The Tension between Definition and Reality in Terminology

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Whereas natural language concepts are based on prototypes, classical terminological definitions (CTDs) are based on necessary and sufficient conditions. The sociocognitive approach to terminology rejects both the possibility and the desirability of CTDs. In this paper, I argue that CTDs are needed for certain types of term, but not for others.

In a first step, I distinguish two overlapping classes of expressions, based on two different criteria for termhood. Specialized vocabulary is the set of items whose use is restricted to specialized communication. Specialization is a gradual property, so that the boundaries of this class are vague. TERMS in the narrow sense have a concept with a clearcut boundary. In scientific and legal contexts, clearcut boundaries are necessary because classification is important. Only for TERMS in this narrow sense do we need CTDs.

Some of the problems raised for CTDs can be solved straightforwardly by restricting their domain to TERMS. Discussions about the best definition, e.g. for governing category in Chomskyan linguistics, indicate a search for the best concept rather than a prototype nature. In cases such as significant in statistics, the CTD is logically independent of the prototype concept associated with the word significant in general language. In such cases, finding CTDs does not pose insuperable problems.

More difficult problems arise when scientific concepts interact with our intuition about classification and with technological advances. The discussion of species in biology, compound in linguistics, and planet in astronomy demonstrates how these problems arise and how they can be addressed without recourse to prototype-based concepts. TERMS in the narrow sense may be unnatural and their definition not straightforward, but they are crucial in scientific communication and depend on CTDs.

Traditionally, terminology is concerned with the standardization of terms. This involves defining the boundaries of a particular concept and selecting a generally accepted name for it. As shown in section 1, this classical approach has been criticized from different perspectives. Whereas the use of corpora has been integrated into the mainstream, Temmerman's (2000) rejection of classical definitions is much more controversial. In order to determine the place of classical definitions in terminology, section 2 distinguishes two criteria for termhood, following ten Hacken (2008). The sets of items identified by these criteria are called *specialized vocabulary* and TERM (in the narrow sense), respectively. Sections 3 and 4 discuss the basic properties of specialized vocabulary and TERMS, respectively. Section 5 addresses issues that arise when we need a TERM, but the definition interacts with our intuitions about the concept and with developments in the field. Section 6 summarizes the conclusion, which is that TERMS in the narrow sense should have classical terminological definitions and that there exist techniques for establishing them.

1. Approaches to the Definition of Terms

As long as it has existed, the field of terminology has been concerned with the identification and definition of terms. A definition links the form of a term to its meaning. Therefore, work in terminology has been influenced by linguistic and philosophical insights into the nature of linguistic expressions and their meaning. A central question in this context is whether and to what extent terms differ from other linguistic expressions.

The traditional approach to terminology, as represented by Wüster (1991), was influenced by the logical positivism of the *Wiener Kreis* ('Viennese Circle'). Carnap's

(1931:221-2) discussion of the meaning of *Stein* ('stone') exemplifies his discussion of word meaning, but it could equally be interpreted as outlining a method for terminological definition. An aspect that is quite typical for the traditional approach is its emphasis on the systematic, top-down identification of terms. Starting from a field of study, first of all concepts are identified. The result is a network of concepts linked by hyponymy and meronymy relations. Terminology is onomasiological in the sense that it starts from concepts and works towards their names. Only after the network of concepts has been established will the traditional terminologist start naming these concepts.

There are two striking aspects in which this working method differs from lexicographic practice. First, in lexicography the starting point is the collection of a corpus. This means that its working method is semasiological, working from linguistic expressions towards their meaning. The modern use of corpora is much younger than the traditional approach to terminology. It is not so long ago that Zgusta (1971:225-40) described the collection of material for a dictionary in terms of excerption. However, the central position of corpora in, for instance, Atkins & Rundell's (2008) description of lexicographic methodology follows quite naturally from the semasiological orientation. By contrast, an onomasiological approach does not offer such a natural position for corpora in the workflow.

The second aspect in which lexicography differs from terminology concerns the constraints imposed on definitions. Atkins & Rundell (2008:407) call *definition* 'a misnomer' in lexicography, preferring 'explanation' as a 'more realistic description of what lexicographers actually do'. They contrast this with the classical approach to definition, giving a set of necessary and sufficient conditions. This approach is adopted in traditional terminological work. The uneasiness with this type of definition in lexicography has a long tradition.

These two aspects in which traditional terminology differs from lexicography have been the subject of separate strands of criticism. Sager (1990) and Pearson (1998) advocate a corpus-based approach to the identification and description of terms. According to Sager, '[s]erious terminology compilation is now firmly corpus-based' (1990:154). If terminology work is undertaken on this basis, it cannot be (purely) onomasiological. As far as any onomasiological aspect plays a role, it has the function of systematically ordering the information found on the basis of the semasiological research. However, integrating the use of corpora with more traditional terminological work does not involve a complete reorientation of the field. Various contributions to Wright & Budin (1997) demonstrate this. This is not in contradiction with Arntz et al.'s (2009:189) observation that terminological dictionaries increasingly opt for an onomasiological presentation.[1] The semasiological approach is above all a way of collecting data. Wright (2006) indicates how important corpus-based research is for standardization, because a standard is of no use if it is not accepted, and it will be more easily accepted if it corresponds more closely to what is in use.

Criticism of the classical approach to definitions is formulated by Temmerman (2000). In her sociocognitive approach to terminology, she highlights the problems of

[1] In their original words: 'Demgegenüber setzt sich bei Fachwörterbücher die begriffliche Gliederung immer mehr durch.' The opposition indicated by *demgegenüber* is to general language dictionaries.

definitions delimiting a concept by means of necessary and sufficient conditions. In linguistic research, it has long been established that concepts in the mental lexicon tend to have a prototype nature. A classical study illustrating this is Labov (1973). By asking a range of informants to judge whether a particular object is a cup or not, he establishes that *cup* is a prototype-based concept. If an object is further removed from the prototype, more informants will reject the label *cup* for it. Jackendoff (1983) summarizes the consequences for definitions of general-language concepts as follows. A prototype may involve necessary conditions, but they are not sufficient. In the case of *cup*, examples of necessary conditions are that it is a concrete object and that it can hold liquid. The distance to the prototype is measured by means of scalar conditions and preference rules. In the case of *cup*, an example of a scalar condition is the height-width relation and an example of a preference rule the presence of a single handle. Preference rules are not necessary conditions, but they interact with scalar conditions. If the object under consideration has a handle, it can be further removed from the prototypical height-width relation and still be judged a cup.

In the light of these considerations, Temmerman's (2000) argument for abandoning the idea of a definition as a set of necessary and sufficient conditions is a further step towards a unification of lexicographic and terminological methodology. However, it is much less clear than for corpus-based methods how the sociocognitive approach can be integrated with traditional practice in terminology. The purpose of this paper is to investigate how terminological practice can benefit from the observations underlying Temmerman's criticism.

2. A Typology of Terms

Definitions establish a relationship between terms and the outside world. On the basis of an ISO norm, Arntz et al. (2009:39) express this as a relation of a concept to an object, a definition, and a designation. Following Jackendoff (1983, 2002), I will assume here that it is not the object itself but its mental representation by the observer that is put in a relationship to the concept and the definition. We can only talk about our projected world, i.e. the interpretation of the input collected by our senses. Even if the objective world exists, we cannot talk about any aspect of it unless we observe or imagine it. The outside world is real, but without our interpretive efforts it is not organized into objects or concepts. Concepts are not in the real world, but in our minds. They are categories we use in the interpretation of the observations of the world. These categories, the interpretation they give rise to, and the resulting projected world are individual. Communication is successful to the extent that the sender and receiver have a similar basis for interpretation and a similar projected world.

In ten Hacken (2008), I observed that there are two reasons for calling something a term. One is that the expression belongs to specialized language, the other that the concept referred to has a precisely delimited extension. The most prototypical terms are those that satisfy both conditions. An example is *context-free language* in mathematical linguistics. However, the two conditions are of a quite different type. Whereas specialization is a scalar condition, having a precisely delimited extension produces a dichotomy. Therefore, we can gradually relax the former, but for the latter, we have to decide whether to adopt it or not.

On the basis of this analysis, I proposed to use different names for two classes defined by the criterion that distinguishes the expressions and their meanings from general vocabulary. SPECIALIZED VOCABULARY is the name for expressions used only in specialized language. This includes cases in which a form occurs in general language as well, but has a different meaning in specialized language. An example of the latter is *hammer* in piano manufacturing. I will use TERM only for expressions with a precisely delimited meaning. In order to avoid confusion, I will always write TERM in this sense in smallcaps. Given that the conditions for specialized vocabulary and TERMS are independent, the two classes overlap freely. Thus, *context-free language* in mathematical linguistics is both a TERM and a specialized vocabulary item.
The reason for introducing these two classes is that they behave differently with respect to prototypes. I will therefore discuss each of them in turn.

3. Defining Specialized Vocabulary

A certain degree of specialization is necessary for TERMS as well as for other items of specialized vocabulary, because they are linked to a particular subject field. However, it is not sufficient as a condition for TERMS, and it does not identify a clearly delimited class of items. The latter is a consequence of the gradual nature of specialization.

The gradual nature of specialization is in part a consequence of the way concepts are lexicalized in general vocabulary. In general vocabulary, *dog*, *cat*, and *bird* are at the same level of specificness. However, in zoological taxonomy, *dog* and *cat* are species and *bird* is a class. The class to which dogs and cats belong is *mammal*, which is a much more specialized expression, because it is not as regularly used outside of the field of zoology. The reason that *mammal* is more specialized than *bird* is that the distinction between individual species of mammals is more prominent than the distinction between species of birds. The discrepancy in natural degree of specificness in taxonomic classification is further illustrated by the level of *family*, which is between class and species. Whereas swallows, owls, and ducks are three families of the class *bird*, cats and dogs both belong to the family of *carnivores*.

Two further properties of specialization are that it depends on the individual speaker and is quite difficult to measure. Names of musical instruments, e.g. *oboe*, *clarinet*, *bassoon*, will be more or less specialized for people depending on their interest in the type of music the instruments feature in. It is not at all obvious how this specialization should be measured, but if it is not done at the level of the individual speaker, only a very crude generalization can be made.

The task of defining specialized vocabulary is not significantly different from that of defining general words. The concept of *oboe* is a prototype. It has some necessary conditions, for instance that it has a double reed, which makes it straightforward to distinguish it from single-reed instruments such as clarinets. The boundary between *oboe* and *bassoon* is also easy to recognize because there are no borderline cases. The distinction in size, shape and pitch is so clear that there is no need to formulate it precisely. In theory, it would be possible to build an instrument intermediate between an *oboe* and a *bassoon* and even a range of instruments gradually bridging the gap between them, but in practice these instruments do not exist so there is no need to determine where in this range the boundary would be. An issue of more practical relevance is whether an *oboe d'amore* or a *cor anglais* are a kind of *oboe* or not,

because these are existing instruments that are larger than but otherwise very similar to oboes. They have a different range, which is significant because the way the instrument is built determines the lowest possible note it can produce. However, the same technique is used for playing each instrument and the notation is such that an oboist can play the other instruments without changing the finger arrangement.

The situation with respect to the definition of *oboe* is typical of much of specialized vocabulary. Concepts like these have a prototype nature without clearly defined boundaries, because there are no borderline cases in the real world. It may be necessary to decide whether *oboe d'amore* or *cor anglais* are included under the label *oboe* or not, but even if three concepts are accepted, this does not change the inherent vagueness of each of them. The example does point to a possible role of standardization in specialized vocabulary. Orchestras in a particular country may agree, for instance, whether they expect any oboist to play the oboe d'amore and the cor anglais as well and refuse them the title of *oboist* if they do not accept to (or cannot) play them.

Another case in which standardization plays a role in specialized vocabulary is highlighted by Arntz et al. (2009:4). They discuss the names of different types of wedge in German and note that there are four types, each of which could be designated by up to six different names. These names could often be applied to more than one of the types. Standardization simplified this situation by recognizing a single standard name for each of the four types and deprecating the others.[2] This is illustrated in Table 1.

<table>
<tr><td>Standard</td><td colspan="6">Pre-standardization names</td></tr>
<tr><td>Treibkeil</td><td rowspan="3">Keil</td><td rowspan="2">Einlegekeil</td><td rowspan="3">Federkeil</td><td>Nutenkeil</td><td>Achskeil</td><td>versenkter Keil</td></tr>
<tr><td>Paßfeder</td><td rowspan="3">Flachkeil</td><td rowspan="2">Feder</td><td>Einlegfeder</td></tr>
<tr><td>Gleitkeil</td><td></td><td>Führungskeil</td></tr>
<tr><td>Flachkeil</td><td></td><td></td><td></td><td></td><td>Flächenkeil</td></tr>
</table>

Table 1. German names for different types of wedge, adapted from Arntz et al. (2009:4)

The significance of the situation illustrated in Table 1 is that each of the standardized terms is not a TERM in the narrow sense introduced in section 2. The concepts remain prototype-based, only the names have been standardized. For items such as these, it is therefore obvious that a treatment along the lines of Temmerman (2000), or, equivalently, of lexicographic manuals such as Atkins & Rundell (2008) or Svensén (2009), is adequate.

4. Defining Terms in the Narrow Sense

In ten Hacken (2008), I gave *context-free language* as an example of a term that is both specialized and has a clearly determined boundary. In mathematical linguistics, the creation of the concept and the name tend to go together. Ten Hacken &

[2] As it is mainly the configuration of the meanings that is relevant than the meanings of the individual items, I have not added English glosses. It is interesting to note that in the German *Wikipedia* (consulted 25 February 2010), *Treibkeil* is redirected to *Spaltkeil*, *Flachkeil* to *Keil*, and *Gleitkeil* has no entry at all. This casts doubt on the degree of acceptance of the standardization described by Arntz et al. (2009).

Fernández Parra (2008:4-5) discuss the origin of the term *context-free grammar*, which is conceptually prior to *context-free language*, as well as its translation into French. There was only a short period between Chomsky's (1959a:142) proposal of the concept and Chomsky's (1959b:393) proposal of the name. In cases such as these, it is obvious that a new, intersubjective concept is created. This concept can be used to evaluate the concepts in individual speakers' minds, as is common in exams. It is not identical to, for instance, the concept in Chomsky's mind. Thus, it will not go out of existence when Chomsky dies. The concept is also not identical to a written definition. Whereas Chomsky's definition is written in English, the concept in mathematical linguistics is language-independent. The language used in the definition only serves the communication. The TERM in mathematical linguistics is an abstract object, consciously created by a specialist. It has a definition with precise boundaries, consisting of necessary and sufficient conditions.

The field of mathematical linguistics is special because of its limited empirical impact. Formal grammars do not emerge naturally, but must be created by mathematical linguists in order to come into existence. It is therefore easy to accept the abstract nature of the TERMS in this field. There are a number of issues that arise when we extend this concept of TERM to other domains. Temmerman (2000) uses some of these issues as arguments against the classical approach to terminology. It is therefore important to address how they affect the validity of the concept of TERM as proposed here.

The first issue I would like to address concerns the discussion about the definition of a particular term. Terms in empirical science classify entities in the real world. Therefore, they relate to independently existing, natural phenomena in a way *context-free grammar* does not. Nevertheless, theories in empirical science need a certain degree of precision for claims to be testable. Therefore, TERMS with a precise boundary are necessary as tools for formulating theories and theoretical claims.

An example where this requirement leads to a discussion about the correct definition of a concept is *governing category* in Chomsky's Government and Binding (GB) theory. In Chomsky's (1981) Binding Theory, the governing category is the domain in which anaphors (e.g. *herself*) must be bound, and pronominals (e.g. *her*) must be free. Chomsky (1981:188) defines governing category as in (1).

(1) α is the governing category for β if and only if α is the minimal category containing β and a governor of β, where α = NP or S.

In the same work, Chomsky (1981:211) gives the alternative definition in (2).

(2) α is the governing category for β if and only if α is the minimal category containing β, a governor of β, and a SUBJECT accessible to β.[3]

Both (1) and (2) are definitions formulated as necessary and sufficient conditions, but they differ in the final condition. At first sight, one might take this as an indication that *governing category* is a prototype of which (1) and (2) are different

[3] Compared to Chomsky's (1981:211) original formulation, I have inverted the use of α and β in (2), in order to facilitate the comparison with (1).

approximations. A better interpretation, however, is that the difference between (1) and (2) is the result of a search for the best concept in a particular theoretical framework. There are two reasons why (2) is presented as an improvement on (1). First, whereas (1) stipulates NP and S as the two possible syntactic categories for α, (2) gives a reason why α can only be one of these categories. Without a definition of *accessible SUBJECT* it is not possible to see this, but in the large majority of cases (1) and (2) have the same effect. However, and this is the second reason, there are some cases in which a different node in the tree is selected by (1) and by (2). Some of the empirical problems associated with (1) are solved by adopting (2) instead. Van Riemsdijk & Williams (1986:271-7) and Lasnik (1989) explain the conceptual and empirical issues involved.

The parallel between *governing category* and *context-free language* is that both are part of a formal system. The difference is that the formal system in which *governing category* occurs is used as a theory of an empirical phenomenon, natural language. As a consequence of this difference, the competing definitions can be evaluated on the basis of their empirical impact. The idea of tinkering with a theoretical concept in order to optimize a theory in empirical science does not imply that the concept is a prototype. It is quite common in works in Chomskyan linguistics to state the definitions of key concepts before using them. Thus, Hoekstra (1984:41) gives (1) with only typographic modifications (A and B for α and β, and 'iff' for 'if and only if'). This indicates that wherever *governing category* is used, a precise definition is implied. When it is not obvious which one is adopted, this is made explicit.[4]

The second issue concerns the apparent use of TERMS from scientific theories in general language. A good example is the use of *significant.* In statistics, *significant* is a TERM used to express that the likelihood of an observed event occurring by chance is below a certain limit. Given a particular result of a double-blind test with a new medical substance and a placebo, what is the chance that this result is accidental? Saying that the difference between the two was significant means that there is a probability *n*, often .05 or .01, so that if the new substance has no real effect, the chance of the outcome is less than *n*. In general language, *significant* is used as a synonym of *important*. It is a prototype concept with a fuzzy boundary. The general language concept of *significant* has no bearing on the TERM *significant* in statistics. It is obvious that, when the form *significant* was chosen as the name for the property in statistics, its general language meaning played a role. However, once set up as a TERM, *significant* became independent of its general language counterpart.

In conclusion, TERMS that are part of a formal system that is designed as a theoretical framework for a science do not have a prototype nature. There may be discussion about their definition, but this does not make the concept fuzzy. It should rather be interpreted as evidence of discussion about the best formulation and, where the definitions have different empirical consequences, the best concept. In cases where a TERM is also used in general language, we have to conclude that there is homonymy between a TERM corresponding to an abstract entity and a word in the mental lexicon of speakers who know the word.

[4] It should be noted in this context that the issue of formalization is itself controversial in generative grammar. Pullum (1989), for instance, attacks Chomsky for not formalizing his theory sufficiently, a criticism that Chomsky (1990) rejects. Cf. ten Hacken (2007:218-229) for a discussion of the background of such attacks and Chomsky's defence.

5. Definitions and Intuitions

TERMS with a precise boundary around the concept are created when there is a communicative need for precision. There are two main contexts in which such a need arises, science and law. Ten Hacken (to appear) discusses legal terms. Here I will concentrate on scientific terms. The argument of the previous section was to limit the extent of the problems identified by Temmerman (2000). In many cases, it is obvious and relatively unproblematic to assume the existence of a TERM as an abstract object created by a conscious action and delimited by a definition with necessary and sufficient conditions. The question now is whether this approach can be extended to the whole domain of scientific terminology.

Problems are to be expected in cases where a TERM is not only homonymous with a general language word, but the natural word also influences our expectations of the extension of the TERM. In the case of *significant*, the natural language concept is at the origin of the TERM, but no longer influences details of its extension. Once we have defined *significant* as a TERM in statistics, we can accept without problems that its entire meaning is in the definition.

For legal terms, it is much more difficult to take such a position. According to Puppe (2008:19), the interpretation of a concept, i.e. the decision whether it applies in a particular situation, depends in part on the consequences of the application of the law. Our sense of justice determines whether a particular definition is intuitively right. Similar issues can arise in science when a concept as designated by a TERM has to coincide with certain intuitions.

An example of a term for which the intuition plays a significant role in evaluating a definition is *species* in biology. A proper definition of the TERM *species* will give a clear answer to the question in (3) for each pair of individuals A and B.

(3) Given two individual organisms A and B, do A and B belong to the same species or not?

Intuitively there is a strong sense that we know the answer to many instantiations of (3). However, it is much more difficult to come up with necessary and sufficient conditions corresponding to this intuition. Yet, any definition does not only have to be formally correct, but also to correspond to our intuitions in any case where these are clear. Mayr (2004:171-193) discusses a number of different criteria that have been used.

Linnaeus used what Mayr (2004:175) calls a *typological species concept*. This is based on the classification of individuals and populations according to properties selected for a taxonomy. The problem with this approach is that it tends to let us down in borderline cases. When A and B are not obviously of the same species or of different species, the question whether we choose the properties that distinguish A and B as typologically relevant is crucial. Unfortunately, this is just the situation in which we want our definition to support our judgement.

A widely used alternative criterion is interbreeding. Mayr (2004:177) calls the resulting concept the *biological species concept*. He notes that there are a number of

problems with this concept. If we apply it to individuals as in (3), there may be many irrelevant reasons why interbreeding does not take place. We can only usefully apply the criterion to populations. This in itself weakens the criterion, because it requires a proper definition of *population*. Non-biological reasons for the absence of interbreeding of populations include geographical and temporal isolation. Whereas geographical isolation can be bridged, at least in principle, this is not the case when, for instance, A in (3) belongs to a population extinguished two centuries ago. Another problem is that the application of interbreeding as a criterion is limited to species with sexual reproduction.

Genetically-based criteria for answering instantiations of (3) are arguably our best hope. However, they are far from straightforward to establish. The genetic makeup of two individuals is always to some extent different and to some extent similar. The question is then which similarities and differences are significant. Compared to the biological species concept, the genetic species concept is universally applicable. Compared to the typological species concept, it is determinate. We can determine an individual's genome and the sequence of its components does not leave anything to subjective judgement. In determining what differences and similarities to look for, however, subjective judgement is crucial. What we should do to operationalize this criterion is then to start from clear cases, using typological and biological concepts, and work towards less clear cases on the basis of (some type of) analogy. This, however, is very close to a methodology based on prototypes. It is also likely to develop in the light of new discoveries.

Against this background, it is relevant that Temmerman's (2000) study concentrates on examples of terms from the life sciences. This is a field that is concerned with real-life concepts. Moreover, its rapid development and technological advances can produce borderline cases by populating areas through which a definition draws the boundary of a concept. This is a well-known effect, but I think it should not be used as an argument against terminological definitions. It only means that definitions have to be revised in the face of increased understanding of the concept. Both the old and the new definitions can be collections of necessary and sufficient criteria.

The occurrence of a situation such as for *species* is by no means restricted to the life sciences. An example from a different field is that of *compound* in linguistic morphology. Dressler (2006) and Lieber & Štekauer (2009) discuss a variety of criteria that have been used in definitions, but do not subject them to a critical discussion in order to arrive at a terminologically sound definition. In principle, such a discussion can be based on theoretical, intuitive, and technical considerations. Theoretical considerations determine whether the criteria are formulated in a way that is acceptable in one's chosen theoretical framework. Intuitive considerations determine whether for clear cases the right results are obtained. Which cases are clear and what the right classification is may vary from one person to the next. Technical considerations determine whether an individual criterion can be applied generally and gives clear results. If there are few borderline cases, this is an indication that the universe is cut in natural places.

In ten Hacken (1994:23-143), and more concisely in ten Hacken (1999), I systematically discuss criteria that have been used to answer the question in (4).

(4) How can it be determined whether an expression is a compound or not?

Based on the discussion of the merits of possible criteria as proposed in the literature, I propose the definition in (5).

(5) A compound is a structure $[X\ Y]_Z$ or $[Y\ X]_Z$, such that:
• The denotation of Z is a subset of the denotation of Y;
• If S is a possible way of specifying Y, the denotation of Z is determined by the range of S's that are compatible with the semantics of X;
• X does not have independent access to the discourse.

The definition in (5) has a strong semantic bias. It excludes exocentric compounds, such as *ballpoint*, and one type of synthetic compounds, illustrated by *long-haired*, but includes combinations with relational adjectives such as *parental guidance*. These decisions are in line with certain other analyses, but not with others. Van Santen (1992) also argues for a division of synthetic compounds such that the class illustrated by *long-haired* is not analysed as compounding. Levi (1978) also argues for the analysis of relational adjective constructions on a par with nominal compounds.

Dressler (2006:30) concludes his overview of definitions with the remark that 'As we can see, an intensional definition of compounds must be preferential, by referring to prototypes, rather than discrete.' If this conclusion holds, (5) is not a definition of compounding. Dressler presupposes that *compound* is a natural category of a prototype nature. Such a conclusion would be in line with Temmerman (2000). If we take *compound* to be a TERM in the same way as *governing category*, however, we can evaluate (5) on the same basis on which we can evaluate (1) and (2). The question is whether we want to make testable claims about compounding or not. If we do, we have to choose a definition and create a TERM. Whether the definition is a good one should be determined on the basis of how it contributes to a theory, not on the basis of how well it corresponds to (whose?) intuitions.

A final point to address is Temmerman's (2000) claim that terms in traditional terminology have immutable definitions. This is problematic when advances in knowledge create borderline cases not foreseen when a term was originally defined. A well-documented example of what happens in such cases is the development of the concept of *planet* in astronomy. As described by Schilling (2007), it had long been assumed that a definition using only their elliptic orbit around the Sun and the fact that they do not emit but only reflect light would be sufficient. This definition was sufficient as long as all objects satisfying these conditions were seen as relatively homogeneous. This situation is similar to the case of wind instruments discussed in section 3. However, as opposed to *oboe*, *planet* is part of a scientific theory. This difference explains the different reaction to further developments in the field.

In the course of the 19th century an increasing number of objects were discovered in the space between the orbits of Mars and Jupiter. They satisfied the contemporary definition of *planet*, although they were significantly smaller. They were atypical representatives of the type *planet* and as such populated the area around the mental concept of *planet*. This discrepancy was resolved by creating a new category, *asteroid*. This meant that when *asteroid* was created as a TERM, *planet* changed definition. The original TERM was abolished in favour of a new TERM. Another such

move occurred in 2006 when a definition in terms of gravity was adopted by the International Astronomical Union, which excluded Pluto from among the planets. It was triggered by the previous discovery of large numbers of outlying objects in remote areas of the solar system. Twice in the history of astronomy since the 19th century, technological advances leading to the discovery of more objects in the solar system have led to a blurring of the concept of *planet* followed by a tightening of the definition.

This example illustrates Temmerman's (2000) point that terminological definitions are not time-independent. At the same time it shows that progressive improvements can be achieved and are compatible with a model in which TERMS have a definition consisting of necessary and sufficient conditions.

6. Conclusion

Our starting point was the question whether and to what extent traditional terminological definitions, consisting of necessary and sufficient conditions, can be given for terms. First, we observed that two criteria are used to recognize terms. Terms are a part of specialized vocabulary and they have precise definitions. Temmerman (2000) argues against the latter. Here it was shown, however, that the two criteria identify different sets of items. Specialization is a matter of degree and does not fully correlate with the formulation of definitions consisting of necessary and sufficient conditions.

For many items that belong to specialized vocabulary there is no need to delimit the concept precisely. The best approach is to treat them in the same way as a lexicographer describes a word. Such lexicographic definitions are fully adequate as long as there is no legal or scientific controversy about the concept.
For TERMS for which a precise delimitation is crucial, it is possible to formulate a definition consisting of necessary and sufficient conditions. Where the concept is created together with its name, there is usually no problem to impose the definition proposed. This happens, for instance, when a new theoretical concept is created in a scientific field or when a law introduces a new legal category. It is of course possible to discuss the felicity of the definition, but this does not reduce its status as a TERM. Such terms are abstract objects against which individual speakers' competence can be evaluated.

Problems may arise when speakers have intuitions about what a term should mean. Examples from different fields of science (*species*, *compound*, *planet*) show that it is not the abstract object, i.e. the TERM, which is vague, but rather that there can be different opinions about competing definitions. These definitions can follow each other chronologically, as for *planet*, have a local applicability to part of the domain, as for *species*, or be in competition with the use in a pre-theoretical sense, as for *compound*. These cases do not illustrate the impossibility of classical terminological definitions. Rather, defining terms can be seen as an applied science, whose aim is to come up with an optimal definition in relation to these requirements and with an explanation of why this definition is adequate and/or better than other possible ones.

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