CLINA
Vol. 9-1, 135-158
June 2023
eISSN: 2444-1961
DOI: https://doi.org/10.14201/clina202391135158

When Terms Become Neologisms: A Contribution to the Study of Neology from the Perspective of Determinologisation

Cuando los términos se convierten en neologismos: una contribución al estudio de la neología desde la perspectiva de la determinologización

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Abstract: This paper deals with the issues of determinologisation and neology. Even though many existing studies focus on the description of the many aspects of neology, few studies address the relation between determinologisation and neology. For this reason, this paper proposes a different perspective on neological processes, based on an analysis of terms in a corpus that represents different stages of the determinologisation process in particle physics, in French. First, the main semantic phenomena occurring in the determinologisation process are described; then, the terms that acquire new metaphorical meanings in general press are discussed in more detail. Results show that a finer description of the semantic phenomena at stake can lead to a better understanding of the mechanisms allowing for the creation of neologisms in general language.

Keywords: neology; neological processes; determinologisation; corpus linguistics; semantic shifts.

Resumen: Este artículo examina las cuestiones de la desterminologización y la neología. Aunque son numerosos los estudios que, desde múltiples perspectivas, se han dedicado a la descripción de la neología, pocos han analizado la relación entre los citados fenómenos. Por esta razón, este artículo adopta un enfoque diferente de los procesos neológicos, basado en el análisis de los términos del ámbito de la Física de partículas a partir de un corpus francés que representa diversas etapas del proceso de desterminologización. En primer lugar, se describen los principales fenómenos semánticos que tienen lugar cuando los términos se desterminologizan; a continuación, se analizan con mayor detalle los términos que adquieren un significado metafórico en la prensa generalista. Los resultados muestran que una descripción más precisa de los fenómenos semánticos que caracterizan la desterminologización permite comprender mejor los mecanismos que subyacen a la creación de neologismos en lengua general.

Palabras clave: neología; procesos neológicos; desterminologización; lingüística de corpus; cambio semántico.

1. INTRODUCTION

The field of neology is characterised by a wide range of studies that focus on its numerous aspects, such as automatic detection of neologisms (e.g. Sablayrolles, 2012; Renouf, 2014; Cartier, 2016; Gérard et al., 2016; Torres Rivera, 2019; Drouin, 2021), neological intuition or neological perception of new lexical units (e.g. Vega Moreno and Llopart-Saumell, 2017; Bernal et al., 2020; Lombard et al., 2021; Sánchez Ibáñez and Maroto, 2021), classification of neologisms and neological processes (Sablayrolles, 2011; Renouf, 2012; Reutenauer, 2012b; Díaz Hormigo, 2020; Cabré et al., 2021). However, neologisms created from terms are not always described in these classifications. In most cases, they are considered from the perspective of semantic neology, as lexical units that acquire a new, often metaphorical meaning (Reutenauer, 2012b; Sablayrolles, 2018; Lombard et al., 2021), and their terminological status is rarely taken into account.

At the same time, the process by which terms enter general language and the changes that result from this are addressed in studies of determinologisation (e.g. Meyer and Mackintosh, 2000; Ungureanu, 2006; Dury, 2008; Renouf, 2017). These studies mostly focus on the semantic changes that are likely to occur when terms are used by laypeople and on their consequences for terminology and specialised language, e.g. for the description of terms in terminological resources as in Meyer (2000) or L'Homme (2020: 80-118). In this case, while terms are indeed recognised as new lexical units in general language, few studies specifically focus on the relation between neology and determinologisation (e.g. Renouf, 2017).

For this reason, this paper deals with both determinologisation and neology. In particular, it aims to show how studying determinologisation as a process can give new insights into the field of neology, especially when it comes to semantic neologisms

created from terms. It will show that a finer description of the semantic phenomena at stake in the determinologisation process can lead to a better understanding of the semantic mechanisms allowing for the creation of neologisms in general language. Following the works of Sablayrolles (2018) or Díaz Hormigo (2020) for example, this paper aims to take part in a discussion on the role of determinologisation in neological processes. The discussion is based on an analysis of terms from the domain of particle physics in a corpus composed of texts from different genres and levels of specialisation, which were assembled in a view to representing different stages of determinologisation in French.

This paper is structured as follows: section 2 provides some theoretical background by defining the concept of determinologisation and by reviewing the main points of view on the neologicity of terms in general language. Section 3 describes the corpus exploited for this study and the tool-based methodology that was adopted. Section 4 focuses on the main results: section 4.1 addresses the different types of semantic phenomena that result from determinologisation and that are observed in the corpus. Section 4.2 discusses the metaphorical uses of terms in more detail and specifically focuses on the role of determinologisation in the emergence of semantic neologisms based on such metaphorical uses. Finally, section 5 outlines some concluding remarks and proposes some perspectives.

2. THEORETICAL BACKGROUND

2.1. *Determinologisation*

Determinologisation designates the movement of terms from specialised language to general language (Guilbert, 1975; Meyer and Mackintosh, 2000; Ungureanu, 2006)[1]. More precisely, it refers to two aspects of this movement: the process by which terms reach general language and the result of this process, i.e. the use of terms in general language (Humbert-Droz, 2021).

The process is characterised by two dimensions. The first one refers to the fact that terms do not enter general language from specialised language directly. On the contrary, they are progressively transferred from specialists to laypeople through various means, which I call *intermediaries*. There are different types of intermediaries, the most

1. Determinologisation is closely related to another phenomenon, conceptualised by Galisson (1978, 1979) and called *banalisation lexicale* in French. Though *banalisation* tends to be used now to designate the movement of terms from specialised language to general language, this usage differs to some extent from the way the concept was first introduced by Galisson. One major difference between *banalisation* and determinologisation stems from the fact that the former characterises a set of lexical items used by semi-expert speakers, whereas the latter concerns terms used by non-expert speakers. See Humbert-Droz (2021: 53-56) for further details on the distinction.

common (and the most well-known) being popularisation[2] and general media (e.g. Cabré, 1994; Pearson, 1998; Moirand, 2007). However, other semi-specialised genres, such as reports and press releases, can be relevant, as they contribute to knowledge transfer (e.g. Beacco et al., 2002; Nicolae and Delavigne, 2013; Condamines and Picton, 2014). In fact, many more intermediaries can play a role in determinologisation, as long as they participate in term circulation: social media, fictional works such as movies and novels, podcasts, etc. The second dimension refers to the fact that determinologisation takes place over time (Dury, 2008; Renouf, 2017).

When terms enter general language, different types of semantic changes are likely to occur. Three main types of such changes are usually described: the appearance of a shallower meaning in general language, the emergence of metaphorical and metonymic uses of terms, and the creation of word play (Meyer and Mackintosh, 2000; Condamines and Picton, 2014; Renouf, 2017). That being said, subtler and more diverse changes can also be observed in the use of terms in non-specialised texts (see 4.1).

At the same time, determinologisation raises issues concerning the neological status of terms in general language. This is reviewed in section 2.2.

2.2. *Neologicity of terms in general language*

When terms appear in general language, they may be perceived by laypeople as new lexical items. As a result, they behave like any other neologisms (e.g. Sablayrolles, 2018; Díaz Hormigo, 2020). Three main points of view on the neologicity of terms in general language can be identified and will be detailed here. Neologicity is broadly defined as the neological nature of a lexical unit, or its perceived novelty. It is a variable and quantifiable feature of any neologism, which highly depends on the communicative setting (Bernal et al., 2020: 47).

2.2.1. Neologicity of terms from a formal and semantic perspective

A first point of view on terms and their use in general language consists in considering them as neologisms both from a formal and from a semantic perspective. In

2. At this point, the status of science popularisation should be clarified. Though both determinologisation and popularisation describe processes related to the transfer of terms and knowledge into general language, one main feature differences them. As defined by Jacobi (1986: 71), Mortureux (1988: 118-120) or Delavigne (2001: 81), among others, the popularisation of scientific discourse aims not only at transferring knowledge but also at ensuring knowledge appropriation by non-experts. This is achieved by using many reformulation and explanation mechanisms. Popularisation is therefore a conscious process, whereas determinologisation is a rather unconscious process (Condamines and Picton, 2014: 168). Nevertheless, popularisation text genres do play a role in the determinologisation process, as they contribute to making terms accessible to non-expert speakers. This is why popularisation texts are considered as intermediaries in the determinologisation process. See Humbert-Droz (2021: 296-298) for a thorough discussion of these aspects.

this case, the appearance of a term in general language is thought to be similar to the appearance of a new lexical unit in a language. In particular, it is argued that both a new lexical unit and a term recently integrated in general language create a comparable sense of novelty, or as it is sometimes called, *neological intuition* (Lombard et al., 2021), or *sentiment néologique* in French (Gardin et al., 1974).

Different authors agree on these similarities. For example, Guilbert explains that when a term enters general language, «a change of neological nature is produced in the general vocabulary» (Guilbert, 1975: 80; my translation). For Sablayrolles, it is clear that the «migration [of a term] from a specialised domain to general language» gives this term «a neological status» (Sablayrolles, 2018: 35; my translation). This idea is also widely shared by Spanish-speaking researchers, who consider that the transfer of terms in general language takes part in lexical renewal (e.g. Adelstein, 1996; Cañete et al., 2016; Vega Moreno and Llopart-Saumell, 2017; Díaz Hormigo, 2020).

These authors also agree that the media, and particularly the general interest press, largely contribute to the spread of neologisms – including terms – in a language. For instance, Reutenauer explains that «journalistic discourse tends to reflect neologisms that are being disseminated or to contribute to their rather widespread dissemination» (Reutenauer, 2012b: 47; my translation).

Besides, terms – like any other neologism – are not always perceived as new lexical units in general language to the same extent. Indeed, the neologicity of a term highly depends on the degree of expertise of speakers in a given domain (Estopà, 2016: 115). Nevertheless, the fact that a term that used to be confined to a specialised language enters general language perfectly corresponds to the definition of *neologism*, as a «new linguistic sign with simultaneous appearance of a new signifier and a new signified» (Sablayrolles, 2012: 38; my translation).

This point of view appears to be the most consensual in the literature. However, two other complementary points of view exist; they are described in the next section.

2.2.2. Terms as semantic neologisms in general language

The second and third points of view on the neologicity of terms in general language concern semantic aspects. When terms are used in general language by non-experts, their meanings always differ to some extent from the meanings they convey in specialised contexts (e.g. Adelstein, 1996; Pearson, 1998; Meyer and Mackintosh, 2000; Ungureanu, 2006; Delavigne, 2020). For instance, Béjoint (1988: 362) explains that «when scientific and technical words have become fairly common in non-specialized use (i.e. when they have moved down our scale), they tend to be used with slightly different meanings all the time».

The second point of view comprises rather slight differences whereas the third one encompasses deeper differences, often associated with the emergence of entirely new metaphorical or metonymic meanings. In the former case, researchers consider even

the slightest changes as neological. In fact, according to Guilbert (1973: 22-23), given that these changes occur when terms reach a more diversified speech community with a lower level of expertise, they correspond to a sociological type of semantic neology.

However, this point of view is not the most widespread in studies of neology, by far. When it comes to semantic neology and terms in general language, deeper shifts (mostly metaphorical) are addressed much more frequently (e.g. Meyer and Mackintosh, 2000: 130; Renouf, 2017: 26). They constitute the third point of view that I would like to describe in this section.

Figures of speech are productive semantic processes, whether the neologisms are created from terms that have migrated into general language or from other lexical units (e.g. Sablayrolles, 2011; Renouf, 2012; Lombard et al., 2021). For instance, Sablayrolles (2011) proposes a detailed classification of semantic processes based on figures of speech, which not only includes metaphor and metonymy but also paradox, understatement or even antonomasia. That being said, it seems that semantic neologisms based on metaphors are still one of the most well-known types of semantic neologisms, especially when they derive from terms. This is illustrated for example by the *Dictionnaire de linguistique*, which states that «metaphors play a great role in lexical innovation […]. In particular, metaphorical shifts are common in the evolution resulting from the transfer of terms to the general vocabulary […]» (Dubois et al., 2002: 302; my translation).

Therefore, it seems that when neological studies focus on metaphorical uses of terms in general language, they most often concentrate on stabilised or well-established metaphorical shifts. For instance, Renouf (2017) investigates semantic shifts that are stable enough to be detected in a large journalistic corpus. She gives the examples of the verb *to downsize*, which appears numerous times in her corpus between 1999 and 2013 with the same metaphorical meaning, namely «to move to a smaller house once retired» (Renouf, 2017: 36). However, as section 4.2.2 will show, some researchers focus on the early phase of emergence of semantic neologisms (e.g. Reutenauer 2012a), even though much less frequently.

3. METHODOLOGICAL FRAMEWORK

As mentioned in the introduction, this paper relies on a corpus-based analysis of terms in the field of particle physics in French. The corpus and the methodology that I adopted are described in this section.

3.1. *Description of the corpus*

The corpus used for this study was compiled in the context of a broader research project with the aim of providing a dataset to observe the behaviour of terms in the determinologisation process in the field of particle physics (Humbert-Droz et al., 2019).

It is composed of five sub-corpora that are meant to represent different stages of determinologisation. This is achieved by selecting data that account for the diversity of genres and levels of specialisation of the texts involved in the process. More precisely, the corpus is composed of:

- a *Specialised* sub-corpus, which contains articles published in the French research journal *Reflets de la physique* and doctoral theses from French universities that are freely accessible online;
- a *Press releases* (abbreviated *PR*) sub-corpus, which comprises press releases from two major actors of particle physics research in French-speaking countries, i.e. CNRS[3] in France and CERN[4] in Switzerland;
- a *Reports* sub-corpus, which contains annual reports from different laboratories undertaking research in particle physics (CERN, LPSC[5] and LAL[6]);
- a *Science popularisation* (abbreviated *SPop*) sub-corpus, which contains articles published in science popularisation journals (*Élémentaire*, *La Recherche*, *Pour la Science*) and websites (CERN for the general public and LHC-France);
- a *Press* sub-corpus, which comprises general press articles taken from French and Swiss newspapers (*Le Temps*, *Le Monde*, *Les Échos*, *Le Figaro*).

The progression from specialised (*Specialised* sub-corpus) to semi-specialised (*PR*, *Reports* and *SPop* sub-corpora) and to non-specialised (*Press* sub-corpus) is meant for the corpus to reflect the continuum between specialised language and general language. The period covered by the corpus extends from 2003 to 2016. This period was selected so that it would include two major events that occurred in the field of particle physics in recent years: the launch of the Large Hadron Collider (LHC) in 2008 at CERN and the discovery of the Higgs boson in 2012, also at CERN. The underlying hypothesis states that, since these events are likely to be extensively covered by the media (as any important scientific event (Moirand, 2007: 64)), the terms used to relate them are likely to be spread by the media as well. As a result, linguistic changes due to the spread of these terms are likely to appear in texts published after the events occurred. For comparison purposes, texts published before the events occurred were also considered.

The total word count of the corpus is slightly above 4 million words. Table 3.1 illustrates the size of each sub-corpus.

3. Centre national de la recherche scientifique (https://www.cnrs.fr/fr/page-daccueil, last access: 5 June 2022).

4. Organisation européenne pour la recherche nucléaire https://home.cern/fr, last access: 5 June 2022).

5. Laboratoire de Physique Subatomique & Cosmologie (https://lpsc.in2p3.fr/index.php/fr/, last access: 5 June 2022).

6. Laboratoire de l'Accélérateur linéraire (https://www.lal.in2p3.fr/, last access: 5 June 2022).

Sub-corpus	Number of occurrences
Specialised	994,875
Press releases	210,320
Reports	1,141,873
Science popularisation	620,045
Press	1,098,708
Total	**4,065,821**

Table 3.1: Size of the corpus

3.2. *Tools and methodology*

The methodology is based on Textual Terminology (Bourigault and Slodzian, 1999; Picton, 2011; Condamines, 2018), and adheres to four main principles[7]:

- the analysis is performed on a corpus whose compilation is determined by the research purpose;
- terms are the starting points for the analysis, and the observation of their distributional contexts is central to the approach;
- the analysis relies on the results provided by corpus-processing tools, whose use is conditioned by their relevance for the research purpose;
- domain experts are involved at every stage of the analysis.

A contrastive point of view is usually adopted and the analysis is most often performed by comparing corpora or sub-corpora. Several tools are used to ensure that the analysis is systematic and reproducible, e.g. concordancers, term extractors, morpho-syntactic taggers. For this study, I mainly relied on AntConc (Anthony, 2018) to observe the distributional contexts of terms and to identify significant differences between the sub-corpora. Terms were automatically extracted with TermoStat (Drouin, 2003), and a relevant sample was selected in collaboration with domain experts.

The analysis was carried out in two main steps. First, the *Specialised* and *Press* sub-corpora were compared to identify distributional differences that can be interpreted in relation to determinologisation. Second, these differences were explored in the *PR*, *Reports* and *SPop* sub-corpora to focus more particularly on the intermediate stages of the process. These aspects will be detailed in section 4.1.

7. See Condamines and Picton (2022) for further details.

4. RESULTS AND DISCUSSION

In this section, I first present an overview of the main changes that occur in the use of terms in the determinologisation process. Then, I focus on the mechanisms that lead to new metaphorical meanings and on how the analysis of determinologisation as a process allows for a better grasp on these mechanisms.

4.1. *Overview of semantic phenomena occurring in the determinologisation process*

The analysis reveals a broad range of phenomena concerning the uses of terms and the ways in which they differ in the *Press* sub-corpus when compared to the *Specialised* sub-corpus. These phenomena appear to be much more diverse than the ones usually described in the literature on determinologisation (see 2.1) and refer to considerably less clear-cut semantic distinctions. In addition, only a minority of these phenomena originate in the *Press* sub-corpus. The vast majority of them are indeed attested in at least one of the intermediate sub-corpora.

4.1.1. Coexistence of different points of view

The first category of phenomena relates to the coexistence of different points of view regarding terms and concepts. This category was identified through the observation of the recurring co-occurrence of particle physics terms with terms from other subject fields, such as astronomy and medicine. Evidence from the corpus suggests at least three types of contexts and possible interpretations.

Contexts showing research interdisciplinarity

In this type of context, the co-occurrence of particle physics terms with terms that refer to other domains highlights the fact that research in one domain usually requires expertise from other domains, or that researchers from different domains collaborate on certain projects. The examples below offer evidence of such interdisciplinarity in the *Press* sub-corpus (the terms under study are in bold and the terms from other domains are in italics).

1. Le but premier d'OGLE, dont le *télescope* est installé à l'*observatoire* de Las Campanas au Chili, est la recherche de **matière noire** (*Press* sub-corpus)

2. un volumineux détecteur d'**antimatière**, qui attend son tour depuis des années, va enfin prendre place dans le dernier vol de *navette*. (*Press* sub-corpus)

These two examples show that the terms *matière noire* (*dark matter*) and *antimatière* (*antimatter*) occur in contexts that imply the field of astronomy. Terms such as *observatoire* (*observatory*), *télescope* (*telescope*) and *navette* (*shuttle*) are indeed associated with this field. These contexts also suggest that searching for dark matter (example 1) and studying antimatter (example 2) require instruments that are usually associated with research in astronomy.

Nuclear power and medicine were identified in similar contexts in the *Press* sub-corpus, and the strong interdisciplinarity of research in particle physics and these three fields was confirmed by domain experts.

Contexts showing the benefits of research in particle physics for other fields

The second type of context illustrates the many ways in which research in particle physics may benefit other fields. While this type of contexts appears to be similar to the first one, the main difference concerns the fact that the relationship between particle physics and the other domains is made explicit by the use of markers[8] such as *utiliser* (*to use*, examples 3 and 5), *faire appel à* (*to call for*, *to require*, example 3), and *dédié à* (*dedicated to*, example 4). Markers are underlined in the examples.

3. La *radiothérapie* classique utilise des **photons** (des «particules» de lumière), alors que la *protonthérapie* fait appel à des **protons**, autrement dit des noyaux d'hydrogène. (*Press* sub-corpus)

4. Mais que va devenir l'**accélérateur de particules** du *Louvre*, Aglae, dédié à la recherche sur les *œuvres d'art* (*Press* sub-corpus)

5. Cette technologie très innovante consiste à utiliser un **accélérateur de particules** pour produire les neutrons qui déclenchent les *réactions de fission* dans le *combustible nucléaire*. (*Press* sub-corpus)

In example 3, the markers indicate the usefulness of certain concepts of particle physics (photons and protons, which are two types of particles) for two medical imaging techniques, namely radiotherapy and proton therapy. In example 4, the marker indicates the use of one specific particle accelerator to perform research on works of art, which is highlighted by the units *Louvre* (the famous museum in Paris) and *œuvre d'art* (*work of art*). Example 5 illustrates the use of a particle accelerator in the field of nuclear power.

8. Following the works of Meyer on knowledge-rich contexts, markers can be defined as linguistic elements that signal «items of domain knowledge that could be useful for conceptual analysis» (Meyer, 2001: 281) in corpora. Even though markers can indicate any type of information that is relevant given one research purpose, in this section, I focus on markers of usefulness. See Condamines et al. (2021) for further details.

At this point, it should be emphasised that, while the examples above were all taken from the *Press* sub-corpus, this does not mean that the phenomena in question are not observable in the intermediate sub-corpora. In fact, evidence of interdisciplinarity and usefulness is also found in the *Reports* and *SPop* sub-corpora. For example, in the former, such evidence is observed in contexts that highlight the contribution of particle physics to medical imaging or that show explicit collaboration. The elements allowing this interpretation are underlined in the examples below. Example 6 focuses on applications in medical imaging and example 7 shows interdisciplinary collaboration in a research team that brings together experts in physics and in medicine.

6. Des **détecteurs** conçus pour la physique des hautes énergies ont été adaptés pour des applications en *imagerie médicale*, notamment en *tomographie par émission de positons* (*TEP*). (*Reports* sub-corpus)

7. Ainsi, la *tomographie par émission de positons* (*TEP*) fait l'objet depuis six ans de recherches au sein de l'équipe Interface Physique-Médecine. (*Reports* sub-corpus)

The observation of the phenomena identified in the *Press* sub-corpus in at least one of the intermediate sub-corpora highlights the fact that when terms are transferred to general language, they experience progressive changes in their uses. In other words, terms reach general language through various types of intermediaries, such as those represented in the intermediate sub-corpora. Their uses begin to change in the intermediaries and continue to change, first in the general press and later in everyday language.

Contexts showing the centrality of a term in different fields

The third type concerns contexts that refer to other domains, such as astronomy or nuclear power. However, because no evidence of interdisciplinarity or markers of usefulness are observed, these contexts point to the fact that different fields can focus on the same research objects. In other words, certain terms can be central to different domains. In this case, example 8 refers to astronomy and example 9 refers to nuclear power, with no explicit reference to particle physics in either context.

8. Dans le *Soleil*, **photons** et **neutrinos** sont créés au cours des réactions nucléaires qui ont lieu au cœur de notre *astre*. (*Press* sub-corpus)

9. En permanence, la *fission* d'un noyau d'*uranium* dégage un **neutron** qui part lui-même casser un autre noyau de *combustible*. (*Press* sub-corpus)

To sum up, these three types of contexts suggest that certain terms from the field of particle physics are likely to be used in other fields as well (e.g. astronomy, medicine, nuclear power, arts/museums) and thus to appear in texts produced by experts of these fields. In this case, each field tends to have its own point of view on terms and

concepts (L'Homme, 2004: 43-44). As a result, the uses of these terms in the *Press* sub-corpus are likely to reflect the different points of view associated with each field – and not only the points of view of particle physics. In the data, they translate into distributional differences that are identified when the sub-corpora are compared to the *Specialised* sub-corpus.

For instance, in the case of the term *proton*, example 3 highlights the perspective of medical imaging. It is reasonable to assume that this perspective can differ to some extent from the perspective of particle physics, given that in medical imaging protons are exploited in cancer treatment whereas in particle physics they are used to create collisions and disintegrations to study other types of particles. These points of view are obviously not incompatible, but they correspond to two different research fields, which focus on different sets of characteristics for the same concept. That being said, their coexistence in non-specialised texts can be responsible for some of the differences in meaning that result from determinologisation. In other words, it seems that the meaning of a term that is conveyed in general language (or in non-specialised texts as is the case in this study) is not necessarily constructed from one domain that is taken as the «starting point» of determinologisation, but most likely from all the domains in which these terms are used.

4.1.2. Influence of contexts dealing with fictional works

Another important distributional difference between the *Press* and *Specialised* sub-corpora is the repeated occurrence of terms in contexts that refer to fictional works, especially those that fall under the notion of *fiction à substrat professionnel* (*FASP*), i.e. those with a strong professional component, in this case scientific (Petit, 1999; Fries and Nallet, 2022). Unlike the previous phenomenon, it is only observed in the *Press* sub-corpus and not in the intermediate sub-corpora. In the examples below, the references to fictional works are evidenced by the units *roman* (*novel*), *méchant* (*villain*) (example 10) and *scène* (*scene*), *tourner* (*to shoot*), *film* (*movie*) (example 11), which suggest that the contexts are about a novel and a movie respectively.

10. Le *méchant* du *roman* veut voler de l'**antimatière** pour fabriquer une bombe. (*Press* sub-corpus)

11. A découvrir les premières *scènes*, précisément *tournées* au **CERN** avec la bénédiction de sa direction, on ne donne pourtant pas cher du *film*. (*Press* sub-corpus)

These contexts reflect the diversity of the topics addressed in general interest newspaper. Yet, because such uses of terms are attested, they also contribute to the meanings of terms that are conveyed in non-specialised situations and ultimately to more permanent changes resulting from determinologisation. For instance, example 10 highlights the possibility of making a bomb with antimatter, though in a fictional context.

If such contexts are recurrent, they may contribute to a common representation or understanding of antimatter being dangerous. Indeed, several contexts hinting at such representations are observed in the *Press* sub-corpus, as examples 12 and 13 show. Example 12 makes the idea of danger explicit with the phrase *bombe à antimatière* (*antimatter bomb*) and example 13 with the phrase *explosion d'antimatière* (*antimatter explosion*), in which *bomb* is implied.

12. Et, dès le 22 décembre 2012, il faudra affronter de nouvelle menaces: l'astéroïde censé percuter la Terre en 2036, la fusion de l'homme et de la machine (estimation: 2045), la bombe à **antimatière**. (*Press* sub-corpus)

13. Vous imaginez vous retrouver au cœur d'une explosion d'**antimatière**? (*Press* sub-corpus)

4.1.3. Contexts suggesting the notion of sensationalism

One important feature that characterises terms' distributional contexts in the *Press* sub-corpus is the recurrence of lexical units that refer to the notion of *sensationalism*. Sensationalism can be defined here as a set of journalistic practices that tend to exploit the spectacular or gruesome aspects of certain pieces of information to capture the readers' attention (Tannenbaum and Lynch, 1960; Villedieu, 1996; Labasse, 2012). It can be observed in many ways. For instance, some news – especially scientific news – is reported in a style that makes extensive use of lexical units and phrases to elicit an emotional response. In the *Press* sub-corpus, two groups of such units that frequently co-occur with particle physics terms are identified:

– units that evoke extraordinary or incredible aspects of certain concepts of particle physics,
– units that evoke mysterious, enigmatic or secret aspects of these concepts.

Examples 14 and 15 illustrate the first group; examples 16 and 17 the second. As for the previous examples, the terms under study are in bold and the units are in italics.

14. En juillet, dans l'anneau de 27 km du **LHC**, les scientifiques ont lancé les uns contre les autres des paquets de particules (**protons**) et avec une énergie *faramineuse* (3,5 TeV). (*Press* sub-corpus)

15. Elles auront lieu quatre fois par tour, au sein d'*énormes* détecteurs capables de reconnaître chacune des **particules élémentaires** ainsi libérées. (*Press* sub-corpus)

16. En brisant des particules, les physiciens espèrent enfin capter l'empreinte du *fantomatique* **boson de Higgs**. (*Press* sub-corpus)

17. Le *secret* de la **matière noire** sera peut-être levé cet été, grâce à un instrument lancé par un des derniers vols d'une navette spatiale américaine. (*Press* sub-corpus)

Two remarks can be made. On the one hand, this recurring co-occurrence contributes to the addition of connotations to the meanings of terms that are conveyed in the *Press* sub-corpus. For example, the term *matière noire* is regularly modified by the adjectives *secret*, *mystérieux* (*mysterious*), *inconnu* (*unknown*). As these collocations become common in general language, or at least in general interest newspaper, the meaning of *matière noire* can become associated with an idea of mystery or of something that is unknown. These aspects will be further elaborated below.

On the other hand, although sensationalism is usually associated with newswriting and the media in general, this feature can be observed in non-journalistic genres as well. For instance, contexts that are similar to those observed in the *Press* sub-corpus were also found in the intermediate sub-corpora. What is more, some contexts attested in newspaper articles were faithfully reproduced from press releases, which appears to be standard practice, as Dempster et al. (2022) point out. This is illustrated by the following identical excerpts.

18. «C'est une formidable nouvelle, le début d'une ère fantastique de physique et, espérons-le de découvertes, après 20 ans d'efforts de la communauté internationale […] (*Press* sub-corpus)

19. «C'est une formidable nouvelle, le début d'une ère fantastique de physique et, espérons-le de découvertes, après 20 ans d'efforts de la communauté internationale […] (*PR* sub-corpus)

Once again, it can be noted that these contexts highlight the interest of considering determinologisation as a process rather than as a result, especially when it comes to meaning change. Indeed, based on the contexts illustrated in examples 18 and 19, it can be argued that the connotations associated with units evoking the notion of sensationalism do not systematically appear in general press. Rather, they might be transferred to the press by way of press releases, as in the case illustrated in this section, or by other intermediaries. I will come back to this aspect in section 4.2.

4.1.4. Metaphorical uses of terms

The last phenomenon addressed in this section concerns metaphorical uses of terms. As in the case of contexts dealing with fictional works, this type of contexts is only attested in the *Press* sub-corpus. Examples below illustrate some of the metaphors encountered in this sub-corpus.

20. En outre, on ne répétera jamais assez que le métal jaune est «l'**antimatière**» de la planche à billets. (*Press* sub-corpus)

21. La «**matière noire**» du génome, pas si mystérieuse (*Press* sub-corpus)

22. Aujourd'hui, on vit dans un **accélérateur de particules** avec toutes ces informations, ces distances raccourcies par les avions et les trains. (*Press* sub-corpus)

23. l'état-major d'Obama reste sur le qui-vive quand Bill Clinton, un **électron libre**, donne son avis. (*Press* sub-corpus)

24. Marielle de Sarnez la **particule élémentaire** des centristes (*Press* sub-corpus)

The use of terms as metaphors in non-specialised texts, and particularly in the media, is one of the most well-known consequences of the determinologisation process. In fact, it is extensively described in most of the existing studies of determinologisation as well as in more general studies about the use of terms in general language (e.g. Guilbert, 1975; Meyer, 2000; Estopà, 2016; Renouf, 2017). However, the semantic processes leading to the creation of the metaphors have received less attention in the context of determinologisation studies, and the same goes for the relationship between determinologisation and neology. These issues will be addressed in section 4.2. Specifically, I will discuss the evolution from metaphorical occurrences of terms used for stylistic purposes towards more permanent meaning shifts considered as semantic neologisms.

4.2. *Creation of metaphorical new meanings*

This section is divided into two sub-sections. The first one focuses on the mechanisms that lead to the metaphorical uses of terms observed in the *Press* sub-corpus, and several examples will be discussed to illustrate them. In the second sub-section, I will show how the analysis of determinologisation can give new insights into the semantic processes that lead to certain meaning shifts in general language and, in doing so, I will insist on the necessity of acknowledging the role of determinologisation in semantic neology.

4.2.1. Defining the metaphorical potential of terms

As said above, metaphorical uses of terms are already described by many authors, although their identification still poses significant problems. Indeed, when it comes to the detection of metaphors in corpora, researchers agree that metaphorical uses of lexical units can only be confirmed by a human analysis of the contexts in which they appear (Deignan, 2005: 92-93; Philip, 2010: 191; Semino, 2017: 465-466; Mpouli,

2019: 98; Stefanowitsch, 2020: 397). For instance, Deignan shows that, depending on the context, two occurrences of the same lexical unit, which appear in the same collocation, can refer either to a metaphorical or to a literal meaning (Deignan, 2005: 83). Moreover, according to Stefanowitsch, «there is nothing in the word itself that distinguishes its literal and metaphorical uses» (Stefanowitsch, 2020: 397). Therefore, observing the contexts remains the most efficient method to confirm that an occurrence is indeed metaphorical.

This is the principle that was have adopted in this study and five terms were identified with a metaphorical meaning in the *Press* sub-corpus (see examples 20-24 above). These terms share two interesting characteristics. First, they are composed of lexical units that also exist in general language, e.g. *accélérateur* (*accelerator*) and *particule* (*particle*) in *accélérateur de particules* (*particle accelerator*); *matière* (*matter*) and *noir* (*black*, *dark*) in *matière noire* (*dark matter*); *particule* and *élémentaire* (*elementary*) in *particule élémentaire* (*elementary particle*); *matière* in *antimatière* or *anti-matière* (*anti-matter*); and *libre* (*free*) in *électron libre* (*free electron*). Second, they regularly appear in contexts described as sensationalist, whether in the *Press* sub-corpus or in the three intermediate sub-corpora (see 4.1.3). For example, *accélérateur de particules* is often modified by adjectives such as *immense* (*huge*) and *gigantesque* (*gigantic*). It also appears in phrases that emphasise the extraordinary aspects of this type of instruments, and especially of the LHC, which is described in the *Press* sub-corpus as the world's most powerful and biggest particle accelerator.

Through the analysis, a correlation was established between these two characteristics and the metaphorical uses of terms observed in this sub-corpus. I propose to refer to it as the metaphorical potential of terms. This means that any term that shares the same characteristics is likely to appear as a metaphor in general press. Let me take an example: when *accélérateur de particules* is used as a metaphor, it most often designates:

- someone who achieves high performance; it is illustrated in example 25, which highlights the impressive performance of a football player;
- someone who is particularly fast. This is illustrated in example 26, which highlights the speed of a rugby player;
- something or someone who contributes to the success of someone else, illustrated in example 27.

25. **Accélérateur de particules**, animateur sur le terrain et en coulisses, Ribéry s'impose de plus en plus comme le véritable leader de l'équipe de France (*Press* sub-corpus)

26. Barrett, l'**accélérateur de particules** All Blacks ; Successeur désigné de Dan Carter, l'ouvreur néo-zélandais impressionne par sa vitesse d'exécution. (*Press* sub-corpus)

27. «Les Arts déco sont un **accélérateur de particules**», se félicite cet ancien élève des Beaux-Arts d'Angoulême, qui est resté à Strasbourg à la fin de ses études, en 2015. (*Press* sub-corpus)

In the first case, the metaphor seems to be created from the contexts in which the term *accélérateur de particules* co-occurs with lexical units evoking extraordinary and outstanding aspects of this concept. In fact, the recurrence of contexts conveying the idea that particle accelerators are highly performant makes the metaphor possible. Semantic features such as /performant/ and /powerful/ are activated in this type of contexts and in contexts in which the term is used metaphorically. For this reason, it can be argued that this metaphorical meaning is based on the features /performant/ and /powerful/.

The second case is different, though. Example 26 shows a metaphorical use of *accélérateur de particules* which describes someone who is particularly fast. Here, the metaphor is created on the basis of semantic features such as /speed/. This feature is also activated when lexical units such as *accélérateur* (*accelerator*), *accélérer* (*accelerate*) and *accélération* (*acceleration*) are used in general language. According to Oliveira (2009: 93), when metaphorical terms enter general language, the units that compose them and that coexist in general language are likely to have some influence on – or even to interfere with – the meaning of the terms observed in general language.

For the term *souffle au cœur* (*heart murmur* in English) in the field of cardiology, Oliveira explains that non-experts usually understand the first meaning of *souffle* only (which literally translates into *breath*) and that they are not necessarily aware of the analogy behind the term. What is more, their understanding of the term is largely influenced by the meaning of the lexical unit *s'essouffler* (*to be short of breath*) in general language, which is derived from *souffle*. As a consequence, the idea that «when one has a heart murmur, one cannot play any sport because he or she might be short of breath very quickly» (Oliveira, 2009: 102; my translation) is widespread. In this case, having a heart murmur is considered a serious condition, whereas most people who have one live a perfectly normal life.

Therefore, according to Oliveira, both the meanings of *souffle* and *s'essouffler* influence the meaning of *souffle au cœur* in general language. In the case of particle physics, a parallel can be drawn between Oliveira's conclusion and my observations, even though *accélérateur de particules* is not a metaphorical term. Indeed, when this term is used to describe someone who is very fast, it can be assumed that the metaphor is created both from the meaning of *accélérateur* in general language and from the meaning of other units that belong to the same derivational family (e.g. *accélérer* and *accélération*, as said above). In the case of *accélérateur*, and following the hypothesis of Meyer and Mackintosh on the terms *mega*, *virtual* and *to delete* (2000: 130-131), a general and a specialised meanings are likely to coexist in general language and to interfere with non-experts' understanding of the term.

The third case is similar. In example 27, the term designates the ability of something to accelerate someone's career, the metaphor being once again based on the semantic feature /speed/, which is activated in *accélérer* in general language.

For the other terms, similar observations are made:

- in the metaphorical uses of *matière noire*, the semantic features /mystery/ and /unknown/ are activated, so are they in contexts in which *matière noire* co-occurs with lexical units such as *mystère* (*mystery*), *mystérieux* (*mysterious*), *secret*, *énigmatique* (*enigmatic*);
- metaphorical uses of *antimatière* are likely to be created either from contexts in which the concept is described as mysterious (example 28 below), or from contexts that highlight the opposition between antimatter and matter (example 29 below). In the latter case, *antimatière* is used metaphorically in order to designate the opposite of something, as in example 20 above;
- *particule élémentaire*, when used metaphorically, refers to the essential, fundamental or elementary role of something or someone, which is conveyed by the meaning of *élémentaire* in general language[9];
- *électron libre* is used metaphorically to designate someone who stands out or who acts independently from the majority. In this case, though, it should be emphasised that the metaphor is not new in French. For instance, according to the *Grand Robert*, it is attested at least since 1994[10].

28. Les chercheurs n'ont pas fini pour autant d'expliquer tous les *mystères* qui entourent l'**antimatière**. (*Press* sub-corpus)

29. Une question tourmente les cosmologues depuis plusieurs décennies: si **antimatière** et matière ont les mêmes propriétés (inversées), pourquoi l'univers n'en contient pas des quantités égales ? (*Press* sub-corpus)

4.2.2. Towards the emergence and stabilisation of semantic neologisms in the press

The previous section discussed the ways in which metaphorical uses of terms are likely to be created in the press, and the notion of metaphorical potential was introduced to describe them. This section focuses more specifically on the relation between these uses and semantic neology.

9. It can also be influenced by the meaning of *fondamental* in *particule fondamentale* (*fundamental particle*), which is a terminological variant of *particule élémentaire*.

10. Le Grand Robert en ligne (https://grandrobert.lerobert.com/robert.asp, last access: 27 June 2022).

With the exception of *électron libre*, the metaphors illustrated in the previous section are subject to several modulations and do not seem to be stabilised in general language. For each term, different nuances are observed in the *Press* sub-corpus. For instance, the term *antimatière* is used as a metaphor either to designate something that is mysterious or to insist on an opposition between two concepts. These metaphors are created on the basis of two distinct sets of semantic features, which are activated in different types of contexts in the corpus. Similarly, *accélérateur de particules* is used in three different metaphorical meanings, as explained in section 4.2.1.

These observations refer to the relative instability of neologisms (e.g. Reutenauer, 2012a; Sánchez Ibáñez and Maroto, 2021: 359). For example, Reutenauer shows that the emergence of a new general meaning for a term can be observed through the diversification of its uses in the press (Reutenauer, 2012a: 1940). In this case, the new general meaning is usually metaphorical.

From this perspective, the examples of metaphors given above can be interpreted as emerging semantic neologisms, which are still in a stabilisation phase. This means that the apparent instability that was observed in the *Press* sub-corpus actually reflects the diversification which characterises the early phase of an emerging new meaning. Indeed, Reutenauer explains that this process of diversification corresponds to a «transitory phase» in discourse, or to an «evolution in progress», which precedes the establishment of a new stable meaning in language (Reutenauer, 2012b: 61). Thus, it can be assumed that the metaphorical meanings identified in the *Press* sub-corpus might stabilise in the near future and be recognised as neologisms.

I believe that these observations lead to a better understanding of the role of determinologisation in neology, and particularly in semantic neology. It can be argued that, since the metaphorical uses of terms can be interpreted as consequences of determinologisation, and since these metaphorical uses can lead to the emergence and stabilisation of new meanings for those terms, then determinologisation must indeed be considered as contributing to neological processes. In addition, it was shown in section 4.1 that certain uses at the origin of metaphors (i.e. the appearance of new connotations through co-occurrence with certain types of lexical units, and especially those that refer to sensationalism) are attested in the intermediate sub-corpora. This observation allows for a better understanding of the ways in which the determinologisation process works, particularly through the intermediate stages of the process. It also provides a better understanding of the semantic mechanisms leading to the emergence of new metaphorical meanings of terms in general language.

5. CONCLUDING REMARKS AND FUTURE WORK

In this paper, I proposed a discussion about the relation between determinologisation and neology. To this end, I based my study on an analysis of particle physics

terms in French in a corpus that represents different stages of the determinologisation process, between highly specialised and non-specialised language. This perspective on determinologisation proved relevant in different ways:

- it highlighted the fact that the semantic phenomena associated with determinologisation do not necessarily appear in non-specialised contexts, but they might also be attested in some intermediaries, which allows for a more complete understanding of determinologisation as a process;
- it brought to light the fact that some of these changes (especially the appearance of new connotations) might explain the mechanisms that lead to the use of terms as metaphors, though they are not the only factor. As detailed in 4.2.1, the coexistence in general language of some components of the terms and of other lexical units that belong to the same derivational family might also influence the metaphorical meanings of terms;
- it allowed me to argue that the metaphorical uses of terms, which were observed in the *Press* sub-corpus for the terms *accélérateur de particules*, *matière noire*, *antimatière* and *particule élémentaire* (as discussed above, the case of *électron libre* is a little different), can in reality be considered as evidence of the emergence of semantic neologisms. This observation exemplifies another point of view on semantic neology and acknowledges the role of determinologisation in neological processes.

While the discussion is largely based on a close examination of the behaviours of five terms of the domain of particle physics in a corpus of French texts, future work is necessary to confirm these conclusions. In particular, more terms that share the two characteristics described above must be analysed to further explore the correlation between these characteristics, the metaphorical uses of terms in the *Press* sub-corpus, and the emergence of semantic neologisms in general press.

In addition, as mentioned in 3.1, the corpus explored in this study was compiled in the context of a broader project, and it covers the period from 2003 to 2016. However, because some changes can occur rather quickly, it seems necessary to observe more recent texts. This will provide more evidence concerning the evolution of the metaphorical uses of terms described in this paper, particularly concerning their status of neologisms in general language. For instance, with more recent data it will be seen whether the new metaphorical meanings actually stabilise over time, as was hypothesised here. In this way, I aim at deepening the reflection on semantic neology and on the mechanisms highlighted in this first study.

ACKNOWLEDGEMENTS

I would like to express my thanks and gratitude to Aurélie Picton and Anne Condamines for the many discussions we had on terminology, corpora and

determinologisation, among other topics, to Nicolás González Granado for his careful review of an earlier draft of this paper, and to the anonymous reviewers for their valuable and very relevant comments.

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