection and analysis

The first two publications from which the corpus was selected are the *New York Times* and the *Washington Post*. They are two high-circulation general interest newspapers in the United States. The *New York Times* is also published abroad via *The International New York Times*, but only the American national edition has been taken into account here so that all four publications belong to the geographic area of the United States. Both publications are very prestigious nationally and throughout the world, with a reputation of reliability and quality, although they have not been spared from scandals in the recent past. For instance, in 2003, a journalist from the *New York Times*, Jayson Blair, had to resign following accusations of plagiarism. However, they remain references as regards international news such as the Fukushima events, as representatives of what Padioleau (1985: 174) called “prestige journalism”, a type of journalism that has acquired a good reputation thanks to its thorough treatment of international news.

The special interest publications selected for this paper are also published in the United States. Both online magazines are specialised in environmental issues, although they adopt different angles on the issue. *The Environmental Magazine* is committed to environment and asserts its commitment in the description of its missions:

Since its inception, the magazine’s mission has remained the same: to provide information about environmental issues and to share ideas and resources so that readers can live more sustainable lives and connect with ongoing efforts for change.

(About. *E-magazine.*)

On the opposite, *Inside Climate Change* claims to be objective in its treatment of environmental news:

Our mission is to produce clear, objective stories that give the public and decision-makers the information they need to navigate the heat and emotion of climate and energy debates.

(About. *Inside Climate News.*)

Although complete objectivity is certainly unattainable in any type of press, the fact that it claims to be objective gives a clue as to how it aims at treating events, in a more factual and non-committed way than publications clearly announcing their commitment to a cause. *Inside Climate News* won the Pulitzer Prize in 2013 for best national reporting, as well as numerous other awards rewarding the quality of its articles. Furthermore, it is worth noting that this magazine immediately states its positioning as one opposed to the general interest press's which is, according to it, little capable of reporting on environmental issues with the required accuracy:

Climate and energy are defining issues of our time, yet most media outlets are now hard-pressed to devote sufficient resources to environmental and investigative reporting. Our goal is to fill this growing national deficiency and contribute to the accurate public understanding so crucial to the proper functioning of democracy.

(About. *Inside Climate News.*)

Although the positionings of these four publications vary greatly, they are all well established and enjoy a substantial readership.

The articles which were chosen were published immediately after the Fukushima disaster and up to one month later, that is to say from March 11th to April 11th, 2011. The selection of articles published immediately after the events makes it possible to grasp the way in which the press reported on events that were new for the general public, at a time when mediation was highly necessary. It was also a time when scientific parameters were still blurry, even for scientists. The purpose of this choice was to seize the instant when the events were the most difficult to understand but when the public was the most in need for explanations.

The corpus articles vary greatly in length and content, mainly due to the frequency of publication of the four newspapers and magazines. Articles in special interest publications, especially, are typically longer than articles in the *New York Times* or the *Washington Post*. Indeed, the former group identifies its practices to investigative reporting, a type of journalism which traditionally publishes long, in-depth research. Moreover, articles in the general interest press are published on a daily basis while special interest article publication is more irregular and can thus allow journalists more time to write longer pieces. This difference accounts for the choice of selecting a greater number of general interest press articles, if the number of words is to be comparable between both groups.

Thus the two main criteria in selecting the articles were the dates of publication and the number of words. The third criterion was that of the topics of the articles, which deal with the disaster itself and its consequences in Japan, thus excluding the articles more generally tackling the situation of nuclear energy in the United States following the events in Japan, although these topics may occasionally come up in the articles that were chosen. In the end, the corpus contains 20 063 words, distributed as follows.

Publication	Number of articles	Number of words
<i>Inside Climate News</i>	3 articles	4569 mots
<i>The Environmental Magazine</i>	7 articles	4817 mots
<i>The Washington Post</i>	4 articles	5190 mots
<i>The New York Times</i>	5 articles	5487 mots

Table 2. Composition of the corpus

The corpus is intentionally small so as to make it possible to analyse qualitatively some complex discursive elements. That is why a punctual event was chosen as a topic.

A first reading of the articles reveals that the angles chosen by the two types of press differ. General interest press articles tend to report on the event in an immediate manner, to explain what is happening at the moment of reporting, to focus on the event, while special interest press articles tend to take into account long-term consequences, initiating reflections on nuclear energy in general, or sources of energy.

Another difference is worth noting: while the general interest press classifies the articles in sections, the special interest press does not do so. Among the eight *New York Times* and *Washington Post* articles, six are published in the International section, two in the Economy section, one in Science and one in Local.

Classifying the articles in sections provides some elements as to their content. For instance, the article published in the Science section (NYT2) adopts a much more general point of view than those published in other sections, even though they were published on the same date, rather focusing on nuclear science than on a factual reporting of the event. The following sections evidence the fact that this article stands out in more than one way.

On reading the articles, term candidates have been selected empirically, with the aim of selecting as many candidates as possible so as not to exclude possible terms. The list of candidate terms has then been confronted to the online tool *Le Grand Dictionnaire Terminologique*, so as to determine which candidates could be confirmed as terms. Although there is often continuity between specialised and general discourse, and thus between terms and words, making the distinction sometimes uneasy, the confirmed terms all belong to specialised fields and are part of a network of terms which form a system making sense in the context of the field. This makes it possible to consider them as terms.

2. The terms and their explanations

2.1. *The terms*

As mentioned above, the environmental field is very diverse, composed of several specialised domains (biology, physics, health, economics...). So as to define this specialisation and the way it is expressed in the press, the terms have been classified according to the field they belong to using *Le Grand Dictionnaire Terminologique*. Some may belong to two fields.

Term	Field
nitrogen 16	chemistry
micro-sievert	physics
fission products	physics
zirconium alloy	physics
cesium 137	physics / chemistry
gamma radiation	physics / chemistry
boric acid	chemistry
rod	mechanics
earthquake fault line	earthquakes
boron	physics
potassium iodide	chemistry
iodine	physics / chemistry
tritium	physics
carcinogen	health
carbon footprint	environment
scalability	mechanics
geothermal energy	energy
carbon / sulfur dioxide	environment
fossil fuels	energy
photovoltaic	energy
radiation	physics / chemistry
magnitude	earthquakes

Table 3. The terms and their fields

Following the classification in fields, the distribution of the terms in the articles has been examined. In this analysis, it appears that general interest press articles contain a greater proportion of terms than special interest press ones, especially terms referring to nuclear physics or chemistry. Those terms, used to describe the disaster directly, to explain the events technically as they unfold, are quite infrequent in the special interest press, thus refuting the idea that the latter may use a more specialised discourse than the daily newspapers under study. This assumption is even further contradicted if the process of determinologisation is taken into account.

Indeed, all the terms are not technical to the same degree as some of them have undergone a process of determinologisation, as defined in 1.1. It is especially the case for terms linked to energy, and more particularly to renewable energies and the environmental dangers caused by fossil fuels, as these topics are becoming increasingly common in public discourse.

So as to understand the scope of the determinologisation process in the corpus, occurrences of the terms in GoogleNews^[2] were compared to occurrences of the terms in the corpus, based on the assumption that the more frequent the term is on GoogleNews, the more determinologised it is. Google News is an aggregate of all the articles published in the press internationally in a given language related to a certain keyword. The following table compares occurrences on GoogleNews to occurrences in the corpus. Terms are ranked from the most to the least frequent on GoogleNews.

Term	Number of occurrences on GoogleNews	Number of occurrences in the corpus	Number of times the term is explained in the corpus
nitrogen 16	1	1	1
micro-sievert	5	2	2
fission products	6	1	1
zirconium alloy	8	2	1
cesium 137	58	6	5
gamma radiation	96	1	1
boric acid	160	1	0
rod	162	8	3
earthquake fault line	988	2	0
boron	1 142	2	2
potassium iodide	1 256	1	1
iodine	1 460	6	6
tritium	3 317	1	1
carcinogen	4 474	1	0
carbon footprint	7 380	1	0
scalability	10 609	1	0
geothermal energy	11 500	2	1
carbon / sulfur dioxide	17 657	2	1
fossil fuels	17 721	3	0
photovoltaic	18 796	1	0
radiation	42 212	14	3
magnitude	92 400	3	2

Table 4. Comparative table of occurrences between the corpus and GoogleNews and explanations

Based on the small number of occurrences of each term, it would be difficult to draw general conclusions on the correspondence of the number of occurrences on GoogleNews and in the corpus. However, this comparison entails two remarks.

First, the number of occurrences on GoogleNews does not seem to have a major impact on the frequency of appearance of the terms in the corpus. The numbers of occurrences of the terms in the corpus are very low generally and do not vary to a great extent from the least frequent

to the most frequent on GoogleNews. Although one may assume that the press uses a discourse that must be accessible to non specialists, and that it should thus contain few terms that are unknown to the general public, this comparison shows that it is not the case: whether the terms are more or less common in the press in general, that is to say more or less determinologised, does not seem to impact the extent to which they are used in the corpus.

Secondly, it appears that the terms belonging to the fields of chemistry are more frequent in the general interest press. However, they are actually not as frequent on GoogleNews as the terms related to alternative sources of energy, of which more occurrences are found in the special interest press. This comparison reveals that the latter type of press does not use a more technical range of terms than daily newspapers, on the contrary.

This remark calls for another question, related to the need to explain words. Indeed, in the corpus, some words are explained or defined, while some others are not, as if the knowledge of their meaning was supposed to be known by readers. This would suggest that readers are expected to be familiar with the meaning of a certain number of terms, perhaps based on their frequency in the press. However, this process of knowledge construction would suppose a uniform readership with similar knowledge of news events, which is difficult to establish, especially for the general interest press, as is mentioned in section 1.1. The number of occurrences of the terms followed or preceded by an explanation is to be found in the last column of table 4. It is to be compared with the total number of occurrences in the corpus, in the previous column.

The observation of these two columns, together with the occurrences on GoogleNews, reveals that the most determinologised terms are also those which are least frequently explained. For instance, the terms in the field of renewable energies are never explained, except for *geothermal energy*, which is not as frequent as the others. However, there is no systematic correspondence. Indeed, very common terms may be explained (like *magnitude*) while less common ones are not (like *boric acid*).

A closer look at the type of publication shows that there is no notable difference between the general interest and special interest press articles as regards explanation. Both make the same choices as to whether to explain the terms or not. One article only differs from the others in this regard, NYT2, the Science section article from *the New York Times*. This article not only uses many technical terms, but it also defines them all, sometimes very precisely (see subsequent section). It is, for instance, the only article defining the core of a reactor, or thyroid, a term which however seems common enough for most readers to know, even in an imprecise manner :

« Located near the base of the neck, the **thyroid** is a large endocrine gland that produces hormones that help control growth and metabolism »

[NYT2]

The Science section article stands out as to the explanation of terms, while all the other articles, regardless of the type of publication, make similar choices. A more detailed study of the way the terms are explained in the corpus confirms that observation.

2.2. Definition and explanation

As mentioned in the previous section, definitions are considered as a type of explanation for the purpose of this study. Definitions as they are implemented in the press are compared to terminological definitions, which are expressed by specialists of the domain (Martin, 1900: 87). The role of the press is to convey knowledge from specialised communities, which is why the definitions it contains are natural definitions, produced by specialists, and may resemble terminological ones. Three main criteria were taken into account in determining the types of explanations present in the articles:

1) the type of elements used to explain the concept: essential and distinctive criteria (as in terminological definitions), essential and common criteria, which are not distinctive, and non essential criteria.

2) the definition mode: either the conceptual mode (a type of definition including a superordinate and a restrictive complement, i.e. definitions in intension), the referential mode (enumeration, i.e. definitions in extension), the language mode (examples, synonyms, antonyms, equivalence).

3) the elements contained in the definition among the five elements which must compose a terminological definition: field, species (part of the definition that contains the superordinate), restrictive complement (part of the definition indicating the characters specific to the notion), species, isonyms.

Based on these criteria, four main types of explanations have been outlined and observed in the corpus: terminological definitions, partial definitions, contextualised explanations and estimates.

Terminological definitions are definitions of terms, minimally including the species and a restrictive complement. This type of definition, as it appears in the corpus, would be acceptable in a terminological dictionary as, although the domain is scarcely mentioned, it is enlightened by the context. Only one article contains this type of definition, NYT2, for instance:

[...] **tritium**. It is a naturally occurring radioactive form of hydrogen, sometimes known as heavy hydrogen. It is found in trace amounts in groundwater throughout the world. Tritium emits a weak form of radiation that does not travel very far in the air and cannot penetrate the skin.

[NYT2]

This definition contains a term (*tritium*), its species (*a naturally occurring radioactive form of hydrogen*), an isonym (*heavy hydrogen*) and elements specific to the term in the category (*emits a weak form...*). This article contains many such definitions, which are often completed by encyclopaedic elements, as in the following definition of *nitrogen 16*:

Nitrogen is the most common gas in the earth's atmosphere, and at a nuclear plant the main radioactive form is known as **nitrogen-16**. It is made when speeding neutrons from the reactor's core hit oxygen in the surrounding cooling water. This radioactive form of nitrogen does not occur in nature. The danger of **nitrogen-16** is an issue only for plant workers and operators because its half-life is only seven seconds.

[NYT2]

This very precise and complete definition is close to the definitions that may be found in a research article: characters are essential and distinctive (they unambiguously identify the notion) and the mode is conceptual. Only one other article contains an occurrence of such a definition, ICN3, when defining *geothermal energy*. A wider study of Science section articles would make it possible to understand this phenomenon further.

What is called “partial definition” is a type of definition containing one or several elements from a terminological definition, but without containing them all. In this case, characters are essential and common, but not distinctive. Several variations on this type were found in the corpus. Sometimes, only the species is mentioned, as in the following examples:

cesium-137 and other radioactive isotopes [WP3]
a radioactive byproduct, **cesium**, [NYT3]

In other occurrences, only the restrictive complement is mentioned, without any information on the species:

boron — which can choke off a nuclear reaction — [NYT5]

Partial definitions may in the end only appear in the form of qualification, as in:

radioactive **iodine-131** [EM7]

Compared to terminological or encyclopaedic definitions, partial definitions are introduced by implicit markers (no marker for qualification, punctuation or “and” for other forms), while the former are introduced in an explicit manner, generally with the verb “be”, as in the previously mentioned definition of tritium. In the encyclopaedic definition of nitrogen-16, markers include “be”, but also phrases such as “known as” and “it is made”, which are explicit. Compared to the latter type, partial definitions thus tend not to be explicitly presented as definitions.

Partial definitions are mainly found in relation to the least terminologised terms like *cesium 137*, *iodine 131*, *boron* or *sulfur dioxide*, whose Latin endings and inclusion of figures make sound more technical to a non specialist readership. For such terms, definitions seem to be required, even though they are only partial ones. On the contrary, terms which do not sound as complex are generally linked to looser types of definitions which, in this paper, are called contextualised explanations and estimates. These two forms cannot be identified as definitions due to the absence of the definitional elements mentioned at the beginning of this section, that is why the term *explanation* is preferred. In both cases, the characters are non-essential and the mode is referential: they no longer define a concept, but they make it possible to understand a specific event in context, such as:

the **zirconium alloy** wrapped around the fuel rods [WP3]

In this example, the explanation is not presented in an explicit manner and markers are implicit: they may either be punctuation, as in partial definitions, or be non-existent. The segment “wrapped around the fuel rods” gives readers information about what *zirconium alloy* refers to, what its role is in the event that is being described, but without providing a

technical definition of this notion. This type of explanation certainly makes it possible for readers to understand the role of the concept in the article, but would not be acceptable in another context.

An interesting point is that the term is not really determinologised and may thus be explained in a more developed manner. However, the articles containing these explanations are not chronologically the first ones in the corpus published on the topic, which may explain why a detailed explanation is not considered to be needed. This remark suggests a knowledge construction process between journalists and their readers, readers acquiring knowledge by reading articles on the same topic day after day as the events unfold. It is however unlikely that the readership be stable enough for this process to systematically take place and to not require journalists to explain the terms in more details every time they mention them. It is also understandable that journalists do not want to repeat the same definitions day after day. With this type of explanation, journalists adopt an intermediate position in which they do not repeat a detailed definition while helping readers who do not know the terms understand them in the context of the article.

Finally, estimates only assess the event rather than explain the notion related to it so that readers may be able to assess it themselves, for instance:

a devastating 9.0 **magnitude** earthquake [EM1]

the benchmark limit of 500 **microsievert per hour**. [...]The hourly amounts are more than half the 1,000 microsievert to which people are usually exposed in one year. [WP1]

In these examples, the explanatory elements are respectively “devastating” and the phrase “benchmark limit”, followed by the next sentence. In the first example, the mention of “9.0 magnitude” would certainly be sufficient for non-expert readers to understand that the earthquake was a devastating one, but such knowledge does not seem to be expected either from general interest or from special interest press readers. Thus, although these terms are likely to be familiar to most readers, journalists make sure they will understand the meaning of the figures by adding an assessment of the events.

2.3. Explanations in expert quotes

In collecting explanations, it appeared that quotes were also a way for journalists to explain the technical aspects of the disaster, via the voice of experts in particular. To understand how journalists use expert quotes and which publications do so, quotes have been gathered and classified according to three criteria: the type of source (nine categories), the form of reported speech and the type of publication. For the purpose of this study, only two categories of reported speech have been applied: direct speech, in which quotation marks are used, and indirect speech, without quotation marks. The results of this analysis are summed up in table 5. In each category, the articles in which each type of quote can be found are listed, followed by the number of occurrences of the type of quote concerned.

type of source	DS-SI ^[3]	IS-SI	DS-GI	IS-GI
Official political sources	EM7: 2	EM1: 4	NYT1: 2	NYT1: 3

	ICN1: 1	EM4: 3 EM5: 1 EM7: 1 ICN1: 6	NYT5: 2 WP3: 1	NYT4: 3 NYT5: 5 WP1: 2 WP3: 1 WP4: 1
Tokyo Electric and TEPCO		ICN1: 2	NYT1: 1	NYT4: 3 NYT5: 1 WP1: 1 WP3: 3
Other political sources^[4]	EM1: 2 EM5: 1 ICN1: 2	EM5: 1 ICN1: 2		NYT1: 1
Organization and campaign members	EM1: 1 EM3: 2 EM5: 3 ICN1: 2 ICN2: 1	EM3: 2 EM4: 2 EM5: 1 EM7: 1 ICN1: 1	NYT5: 1 WP3: 2 WP4: 4	NYT2: 2 WP1: 1 WP3: 2 WP4: 1
Reports		EM1: 1 EM5: 1 EM7: 1 ICN1: 1		NYT5: 1
Nuclear energy specialists	EM5: 1 ICN1: 2 ICN3: 2	EM6: 1 ICN1: 4 ICN2: 1 ICN3: 1	NYT1: 1 NYT5: 2 WP1: 2 WP3: 2	NYT1: 2 NYT5: 2 WP1: 3 WP3: 3
Scientists	EM1: 2 EM6: 1 ICN1: 2 ICN2: 2		NYT2: 3 NYT4: 1 WP3: 1	
Press and news agencies	ICN1: 1	ICN2: 1	WP3: 2	NYT1: 1 NYT4: 1 NYT5: 1 WP1: 1 WP3: 4
Individuals	ICN1: 1		WP2: 5	WP2: 3

Table 5. Sources, quotes and types of press.

It appears from this classification that the sources vary according to the type of publication. For instance, special interest articles scarcely quote the companies involved in the disaster (Tokyo Electric and TEPCO), while those are widely quoted in the general interest press, mainly in direct speech. This discrepancy may be due to the fact that daily newspapers report the event as they unfold, with victims and culprits. The angles chosen in the articles also explain why the special interest press seldom quotes individuals while the general interest press often does. For example, WP2 is only focused on the personal history of several victims. Individuals are both quoted in direct and indirect speech, most of them successively in the two modes.

Generally speaking, sources in the general interest press are more varied, which can be explained by the fact that they represent a broader view on the event, with one article dealing with precise scientific facts, others focusing on victims' stories or yet others telling the events, while the special interest press tends to focus on one point of view and to initiate a broader reflection based on this specific event.

However, there are a few similarities between both types, as both quote many official political sources, mainly in indirect speech, as well as many organization and campaign members or nuclear energy specialists. The latter may include engineers who know about nuclear power plants or people who have conducted studies on previous nuclear disasters. The same treatment is applied to scientists. Both categories require more in-depth examination since these quotes are first produced by specialists of the field and thus reflect the journalists' mediation role.

Table 5 shows that these specialists are not the most common sources for journalists, in either type of press, compared to other sources. However, a few interesting examples of this type of quotes can be found in the corpus.

In expert quotes, the most technical speech is generally quoted in direct speech. For example, these quotes from NYT5 may be compared:

- (1) The plant's operator must constantly try to flood the reactors with seawater, then release the resulting radioactive steam into the atmosphere, several experts familiar with the design of the Daiichi facility said.
- (2) Christopher D. Wilson, a reactor operator and later a manager at Exelon's Oyster Creek plant, near Toms River, N.J., said, "normally you would just re-establish electricity supply, from the on-site diesel generator or a portable one."

In quote (1), the process of trying to stop the reactor is explained in a narrative mode, with few technical terms and in a very accessible manner. The identification of the source, "several experts familiar with the design of the Daiichi facility", suggests that this explanation was rephrased by the journalist from several sources. On the opposite, in quote (2), the direct speech quote contains a number of scientific terms uttered by one unique source and thus is much more complex than (1) in terms of accessibility for non specialists.

These remarks raise the issue of the role of scientific speech within journalistic discourse. Quotes are integrated into the articles, and thus serve the purposes of the article and the newspaper they are published in. It may thus be wondered what their specific function is and, more precisely, whether it is to convey scientific words or to popularize scientific knowledge.

To understand this process, the terms contained in the quotes have been analysed, only to observe that expert quotes contain few technical terms, which evidences the fact that the role of quotes is not to convey scientific knowledge. Actually, expert quotes are little technical and rather seem to have an explanatory function, as in the following examples:

In the meantime, the world waits in hopes that disaster is averted and Fukushima's reactors can be cooled. **"They have a window of opportunity where they can do a lot,"** says Friedrich Steinhäusler, a professor of physics and biophysics at Salzburg University and an adviser to the Austrian government on nuclear issues. **"But if the heat is not brought down, the cascading problems can eventually be impossible to control. This isn't something that will happen in a few hours. It's days."** [EM1]

Edano said that it was too early to tell if workers' emergency cooling efforts are working for unit 2. **"There is no manual to this kind of incident. I**

believe on the ground things are chaotic,” Takayuki Terai, professor of nuclear engineering at the University of Tokyo. **“But in essence, they just have to put water into the reactors continuously and cool them down and contain them.”** [WP3]

The purpose of these quotes is to explain the situation, thus constituting a popularisation discourse. This analysis may seem surprising given that journalists’ role is to convey scientific knowledge, as mentioned in section 1, and thus explain discourse originally produced by specialists. So it may seem unexpected that journalists actually do not assume their mediation role in their own words, but leave the explanatory part of the discourse to specialists, quoted in direct speech, who, as a consequence, only use little technical discourse.

The rationale for this process may be found in the fact that specialists do convey their expertise on the situation, but actually do not give much new information. Most of the information given in expert quotes had already been introduced in the article, by journalists themselves, as in the following quote:

It was so strong, in fact, that it moved Japan’s coastline and changed the balance of the planet. Japan is **“wider than it was before,”** said Ross Stein, a geophysicist at the USGS. [EM1]

The information that Japan is “wider than before” is already present in the previous sentence mentioning the fact that the earthquake “moved Japan’s coastline”. Thus scientific discourse here only gives journalistic discourse scientific endorsement, legitimating the article and its analysis of the event. This seems to be one of the main functions of expert quotes.

3. Discussion

The main focus of this study is to understand whether specialised information is treated differently in the general interest press and in the special interest one, the assumption being that special interest articles may be more specialised, given the previous interest that characterises their readers.

However, the above analyses have shown that the treatment of specialised information is remarkably similar in both types of publications. Technical terms are mentioned, but they are generally very little explained, except in the Science section article or via expert voices, in quotes. Differences in the distribution of terms are mainly accounted for by the editorial lines of the publications and the angles adopted in the articles. For instance, terms related to renewable energies are frequent in *The Environmental Magazine*, which focuses on sustainability. Thus, in terms of degree of specialisation, there is no significant difference between the publications, which is consistent with the similarity in the profiles of the authors.

These similarities raise the issue of the function of specialised information in the articles. The definitions and explanations of terms are the results of choices between two constraints. First, journalists should give their readers enough information so that they understand the event, which sometimes requires resorting to technical terms. But simultaneously, journalists should produce an attractive form of speech that is understandable by the greater number.

Thus it is questionable whether terms are used to fulfil their traditional role of conveying technical information in such articles. For example, one article mentions « a radioactive byproduct, **cesium** » (NYT3). In this example, is the term really useful to understand the notion, or would not the superordinate be sufficient to non specialist readers? It is uncertain whether readers really need the term to understand the event, as in the following example:

Radiation comes in a lot of different forms. Some of it is fairly benign, with a short **half-life**. Some is extremely toxic.

[WP4]

Here, the term “half-life” does not add any information for readers who do not have a previous knowledge of it, while the previous estimate, “fairly benign”, is much more useful to such readers. In fact, the use of terms, especially of the most technical ones, is often superfluous in terms of content and knowledge of the field. However, it certainly gives the articles a technical nature in surface, a scientific gloss that may increase their legitimacy for readers.

Legitimacy is also the main rationale for the use of quotes in general, and in particular of explanations in expert quotes. Previous study (Peynaud, 2011: 61) has shown that quotes increase the legitimacy of the discourse. In particular, direct quotes make it possible for experts to intervene directly in the discourse and sometimes express what journalists cannot take in charge themselves, especially opinion and technical elements. Indirect speech also legitimates the discourse to the extent that it reflects experts’ words. However, journalists have more influence on the discourse in indirect speech since they can modify it by rephrasing certain parts of it. In political articles, for instance, direct speech is more often chosen for opinion quotes, while indirect speech is preferred for official speech, when journalists do not need to find legitimacy in the word-for-word repetition of the source speech (*Ibid.*: 52).

It is the case in the corpus where, for instance, official political sources are mainly quoted in indirect speech, which can be accounted for by the non-polemical nature of their words. They are only quoted in direct speech when their formulations are especially striking, such as:

The gauges that measure the water level “don’t appear to be giving accurate readings,” one American official said.

Hedging being already present in the quote, there is no need for journalists to modify it. In this case, direct speech makes it possible to reflect how careful officials are when dealing with this topic.

The treatment of organization or campaign members is also similar in both types of publications. These organizations (NRDC, nuclear regulatory commission, etc.) may be more or less committed, and thus produce different types of speech. What appears in the corpus is that organizations with which journalists agree tend to be quoted in indirect speech, where the quote is integrated into the article, and thus into the journalist’s text. On the opposite, quotes with which journalists do not agree are quoted in direct speech, which allows more distance towards the content of the quote. This distribution is remarkable in EM3, if it is remembered that *The Environmental Magazine* clearly displays its commitment towards the environment.

In this article, sources in indirect speech are “the Nuclear Regulatory Commission” and “Mary Anne Hitt of the Sierra Club”, while sources in direct speech are “the coal lobby”, “coal advocates” and the imprecise but derogatory phrase “so the argument goes”.

The analysis in 2.3. evidences the fact that technical information is mainly quoted in direct speech. The frequency of direct speech in this context is consistent with the search for legitimacy, since journalists do not have the necessary legitimacy to express themselves authoritatively on this type of scientific topic. Using expert voices for explanations thus increases the legitimacy of press discourse by making experts, who represent authorities on the topic and whose voice is not easily questioned, play the mediation role that journalists, who are not specialists of the field, cannot play.

As magazines writing for an informed audience on a specific topic, the special interest publications may seem less in need to justify their legitimacy on these topics than the general interest press, which publishes on all topics. However, the previous analyses of terms and explanations reveals that the search for legitimacy is just as strong in both types of publications, despite their different editorial lines and intended audiences. Further study on the special interest press could contribute to elucidate their positioning in terms of specialisation.

Conclusion

The main question for this study was to understand how the two types of press, with different degrees of specialisation, can inform citizens on issues related to a field as complex as environment. Two questions derive from this first interrogation. First, does the press produce a specialised discourse on environment? Second, does the press fulfil its mediation mission?

The study of specialised terms and quotes in the Fukushima coverage reveals that press articles do sometimes give elements to help the public understand the technical aspects of such an event. However, it scarcely goes as far as conveying specialised knowledge to increase the public’s scientific understanding of the field, in either type of press. On the opposite, terms and quotes rather seem to be part of a legitimisation strategy: by quoting experts and technical terms, journalists give their discourse a scientific gloss that makes it appear more accurate, more authentic, even though terms are very rarely defined and quotes generally have a low degree of technical content.

This process appears in both types of press and the study finally reveals that there is little difference in the treatment of specialised knowledge between the general interest press and the special interest press, apart from the Science section article from the *New York Times*. Science section articles would require further study in order to understand their specificity. This similarity may be accounted for by the fact that most of the authors are journalists and thus are trained to treat the news in a similar manner, while differences are mainly due to journalists following the editorial policy of each news outlet.

It may thus be concluded that the press does convey scientific and technical elements related to such an environmental issue, but without representing in itself a specialised discourse on the topic. As for popularisation, although it may be found in some quotes, it does not seem to

be the main purpose of the discourse in either type of press since most explanations are context-specific and do not make it possible for readers to increase their technical knowledge of the topic.

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Notes

^[1] Corpus collection is explained in section 1.3.

^[2] <<https://news.google.com/>>

^[3] DS stands for direct speech, IS for indirect speech, SI for special-interest press and GI for general-interest press.

^[4] Other official sources mainly includes members of Congress reacting to the disaster.