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Degrees of term transparency

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Abstract: This paper describes several levels of semantic transparency of terms. Transparent terms comprise constituents representing synchronically salient characteristics of concepts. Less transparent terms contain vague general language words, unique metaphorical elements, etc. Syntactic non-compositionality of constituents also plays a role. "Transfers" between the pool of transparent and non-transparent components are possible. The different categories of transparency are important for translation research and comparative studies.

Keywords: terminology, classifications of terms, semantic transparency, terminology research.

Introduction: semantic transparency

Semantic transparency is a popular topic in linguistics. Originating from morphology, the concept has received particular attention in psycholinguistics (Bell/ Schäfer 2016: 157) and computational linguistics (McCarthy/ Keller/ Carroll 2003). Available definitions of semantic transparency do not fully overlap. I. Plag (2003: 46) adduces words like *manageable* as prime examples of semantic transparency, explaining that "their meaning is predictable on the basis of the word-formation rule according to which they have been formed". In contrast, P. Zwitserlood (1994: 344) merely states that the meaning of the whole and those of its components need to be synchronically related, thus regarding *milkman* as transparent, although the meaning of this compound is not predictable as per Plag's definition.

The notions of motivation and compositionality appear to describe the same phenomenon. Their respective definitions both stress the reconstruction of the meaning of a compositional/motivated lexical unit from the meanings of identified components and gradability of the phenomenon in question. Motivation is defined in the following way in H. Bussmann (1998: 774):

> A word form is motivated if its whole meaning can be ascertained from the sum of the meanings of its individual elements, e.g. *bookstore, garbageman, movie theater*. Synchronically, there are several levels of motivation: full motivation *(wine cellar),* partial motivation *(housecoat),* and complete lexicalization *(mincemeat)*.

S. Reddy, D. McCarthy and S. Manandhar (2011: 21) define compositionality as "a language phenomenon where the meaning of an expression can be expressed in

terms of the meaning of its constituents" and similarly note that there is a range of compositionality, with expressions like *swimming pool* being fully compositional, *cloud nine* being non-compositional, and *zebra crossing* representing partial compositionality.

1. Term transparency

Semantic transparency can be easily studied in terminology as the meaning emerging from the compositional structure of a compound term can be readily compared to that term's definition. Term transparency has been included as a postulate among published sets of criteria which terms should meet. Such sets, whose goal is to improve specialised communication, have been proposed by several scientists or terminological bodies (Mazur 1961; Gilreath 1995). They concern the form (structure) of terms or the relation between terms and their associated concepts. Transparency is one of the seven term formation principles according to the ISO standard ISO 704: 2022. It concerns the extent to which the form of a term corresponds to salient features of the underlying concept. The definition reads that "a term or appellation is considered transparent when the concept it designates can be inferred, at least partially, without a definition or an explanation. In other words, the meaning of a term or appellation can be deduced from its parts. For a term to be transparent, a key characteristic – usually a delimiting characteristic – is used in the formation of the term or appellation itself" (ISO 704:2021: 53).

2. Terminological transparency is gradable

Terminological transparency is obviously supported by the fact that particular characteristics of domain-specific concepts are usually represented by the same lexical elements (morphemes/words) in different terms. These units may be formed by any mechanism of term formation, i.e. derive from a general language name for a given object, event or characteristic, represent a word/phrase in another language (notably Greek or Latin, and more recently also English), an indigenous or borrowed bound morpheme or represent a metaphorical extension of meaning, again of a word or morpheme. Over time, they come to be steadily associated with specific concepts or concept characteristics in a given domain and when a terminology is analysed in the synchronic plane, their conceptual links come to the fore while their diachronic development is subdued. Importantly, synonymy can exist, e.g. the Neoclassical combining form *cephal(o)-* corresponds to the noun *head*.

Terminological transparency relies on the constancy/consistency of use of the same element in a given specialised meaning in different terms.

However, not all terms are made up of elements used consistently in a monosemic manner. General-language words (e.g., *cold* or *early*) are commonly used in terms in meanings that vary. Terms may also include or be wholly formed of elements that are synchronically metaphorical (e.g., a *ground-glass lesion* on a chest X-ray is certainly not made up of glass). Semantically empty term constituents (such as numbers or Greek letters) are also encountered. Transparency is thus gradable, i.e. a term may be more or less transparent compared to other terms.

Gradability may be quantitative in nature, being associated with the number of term elements reflecting a salient characteristic of the underlying concept, or qualitative, when different terms contain elements representing different degrees of transparency. The qualitative criterion is the basis for the recognition of several classes of terms according to their transparency in the following sections.

3. Degrees of transparency

3.1. Endoderived terms

The presentation of categories of terms differing in the degree of transparency begins with the group of the most transparent terms, which are those that contain only words/morphemes that currently have only a specialized meaning within a given domain terminology, as in *viral pharyngitis*. In this term, *viral* refers to the specialised concept of 'virus', *pharyng-* is a morpheme referring to the specialized concept of 'pharynx' (corresponding roughly to 'throat' in general language) and *-itis* is a morpheme that refers to the specialized concept of 'inflammation'. Let us trace the origin of these elements: *virus* had undergone semantic transformation from "poisonous substance" to "agent causing infectious disease" to the current definition (Website 1). The earlier senses are now extinct, but have survived in historical derivatives such as *virulent*. *Pharynx* is a borrowing from Greek, where it meant 'throat' (Website 1), and *-itis*, another classical borrowing, was originally a suffix denoting possession, e.g., *nosos gastritis* = 'stomach disease', but the meaning was ultimately narrowed down to 'inflammatory disease' (Website 1). Thus, all the constituents of *viral pharyngitis* have meanings that are currently associated with concepts relevant to medicine. Such terms can be called 'endoderived' as all their constituents are derived from the synchronic stock of words/morphemes representing concepts of the domain in question.

3.2. Terms with "shine-through" non-specialised constituents

A potentially less transparent category of terms consists of those that include a term constituent that, although currently used in specialized meanings in technolects, can also be used in a more general meaning. The specialized meaning represents a narrowing of the non-specialised meaning. This is the case of *subordinate* or *dependent* in *subordinate/dependent clause* in linguistics. There is no doubt that the adjectives possess a specialized meaning and that this meaning is also found in etymologically related terms, such as *subordination*/*dependency (relation)*, *subordinating* (*conjunction*). At the same time, a more general non-specialised meaning obviously exists for the two adjectives. This may be of importance to learners of the domain terminology in question, who might be misled when trying to work out the meaning of *subordinate clause*, assuming in their minds complete transparency of this term, on the basis of the non-specialised meaning.

Inflammation, in turn, is not used in another meaning also by non-specialists, but the original meaning of '(the act of) inflaming, setting on fire' can still be retrieved from the morphemic constituents of this word. As this meaning is currently rare, it does not affect the reading.

Shine-through etymology can also occur among morphemes. The suffixes *-graphy*

and *-logy*, used to form numerous names of sciences, are traceable to the Greek words for writing and speaking, which nevertheless does not obscure the understanding of terms containing them.

3.3. Terms with non-specialised constituents used in narrowed meaning

Another level of incomplete transparency is represented by terms that include a constituent used in general language whose meaning has been narrowed, again without metaphorization, but not in a consistent manner across these terms. Examples include the adjective *cold*, as in *cold agglutinins* or *cold fusion*. Cold agglutinins are antibodies that become activated at a particular ambient temperature (3-4°C) and cold fusion is intended to take place at a particular temperature (room temperature). As you can see, the respective temperature ranges are not the same and it is not possible to predict what the range is on hearing or reading the full term. This substantially decreases the transparency of such terms. Moreover, metaphorical terms with the same constituents also exist, e.g. *cold forceps polypectomy*, where *cold* means 'performed without using an electrical appliance'

3.4. Metaphorical terms

Terms with metaphorical constituents (usually there is one metaphorical constituent per term and it may be one word or more words, less often a morpheme or morphemes) have recently been mostly investigated on account of their postulated relation to human cognitive abilities. However, they are yet another distinct group of terms that can be placed along the gradient of limited transparency. As opposed to the group just discussed, metaphorical constituents are often used to produce one-off nominations, i.e., they are not employed in other terms. In *sunset sign*, the constituent *sunset* denotes a particular position of the eyeballs associated with a neurological disorder. There are possibly no other terms in medicine that include the word *sunset*.

3.5. Eponymic terms

The three remaining categories comprise terms that include constituents which contribute very little in terms of explanatory information. Eponyms, such as *Alzheimer's disease*, point to a sufferer or doctor who described the disease. This characteristic of the underlying concept can only be relevant to those who know the patient in question or the patients of the doctor so commemorated (or have read the original description) and can recall features of their medical condition.

3.6. Terms containing alphanumeric symbols

Terms containing alphanumeric symbols (*viral hepatitis B*) may represent concepts too complex for a word constituent to convey useful differentiating information (see Górnicz 2017).

3.7. Terms containing constituents with blurred semantics

Finally, there are terms whose current form is probably unintelligible to the users, which is due to the loss of currency of use for certain constituents (most often borrowed from Greek or Latin). *Diabetes mellitus* is a case in point as few terms use

either of these two constituents in English. The word *diabetes* (Gr. 'syphon') occurs in the names of at least two other diseases where one symptom is excessive production of urine. These diseases have little in common beyond this and may have different names in some languages, including Polish. Overall, terms such as *diabetes mellitus* or *diabetes insipidus* are synchronically not compositional, i.e., they cannot be split into transparent constituents that carry specialized lexical meanings (unless we assume – mechanically – that *diabetes* does carry the meaning 'overproduction of urine' and the other constituent carries all remaining characteristics of the concept as specified in a definition).

3.8. Terms with missing constituents

There is also a category of terms characterized by the omission of a component that would otherwise indicate the relation between some characteristics of the underlying concept.

Such terms are similar to compounds like *milkman* or *zebra crossing*, which exhibit a certain gap in their surface semantic structures: the relation between the two nominal arguments is not expressed. This missing link is readily supplied by our knowledge about the world, which includes the realization that some people have a job delivering milk to people's homes or that a crossing for pedestrians represents a pattern of alternating white stripes and the black colour of asphalt. In terminology, the missing link is again supplied by the definition. The term *portal hypertension*, for example, refers to increased pressure in the portal vein, but the word *vein* is not present in the term. This kind of semantic gap-filling mechanism involving reliance on one's knowledge about the world has been described for adjectival phrases by Kiklewicz (2012: 152), who used several general language examples to show how an "exosemantic" component of meaning is supplied by what he calls cultural knowledge.

4. Endoderived and exoderived terms

The description of the various categories of fully transparent/compositional and not-so-transparent terms served the purpose of introducing two new names for types of terms, namely endoderived and exoderived terms. We have seen that certain meaningful lexical elements carry meanings directly (i.e. not metaphorically) related to characteristics of the specialized concepts in the domain of interest. Some of these elements are examples of past metaphorization of a general language word, but are currently not construed as metaphorical. Other lexical elements refer to characteristics of concepts in a metonymic, (synchronically) metaphorical or another kind of roundabout manner. The proposed distinction exploits these very differences.

Endoderived terms are defined as terms made up exclusively of elements (words or morphemes) reproducibly associated with synchronically salient characteristics of concepts.

Exoderived terms are terms containing one or more elements not reproducibly associated with salient and identical characteristics of concepts.

While this distinction brings to mind the well-known distinction between endocentric and exocentric (Benczes 2005, after Bloomfield 1933) compounds, it is not

based on the placement of the compound and its constituents under the same or different part-of-speech labels. The criteria for classifying a term as endo- or exoderived are specified by tying these descriptions to definitions of terms: a concept characteristic expressed by a term constituent is salient if it is listed in the definition of the associated concept.

The constituents of a term need to refer to synchronically salient characteristics of concepts for the term to be regarded as endoderived. *Mellitus* in *diabetes mellitus* is not synchronically salient as we know now that urine tasting of honey occurs only in some diabetes patients.

The vast majority of endoderived terms are multiword terms. One-word terms may still be made up of two or more specialized morphemes, as is the case with Latinate (or Neo-Classical) compounds (discussed below). The status of monomorphemic one-word terms, such as the names of certain basic concepts in a discipline or lexical units transferred from general language, will vary from case to case. They may be regarded as endoderived if the terminological meaning is synchronically the prevailing one. Some such terms, identical with general language words and representing non-metaphorical elaborations of the meaning of those words, may be difficult to classify. The specialized meaning of *heat*, a term in physics and chemistry, 'energy that is transferred from one body to another as the result of a difference in temperature' (www.britannica.com/science/heat)) is quite detached from the meaning in general language '(1)**:** a condition of being hot, warmth, (2)**:** a marked or notable degree of hotness' (Website 2), in that, for example, the specialized meaning does not refer to the physical sensation of hotness of objects. Consequently, the general meaning may lead to confusion or misinterpretation of the physical or chemical concept.

The same applies to the status of certain term constituents. *Manner*, in linguistics, is a constituent of such terms as *adverb of manner*. In linguistics, this concept is often left undefined and is understood intuitively, possibly regarded as a semantic primitive (Stosic 2020), relying heavily on its general language meaning, as in the following definition '(1): a characteristic or customary mode of acting, custom; (2): a mode of procedure or way of acting, fashion; (3): method of artistic execution or mode of presentation, style' (Website 2). Thus, unlike *heat*, *adverb of manner* appears to be quite transparent.

Terms classified as Latinate compounds are often endoderived (e.g. *geography*), but note that they may involve non-literal understanding of certain components, e.g. *anaemia* would literally have to be interpreted as 'no blood' rather than 'a deficiency in certain blood elements'. Latinate terms may also develop metaphorical meanings. The case of *triangulation* is discussed below.

Multiword terms may contain general language words used in their usual meanings. For example, the term *sentence-initial adverb of manner* contains the adjective *initial,* used in the prevailing sense indicated by the second definition '(1): of or relating to the beginning, incipient; (2): placed at the beginning, first' (Website 2). Such uses of general language words do not adversely affect the transparency of terms, and the term in question is still compositional and can still be considered endoderived.

This also applies to the treatment of *manner* here, but, as argued above, this lexeme has a terminological meaning.

When a general language word also occurs in a term, but closer analysis reveals that it is not used in its straightforward meaning, the term needs to be classified as exoderived. It is actually the different meanings of these words as used in a number of terms that place such terms in the exoderived category. Let us invoke again the meanings of *cold* in the following two terms:

Cold agglutinins 'these agglutinins damage erythrocytes at temperatures below normal core body temperature'

Cold forceps polypectomy '(removal of a polyp) performed with a forceps without using diathermy'

The meanings are different and even the former carries more complex content than the general language definition of *cold*:

'**1a:** having or being a temperature that is uncomfortably low for humans;
b: having a relatively low temperature or one lower than normal or expected
c: not heated: such as
(1) *of food***:** served without heating especially after initial cooking or processing;
(2): served chilled or with ice;
(3): involving processing without the use of heat' (Website 2).

We can clearly see that the use of *cold* in *cold agglutinins* is not quite metaphorical, because the seme 'of a lower temperature than the core body temperature' represents just a narrowing of the general meaning and the element 'are activated' functions as a link between cold and agglutinins rather than an indicator of domain change. In the latter example the meaning 'without using diathermy' is related to the meaning 'without the application of heat', which is further away from the general language meaning. One might treat it as metaphorical.

It is, indeed, terms based on metaphors that are the most outstanding examples of exoderived terms, such as, once again, *sunset sign*, where *sunset* refers to eyeball positioning. It is, however, not used consistently across a number of terms, and so reconstruction of the definition based on the meaning of the two constituent words is rather not possible.

The remaining categories of non-transparent terms, i.e. eponymic terms and terms with symbols, are exoderived when viewed in isolation. However, note that the non-transparent elements are sometimes used consistently across a number of terms, making them transparent by reference to the first-coined term in such a set. In physics, *alpha radiation* is radiation formed of the nuclei of helium atoms, and an *alpha particle* is that nucleus.

5. Dynamics of transparency: exoderived to endoderived and vice versa

The endoderived/exoderived status of a term constituent is not permanent. There are countless examples of diachronically metaphorical terms, such as *inflammation*,

which we have discussed (Lat. *inflammatio* 'a kindling, a setting on fire', Pl. *zapalenie*, which can also refer to turning on a light in contemporary Polish, as in *zapalenie światła w pokoju* 'turning on the light in the room'), that represent metaphorical derivations of general language words.

The name of the organ *lungs* in a number of languages was derived metaphorically from words indicating lightness or light weight, as the lungs were the organ that would float on the surface of water rather than sink (Website 1). This holds true for the Greek and Russian names: Lat. *pulmo,* Gr. *pleumon* [lit. 'floater'], Rus. *легкие* (legkie) [lit. 'light' (adj)].

On a side note, such elements are often quoted by followers of the sociocognitive approach to terminological studies as indicating the power of metaphorical/creative thinking in knowledge development and expression of knowledge in communication for special purposes. However, the question needs to be asked whether the concepts denoted by these terms, and evidenced by their definitions, are also metaphorical, and the answer has to be negative. A look at the definitions indicates that they are phrased in a non-metaphorical manner, i.e., using words possessing endoderived meanings.

The exoderived to endoderived transition is also witnessed in contemporary terminologies. When a metaphorical term element comes to be used in the same metaphorical meaning in a number of terms, this indicates that the meaning, although metaphorical, is stable and predictable, which fulfils the criteria for an endoderived constituent. This is the case with the adjective *kissing*, which appears in a few medical terms, listed below together with brief definitions (Dorlands 2011):

> *kissing ulcers* – gastric ulcers on directly opposing surfaces of the stomach, as on opposite sides of the lesser curvature.
> *kissing nevus* – a congenital condition in which matching nevi are on the upper and lower eyelids, so that they appear to be one lesion when the eye is closed.
> *kissing spines* – a condition in which the spinous processes of adjacent vertebrae are in contact; called also Baastrup disease or syndrome.
> *kissing puncta* – condition of the upper punctum being apposed to the lower punctum when the eyes are open.
> *kissing sequestra* – A term referring to an articular lesion (…). Kissing sequestra are classically located in the knee, accompanied by extensive cortical destruction, in the middle of which are 2 preserved islands of apposed – 'kissing' – sclerotic bone, visualised on a plain film.
> *kissing cavities* – a pair of cavities of two tooth surfaces facing each other.

The underlined phrases represent shared elements of the definitions. *Kissing* has come to mean 'directly opposing, apposed to one another'. While this process is similar to that of terminologisation (see e.g. ISO 704:2022), the latter is generally conceived of as referring to entire terms rather than term components.

Semantic transfer in the opposite direction, i.e. when an endoderived constituent acquires a new meaning in a new term, can also be encountered. In fact, this is a well-established term formation technique, described as 'semantic transfer between terminologies'. Well-known examples include the use of *virus* in computer science.

In linguistics, recent terminological additions include *triangulation*. Triangulation is a surveying method that measures the angles in a triangle formed by three survey control points (Website 3). As the stem *triangul-* refers to an important characteristic of the underlying concept (using a triangle to determine locations), *triangulation* is an endoderived term in surveying.

In social sciences, this word refers to the application and combination of several research methods in the study of the same phenomenon. The semantic modification involves the change of the domain, from surveying to social sciences, and the replacement of the seme 'using three points in space to obtain measurements' to 'approaching the object of study from various (not necessarily three) points of view'.

6. Endoderived terms as an operational category

Apart from enabling a division of terms into two categories, the endoderived-exoderived opposition is actually reflected in how such terms function in specialized discourses, especially when they come to be used (in the form of equivalents) in languages other than those in which they were originally coined.

In this respect, it can be observed that endoderived terms are generally translated word for word (or morpheme for morpheme) inasmuch as term constituents denoting such concept elements are readily found in many languages. Additionally, their translations are not perceived as calques. This is particularly visible when the equivalents of Neo-Classical terms are not Neo-Classical terms, as is the case with the Polish language of medicine, which has indigenous terms/morphemes for such international lexemes and morphemes of Latin-Greek origin as, for example, *syndrome*, *diagnosis*, *chronic*, *-itis* or *-oma* (tumour). Terms like *wirusowe zapalenie gardła* ('viral pharyngitis') certainly represent calques of specific terms in Latin or modern languages such as French, German or English. It is obviously highly unlikely that the underlying concepts were first conceived of by someone in Poland and the original terms were first coined in Polish. Still, such terms are not regarded as calques. The realisation that they are calques came as a surprise to the present author and to the many colleagues and students to whom I have since pointed out that fact.

Exoderived terms may also be translated word for word, but they tend to be accompanied by metalinguistic comments indicating that they are perceived as unnatural, e.g. described as *the German*, etc., *term*; presented in quotation marks; preceded by signs of their alien nature, e.g., (equivalents of) the phrase *so-called*. In a study of articles from a Polish orthopaedic journal (Górnicz 2016), metaphorical terms were a prominent group of lexical units introduced in this manner in texts.

7. Potential for use in comparative studies

The recognition of several degrees of semantic transparency in terminology and the distinction between endoderived and exoderived terms are convenient stepping stones for comparative studies. The proportions of endoderived and the different types of exoderived terms in various domains in an ethnolect can be easily established and domain terminologies can be ranked along this cline, giving rise to investigations of

what makes a terminology more or less endo-/exoderived. Where concepts are expressed by a range of synonymous terms, it can be established whether it is endoderived or the various types of exoderived terms that possess the status of preferred terms in particular cases, and generalisations can be made on this basis.

Comparisons can also naturally be made between terminologies of the same domain in different languages, starting again with generation of overall indices, or perhaps starting with comparisons of pairs of equivalent terms to find out whether they represent the same level of transparency and whether any differences in this respect are generalizable to the entire terminological lexis in one language in this domain, or perhaps, the entire ethnolectal terminological lexis. One question that can be asked is whether exoderived terms from a language that is currently the source of new terminology, such as English, are borrowed or calqued into other languages or whether their components are replaced with endoderived components. An analysis for the Polish languages of medicine and computer science (Górnicz 2019) proves that the latter scenario is possible.

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