Variable scope for popularization of specialized terminology: The case of medico-pharmaceutical terms

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Abstract Taking issue with the assumption that specialized terms represent an esoteric and unnecessary 'code' that may unproblematically be replaced by core-vocabulary items or circumlocutions, this article explores whether popularization is equally possible within different subcategories of a specific field of LSP terminology, viz. medico-pharmaceutical terms. In a corpus of two derivationally related text types (a specialized pharmaceutical genre and its lay-oriented counterpart), we identified four relevant subcategories of terms and charted the actual popularization strategies employed within each category. Having observed systematic differences in the way specialized terms are reformulated in the four terminological subcategories, we argue that the popularization strategies identified diverge not only in kind but also in degree. The empirical results lead us to assume that the actual divergences observed can be taken as a clear indication that some of the terminological categories represent a markedly higher popularization potential than others.

Keywords popularization potential, degrees of popularization, medico-pharmaceutical terminology, subcategories of terms, strategies, reformulation, definition

1 Introduction

This investigation is concerned with a particular instance of knowledge communication, viz. the reformulation of specialized medical and pharmaceutical terminology[1] for readers in the role of patients. This places the investigation within the field of *popularization*, which is understood here as the bridging of a knowledge divide, or *asymmetry*, between experts and non-experts (Gotti 2014: 16pp., Camus 2009: 466, Kastberg 2011). Involving a transfer of knowledge from experts to lay receivers, popularization can be conceptualized as *recontextualization* (Ciapuscio 2003: 210, Calsamiglia/van Dijk 2004: 370, Motta-Roth/Scherer 2016), in that, according to Gotti (2014: 23), "popularization is thus not just [to be] seen as a category of texts, but as a recontextualization process that implies relevant changes in the roles taken on by the actors and institutions involved". In other words, popularization involves two contexts, or communicative events: the 'source' or original context constituted by experts addressing experts in a specialized register, and the 'target' or popularized context where the

[1] We define *terminology* as the lexicon specific to a special subject field such as medicine (Sager 1990: 19, Castellví 1999: 81), and we define *term* as a lexical form or label which designates a concept within the knowledge structure of the discipline in question (Sager 1990: 19, Castellví 1999: 81).

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expert shifts his/her role to that of a mediator, transforming the specialized meanings of the 'source' context into a linguistic register that may be more readily accessible for a readership with limited domain-specific knowledge. Thus, referring to the communicative exigencies of the 'target' context, Calsamiglia/van Dijk (2004: 371) note that popularization must "adapt to appropriateness conditions and other constraints [...] of the communicative event", by which, presumably, they refer to the necessity of transforming the specialized elements of the original context into more simplified language characterized e. g. by the avoidance or limited use of specialized terminology.

It should be noted that certain discourse scholars (e. g. Hilgartner 1990, Myers 2003) question a sharp divide between expert and lay readerships, pointing out that rather than a clear-cut dichotomy, the two types of audience constitute opposite poles on a continuum with intermediate degrees of expertise (cf. Hilgartner 1990: 528). Even within their own field of expertise, such as medicine, experts have more specialized knowledge in certain subfields than in others; similarly, a lay audience is far from a homogeneous group with a uniform level of knowledge in a given domain (Myers 2003: 267–269). This is particularly the case within the field of medicine, which is seeing an increasing focus on variable levels of health literacy among patients (cf. Kutner et al. 2006). Further, Ciapuscio (2003: 208) points out that especially in the popularization of scientific discoveries, a third party, viz. the science journalist, intervenes as a mediator between the scientist and the lay public, just as the nurse may serve as an intermediary between the specialist and the patient in the secondary healthcare sector. For the present purpose, however, the dichotomy between expert vs. lay orientation introduced above will be maintained as a useful way of theorizing the contexts in which specialized 'source' texts and lay-oriented rewritings (such as those involved in the present investigation – see Section 2) are embedded.

When it comes to the *investigation* of popularization within linguistics and discourse studies, it appears that the original research interest was centered on science journalism, whereas recent years have seen a surge of interest in popularization in all the major fields of LSP: in law (e. g. Fonsén 2008, 2014, Heffer 2008a, 2008b, Anesa 2012, Polese/D'Avanzo 2012, Heller/Engberg 2017), in business and economics (e. g. Bamford 2012, Mattiello 2015), in the natural sciences (especially physics and biology) (e. g. Niederhauser 1999, Knudsen 2003, Rovira 2008, Bondi 2012, Garzone 2012), and in medicine (e. g. Becker 2001, Gülich 2003, Camus 2009, Ezpeleta Piorno 2012, Maci 2012, Muños-Miquel 2012). Across the domain-based categories, most studies are concerned with popularization in the written medium, whereas a few (Gülich 2003, Heffer 2008a, 2008b, Caliendo 2012, Scotto di Carlo 2014) focus on oral mediation. Another distinction that transcends the domain-based borderlines is the type of focus in the individual investigations. In a number of studies, the focus is on the lay-oriented language in isolation (e.g Caliendo 2012, Maci 2012, Scotto di Carlo 2014), i. e. without any kind of comparison with the specialized 'source' language. Others, such as Niederhauser (1999), Muños-Miquel (2012), Heller/Engberg (2017), take a decidedly comparative approach, investigating the *transformation* of 'source' terminology into lay versions, which will be the approach of the present investigation also.

What unites all previous studies of popularization, across domain-based and others types of divisions, is a focus on 'actuality', i. e. with the actual (re)formulation strategies manifested in the lay-oriented texts. A question that has received no attention, on the other hand, pertains to 'potentiality', i. e. whether different domain-based categories of specialized terminology lend themselves to different types and degrees of popularization. Comparing the major fields of LSP terminology (business, law, medicine, physics, etc.) with each other in this regard

is, however, beyond the scope of an article like this. Instead, this article focuses on a particular branch of LSP terminology, viz. the medical and pharmaceutical terms associated with medicinal products. The reason for this particular choice is simply that since most people find themselves in the role of medicine users at some point in their lives, this specific field of expert-lay communication is likely to be one of those – if not *the* one – with the largest readership altogether. The particular aim of the article is to investigate to what extent different subcategories of specialized terms within this field represent different types of popularization potential. To answer this question, an empirical investigation is conducted on a corpus of specialized medico-pharmaceutical texts and their popularized counterparts. The initial aim of this analysis is to chart the actual popularization strategies manifested within four different terminological subcategories. The investigation thus assumes that actuality can be taken to reflect potentiality in this case: If a clear pattern is detectable in the actual reformulation of a specific terminological subcategory, such a pattern will be assumed to be indicative of what strategy/-ies are possible within that category. Thus, while the initial focus of the empirical analyses may be said to be on the reformulations, the real object of interest is in the last resort to be found on the 'source' side, insofar as explanations of variance in popularization strategies will be sought in the characteristics of (subcategories of) specialized 'source' terms.

The structure of the article will be the following: Section 2 introduces the corpus and the methodology, Section 3 presents the analytical results, and Section 4 links the results with possible explanations of the differences charted.

2 Corpus and methodology

2.1 Presentation of corpus

The corpus, which has been sampled from the website of the European Medicines Agency[2], consists of two derivationally related text types, viz. one specialized and one lay-oriented, with the individual lay text representing, in part, a rewriting of a specialized original. (As a matter of convenience, the terms *source* (ST) and *target texts* (TT) – borrowed from Translation Studies[3] – will be used henceforth.) The source texts belong to the specialized genre named *Summary of Product Characteristics* (SmPC), which pharmaceutical companies are required to publish in connection with the marketing of medicinal products. The SmPCs set out the pharmaceutical specifications of a given product, i. e. particulars concerning e. g. so-called indications and contraindications (what medical condition the drug is used for and circumstances under which it should not be used), dosage instructions, chemical composition, the drug's precise method of action within the body, side effects, storage instructions and the like. The target text type is the so-called *Patient Information Leaflet* (PIL), which accompanies the packaging of the medicinal product. The derivational relationship between SmPCs and PILs means that the SmPC information that is relevant for the end user is recontextualized and reformulated in the corresponding PIL (for a minute investigation of the correspondence between PIL and SmPC

[2] Cf. http://www.ema.europa.eu/ema/.

[3] Despite the use of Translation Studies terminology, this article deliberately ignores the debate whether popularization can be seen as a special case of translation, so-called *intralingual translation* (e. g. Jakobson 1959: 233). Scholars such as Zethsen (2007), Muños-Miquel (2012) and Hill-Madsen (2015a) advocate this interpretation, whereas others denounce it, e. g. Ciapuscio (2003: 209), Camus (2009), and Raichvarg (2010). The debate is avoided here for reasons of space.

sections, see Van Vaerenbergh 2007). Being aimed at lay readers, i. e. persons who, according to the definition provided by the relevant EU legislation, "[do] not have formal education in a relevant field of healthcare or medical discipline" (Eur-lex 2014), the reformulations are legally required to "reflect the terminology the patient is likely to be familiar with" (European Medicines Agency 2016: 25).

The literature on PILs is vast and tends to be focused on comprehension barriers and problems with poor readability in the genre (e. g. Askehave/Korning Zethsen 2003, 2010, Clerehan/Buchbinder 2006, Hirsch et al. 2008, to name but a few). Studies that are more specifically concerned with the derivational aspect of PILs, i. e. with PILs as products of derivation and popularization processes, are, e. g., Ezpeleta Piorno (2012), Van Vaerenbergh (2003, 2007) and Hill-Madsen (2015a, 2015b). A precursor of the present investigation is Hill-Madsen (2015a), which is a study more broadly focused on the reformulation of lexis as such (not only specialized, but also semi- and non-specialized items), whereas the present study focuses specifically on the popularization of highly specialized medical terminology. Hill-Madsen (2015a) also differs from the present study by not being concerned with the question of how subcategories of source terminology diverge in respect of popularization potential.

2.2 Categories of medical and pharmaceutical terms

Initially, through scrutiny of the first six documents sampled for the investigation (see Section 2.3), four relevant categories of medical terms and three relevant pharmaceutical categories were identified. It should be noted that although further terminological categories can undoubtedly be found in the source texts, the point is that those identified are the ones that are recontextualized in the target texts, and hence the only ones pertinent to the present purpose. The seven initial categories were:

a) anatomical terms, e. g. *gastrointestinal tract* and *gallbladder*,
b) terms denoting medical disorders (medical conditions, diseases and symptoms), e. g. *hypoglycaemia* and *cervical cancer*,
c) bio-chemical and microbiological terms, such as *alanine aminotransferase* and *leucocytes*,
d) terms denoting physiological processes, e. g. *lactation* and *ovulation*,
e) terms for classes of medicinal products and the active substances of products, such as *statins* and *dexamethasone*,
f) methods of administration (i. e. the specific way the drug is taken by or given to the patient), such as *injection* and *infusion*, and
g) so-called excipients (substances without therapeutic effect – used as carrier substances for the active substance), e. g. *acetic acid* and *sodium hydroxide*.

However, after the examination of around 50 texts, only around 25 anatomical terms, 3 terms for physiological processes and 3 method-of-administration terms had been identified, which was considered too small a sample to generalize from. Accordingly, these three categories were left out of consideration and the investigation limited to the four other categories, i. e.:

- Medical disorders,
- Biochemistry and microbiology,
- Medicinal products and active substances (henceforth shortened to 'medicinal products' simply),
- Excipients.

2.3 Sampling procedure

Since the object of the investigation was to attain as complete a picture as possible of the variety in the popularization of terminology within this field, so-called *maximum variety sampling* (Ritchie/Lewis/Elam 2003: 114) was used to obtain maximum diversity in the corpus. For this reason, the original intention was to select one text 'pair' (SmPC and PIL) for each of the fourteen ATC[4] categories of medicinal products. However, after six documents had been selected and scrutinized, a very uneven distribution of the number of terms in each category emerged, with the overwhelming number of items belonging to the medicinal-products and the medical-disorder category. Moreover, the examination of the six documents also revealed a marked degree of overlap in the medical-disorder terms between the documents. Especially when it came to terms for side effects, the same relatively limited set of items tended to recur.

At the same time, the six documents contained only very few biochemical and microbiological terms, which motivated a change in method for a second round of sampling: Starting from the very beginning of the EMA's alphabetically ordered collection of SmPCs and PILs, each document on the list was examined with a view to extracting biochemical and microbiological terms, and to supplement the medical-disorder category with items not already represented in the six documents from the first round. This second round of sampling was considered justified since the objective was to select a maximum variety of *terms* and not of texts. It should be noted, however, that in the second sampling round not all documents on the EMA list were examined: Exactly because of the maximum-variety principle, it was decided to avoid products whose so-called therapeutic area (the specific disorder or disease that the drug is designed to treat) was already represented by another text in the sample.

After the sampling of approximately 50 texts in the second round, the total number of terms compiled in the two rounds amounted to 202 in the medical-disorder category, 65 in biochemistry and microbiology, 159 items in medicinal products and 60 items in the excipients category. In each category, the number of items selected was deemed sufficient for the establishment of clear patterns of popularization. The reason for the significantly lower number in the categories 'biochemistry and microbiology', 'medicinal products' and 'excipients' is that, as the analyses in Section 3 will reflect, these categories all proved highly uniform in terms of popularization strategies. In connection with the medical-disorder terms, on the other hand, multiple strategies were discernible, necessitating a significantly higher number of items to provide reliable grounds for generalization concerning this category.

2.4 Methodology

The methodology behind the investigation is the so-called 'coupled-pairs' method known from Translation Studies, i. e. the practice of comparing source and target texts with a view to identifying target segments and pairing them with corresponding source segments (cf. Toury 1995). Since only a minor part of the source texts are transferred (via reformulation) to the target texts, the target texts were the point of departure. The target texts were scrutinized to

[4] ATC refers to the *Anatomical Therapeutic Chemical Classification System*, which is the official WHO system used for the classification of medicinal products (WHO Collaborating Centre for Drug Statistics Methodology 2018).

identify words and phrases signifying a medical or pharmaceutical concept,[5] and with a view to tracing the origin of such items back to a specific term in the source text by taking the context of both the target and the source item into account.

3 Results

3.1 The category 'medical disorders'

Of all the four terminological subcategories investigated, the terms in the medical-disorder category are clearly those exhibiting the greatest variety in terms of popularization strategies. The following tendencies have been identified:

- Direct transfer (Section 3.1.1)
- Choice of EGP (English for General Purposes) equivalent (3.1.2)
- Translation (3.1.3)
- Definition (3.1.4).

It should be emphasized that these tendencies are to be regarded as categories with fuzzy borders. This means that each category contains core members as well as borderline cases that are often seen to combine traits from several types of strategies.

3.1.1 Direct transfer

The first type of strategy, for which the label 'direct transfer' has been chosen (from Schjoldager/Gottlieb/Klitgaard 2008: 93), is a borderline category with dubious popularization credentials, consisting in the mere reduplication of a source item in the PIL. Some items, in fact, fall outside the purview of this investigation:

(1) *sickle cell crisis* (*Accofil* 11-4.4/63-1)[6]
(2) *Adult Respiratory Distress Syndrome* (ARDS) (*Accofil* 17-4.8/70-4)
(3) *rheumatoid arthritis* (*Accofil* 13-4.8/72-4)
(4) *fibroid tumours* (*Ovaleap* 5-4.3/32-2)
(5) *Sphincter of Oddi spasm* (*Truberzi* 3-4.3/39-2)

[5] It should be noted that this methodology has a parallel in the so-called 'onomasiological' or 'naming' approach in the science of terminology (Sager 1990: 56), i. e. the identification of specialized terms via concepts, which recognizes the primacy of the extralinguistic reality in the process of naming. In other words, in establishing the terminology of a given subject field, the terminologist takes his/her point of departure in the knowledge structure of the field and proceeds, from its constitutive concepts, to identify the terms that designate these concepts. However, there is a difference between the onomasiological approach and our methodology: The target expressions under investigation in the PILs cannot be regarded as terms because they do not belong to a specialized register but represent *rewritings* of terms. Accordingly, we have deliberately chosen not to refer to 'terms' and 'concepts' in the PILs, having opted for the formulation 'words and phrases with a medical content' instead.

[6] Each SmPC-PIL text pair is published in a single document which, as a matter of convenience, is referred to here by the product name. Page and section number are given for the source and target text each, with a slash separating the ST and the TT reference. *11-4.4* thus refers to p. 11, Section 4.4 in the SmPC, and *63-1* refers to p. 63, Section 1 in the PIL. Please see the Appendix for the full bibliographic details of all text pairs.

Examples 1–5 are all technical terms that have been transferred from the source texts with no attempt at rewording or explanation, contrary to the previously quoted requirement of understandability for the lay readership. These examples are considered solely because of their very presence in a lay-oriented text type, but the absence of any type of reformulation means that they must really be excluded from any popularization category. A number of other items, such as the following examples of direct transfer, are more deserving of membership:

(6) *rash* (*Accofil* 16-4.8/63-2)
(7) *HIV infection* (*Accofil* 4-4.8/64-3)
(8) *decreased appetite* (*Fexeric* 6-4.8/23-4)
(9) *increased appetite* (*Fexeric* 6-4.8/23-4)
(10) *cough* (*Daklinza* 16-4.8/53-4)
(11) *diarrhoea* (*Fexeric* 6-4.8/23-4)
(12) *vomiting* (*Fexeric* 6-4.8/23-4)
(13) *constipation* (*Fexeric* 6-4.8/23-4)
(14) *nausea* (*Fexeric* 6-4.8/23-4)
(15) *pain* (*Fexeric* 6-4.8/24-4)
(16) *dizziness* (*Hetlioz* 5-4.8/24-4)
(17) *fatigue* (*Hetlioz* 5-4.8/24-4)
(18) *migraine* (*Daklinza* 18-4.8/53-4)
(19) *irritability* (*Daklinza* 18-4.8/53-4)
(20) *hot flush* (*Daklinza* 18-4.8/53-4)
(21) *itching* (*Daklinza* 18-4.8/53-4)
(22) *bronchitis* (*Fexeric* 6-4.8/24-4)

Although nothing has been done to (further) popularize these items, they must all be regarded as belonging to a vocabulary familiar to the average adult reader, and hence as items for which no reformulation is *needed*. Nevertheless, the reduplicated items are far from forming any uniform group, ranging, in fact, from items that belong to a common-core English vocabulary (e. g. *cough, vomiting, pain, itching*), over items which must still be considered core vocabulary, but whose French or Latin/Greek ancestry may impart a slightly foreign 'ring' to them (e. g. *fatigue, nausea, migraine, diarrhoea*), to items such as *HIV infections* and *bronchitis*, which both originate as technical terms, but have found their way into a vocabulary shared by the majority of modern adult speakers of English.

3.1.2 EGP equivalents

Whereas the category 'direct transfer' entails identity between source and target items, the choice of an EGP equivalent involves change. Examples are the following:

(23) *anaphylactic* (*Accofil* 14-4.8) → *allergic* (72-4)
(24) *epistaxis* (*Accofil* 15-4.8) → *nosebleed* (71-4)
(25) *dyspepsia* (*Fexeric* 6-4.8) → *indigestion* (24-4)
(26) *ischaemic attack* (*Ovaleap* 6-4.4) → *stroke* (36-4)
(27) *dysphonia* (*Bretaris Genuair* 9-4.8) → *hoarseness* (26-4)
(28) *gastrooesophagal reflux disease* (*Daklinza* 18-4.8) → *heartburn* (53-4)
(29) *nasopharyngitis* (*Bretaris Genuair* 9-4.8) → *common cold* (26-4)

As examples 23–29 show, an EGP equivalent consists in the replacement of a specialized source item with the established core-vocabulary equivalent in the target text. In by far the majority of cases, the target expression is a single-word item.

3.1.3 Translation

Whereas an EGP equivalent is a fixed expression that replaces the whole of the specialized source item, a translation is a rendering of the individual Greek or Latin components of the source item by means of corresponding English words. The label 'translation' has been chosen for this strategy owing to its clear affinity with translation in the ordinary sense, i. e. between two different languages. Two subcategories are discernible: In one category, for which the label 'morphemic translation' (taken from Vermeer 2008: 7) has been chosen, the ST components behind corresponding TT items are morphemes, whereas in the other category, to be labelled 'word-for-word translation', the ST components are words. However, combinations do occur (see below), making the boundary between the two subcategories a fuzzy one. Below, the 'morphemic' approach will be analyzed first, followed by the 'word-for-word' approach.

The nature of the morphemic approach may be illustrated by means of the following imaginary example: If applied to the source item *nasopharyngitis* in example (29) above, a morphemic translation would yield *inflammation of the nose and throat*, where the three original Greek/Latin morphemes *nasus* (= *nose*), *pharynx* (= *throat*) and *-itis* (= *inflammation*) are each rendered by an English (usually core vocabulary) word. Characteristically, most of the source terms in the morphemic subcategory contain a central morpheme that denotes a body part, organ or other type of bodily 'component' such as blood, or 'product' such as urine. Thus, examples 30–32 are all centered around blood:

(30) *hypo-phosphat-aem-ia* (*Fexeric* 3-4.3) → *low levels of phosphorus in your blood* (21-2)
(31) *haema-temesis* → (*Fexeric* 6-4.8) → *vomiting of blood* (23-4)
(32) *haemo-ptysis* (*Accofil* 16-4.8) → *coughing up blood* (71-4)

In (30), *hypo-*, which really means 'under', has been translated into *low levels of*, *phosphat-* has become *phosphorus*, and *aem-* is the morpheme which is rendered as *blood*. The only source morpheme that is not clearly traceable to any TT word(s) is the suffix *-ia*, which means 'the condition of …'.[7] Similarly, *blood* on the target side in (31) and (32) derives from *haema-*, and *vomiting* and *coughing up* stem from *-temesis* and *-ptysis*, respectively (*ptysis* really means 'spitting').

Examples with *urine* as a central source morpheme are:

(33) *pollakiuria* (*Hetlioz* 5-4.8) → *increase in daytime urination* (24-4)
(34) *oliguria* (*Ovaleap* 6-4.4) → *decreased urine production* (36-4)
(35) *dysuria* (*Accofil* 16-4.8) → *pain while passing urine* (71-4)

In all three cases, TT *urine/urination* stems from the source morpheme *-ur-* (*-οὐρ-* in Greek). The three source items also reflect the frequent occurrence of pre- and suffixing in medical terms, such as the prefixes *pollaki-* (literally 'frequent') (Montanari 2015: 1702), which has become *increase* (*in*) in the TT, *olig-* ('few' or 'little'), which is represented by *decreased* in the

[7] Except where otherwise indicated, etymological information has been taken from the *Oxford English Dictionary* (Oxford Dictionaries 2017).

TT, and *dys-* ('bad' or 'difficult') (Montanari 2015: 559), which is rendered as *pain* in the TT. Other examples with *dys-* as a prefix are (36) *dysgeusia* (*Fexeric* 6-4.8) → *taste disturbance* (24-4) (with *taste* derived from *-geus-* 'sense of taste' and *disturbance* from *dys-*), and (37) *dyspnoea* (*Accofil* 17-4.8) → *shortness of breath* (70-4), where *dys-* becomes *shortness* and *-pnoe-* becomes *breath*.

As for source morphemes denoting organs or body parts, examples are (38) *hepatomegaly* (*Accofil* 15-4.8) → *enlargement of the liver* (71-4), where ST *hepat-* is recognizable as TT *liver* and *-megal-* as *enlargement* (from Greek *megas*, meaning 'big'; Montanari 2015: 1292-93), and (39) *arthralgia* (*Accofil* 16.4.8) → *joint pain* (71-4), with TT *joint* corresponding directly to ST *arthr-* and *alg-* to *pain*. Also worth mentioning is a frequently occurring morphemic compound, viz. the suffix *-itis*, meaning 'inflammation in', combined with a morpheme denoting an organ, whereby the meaning of the compound as a whole becomes 'inflammation in organ X'. Instances are:

(40) *gastritis* (*Fexeric* 6-4.8) → *inflammation of the stomach lining* (24-4)
(41) *pancreatitis* (*Truberzi* 3-4.3) → *inflammation of the pancreas* (39-2)
(42) *hepatitis* (*Axuara* 5-4.8) → *inflammation of the liver* (74-4)
(43) *stomatitis* (*Bretaris Genuair* 9-4.8) → *inflammation of the mouth* (24-4).

In these examples, TT *pancreas-* is easily recognizable in ST *pancreat-*, TT *stomach* derives from ST *gastr-*, TT *liver* from ST *hepat-*, and TT *mouth* from ST *stoma-*.

What should be noted, however, is that the translation of an originally Greek or Latin morpheme is not in all cases direct or literal, i. e. with full equivalence in meaning. Translations such as *hepat-* into *liver* (example 42) and ST *stoma-* into *mouth* (43) are, indeed, literal, but the translation of, e. g., the source morpheme *olig-* above as *decreased* in example (34) was not. Similarly, the rendering of the source morpheme *pancreat-* by TT *pancreas* in example (41) is not, in fact, a 'translation', but a direct transfer of the same morpheme, with the only difference that the source morpheme attains word status in the TT. In a number of cases, the TT unit also contains elements that are not traceable back to any specific source morpheme. That was the case in, e. g., (33) *pollakiuria* (*Hetlioz* 5-4.8) → *increase in daytime urination* (24-4), where the TT element *daytime* does not derive specifically from either ST *pollaki-*, *-ur-* or *-ia.*

While the source terms in the morphemic category of translation are one-word items (almost exclusively of Greek origin), the source terms in the other subcategory, the 'word-for-word' approach, are by necessity multi-word items. Examples are:

(44) *cutaneous vasculitis* (*Accofil* 15-4.8) → *inflammation of the blood vessels of the skin* (71-4)
(45) *pulmonary haemorrhage* (*Accofil* 13-4.8) → *bleeding from the lung* (72-4)
(46) *veno-occlusive disease* (*Accofil* 13-4.8) → *liver damage caused by blocking of the small veins within the liver* (72-4)
(47) *nasal congestion* (*Daklinza* 18-4.8) → *blocked nose* (53-4)
(48) *gastrointestinal perforation* (*Cyramza* 8-4.4) → *developing a hole in the wall of your gut* (42-2)

In (45), ST *pulmonary* is traceable to TT *from the lung* and ST *haemorrhage* to TT *bleeding*. Similarly, in (46), ST *veno-* becomes TT *of the small veins*, ST *occlusive* becomes TT *blocking*, and ST *disease* becomes TT *liver damage* (*caused by*).[8] As in the morphemic-translation

[8] Not all examples will be commented on.

category, there is a clear tendency for the specialized, in this case mostly Latin-origin, source words to be rendered by core-vocabulary English counterparts. Exceptions occur, however, as in ST *disease* in (46), which is already part of the core vocabulary of English. What is also noteworthy is that a number of instances are, in fact, combinations of the morphemic approach and the word-for-word approach. This is the case in (44), where the source word *cutaneous* is traceable to TT *of the skin*, but where the ST word *vasculitis* consists in two morphemes that are each traceable to different TT elements: ST *vascul-* to TT *the blood vessels*, and ST *-itis* to TT *inflammation of*. Combinations between the word-for-word approach and direct transfer also occur, as in (49) *Gastro-oesophageal junction adenocarcinoma* (*Cyramza* 2-4.1) → *cancer of the junction between the oesophagus and the stomach* (41-1). Here, ST *gastro-* recurs in TT *the stomach*, ST *oesophageal* in TT *the oesophagus*, ST *junction* as TT *junction* and ST *adenocarcinoma* as TT *cancer*. The ST words *oesophageal* and *junction*, in other words, have been reduplicated in the TT.

3.1.4 Definition

The final popularization strategy registered in connection with medical-disorder terms is *definition*, which is actually rather infrequently manifested within this category, but which – as Sections 3.2 and 3.3 will show – dominates some of the other categories of source terms. Before examples are given, however, the very term *definition* in itself needs to be defined. Following Sager, we understand definitions as "the process of referring someone from a term to the concept which is the meaning of this term so that he can connect the symbol with the concept" (1990: 42). Furthermore, in accordance with Hank (2006: 399), a definition will be understood here as consisting of 1) a reference to a superordinate class of phenomena (called the 'genus') to which the definiendum can be assigned and 2) one or several characteristics which distinguish the definiendum from other species (so-called 'differentiae').[9] However, since the particular characteristics that are listed as part of a definition may not always be truly distinctive features, the more neutral label 'properties' will be preferred over the label 'differentiae' here.

One example of the rather few cases of definition in the medical-disorder category is (50) *hepatitis C* (*Daklinza* 3-4.1) → *hepatitis C, an infectious disease that affects the liver, caused by the hepatitis C virus* (50-1), which follows a relatively typical pattern whereby the definiendum (here: *hepatitis C*) is reduplicated in the TT, followed by a post-nominal apposition (here: *an infectious disease*, etc.), which is one of the ways in which a definition is realized grammatically (Wignell/Martin/Eggins 1989: 375, cf. Mattiello 2015: 6). Inside the apposition, *an infectious disease* indicates the genus of which *hepatitis C* is a species, *that affects the liver* specifies the anatomical location of the disease, and *caused by the hepatitis C virus* specifies the aetiology. The other primary way in which a definition is realized grammatically is by means of fully-fledged sentence, as in (51) *Porphyria* (*Ovaleap* 5-4.4) → *Porphyria. This is a condition that may be passed on from parents to children which means that you have an inability to break down Porphyrins* (32-2). Here, the definiendum takes up the grammatical subject *This* (anaphorically replacing *Porphyria*), whereas the definition itself is offered via the subject complement *a condition that*, etc. In the noun phrase that realizes the subject complement, *a condition* indicates the genus and the following relative clause (*that may be passed on*

[9] Both Sager (1990: 42–44) and Castellví (1999: 104–108) offer elaborate typologies of definitions, which, however, are unsuitable for the present purpose.

from parents to children) one property, which is aetiology. The following relative clause *which means*, etc. specifies another property, viz. the physiological deficiency which characterizes the disease.

In a number of instances, the definition offered is partial only, as in a case such as (52) *Sweets Syndrome* (*Accofil* 13-4.8) → *plum-coloured, raised, painful sores on the limbs and sometimes the face and neck with fever (Sweets syndrome)* (72-4). The stance taken here is that the whole of the target text wording in this example serves to specify one important property, namely symptoms, whereas the genus is absent. A definition with the genus included would then be, e. g., *Sweets Syndrome is a condition whose symptoms are plum-coloured, raised, painful sores …*

3.2 The category 'biochemical and microbiological terms'

Like the medical-disorder terms, the next category of source items, 'biochemical and microbiological terms', features a small handful of specialized source items that have been reduplicated in the PIL with no attempt at popularization, such as (53) *lutropin alfa* (*Ovaleap* 4-4.2/34-3) and (54) *glycosylated haemoglobin* (*Abilify* 11-4.8/110-4). Similarly, there are a few instances of an EGP equivalent having been chosen to replace a specialized source term, such as (55) *glucose* (*Abasaglar* 5-4.5) → *blood sugar* (65-2). Apart from these few cases, by far the most prevalent popularization strategy is definition, both in its complete variety, i. e. including both the genus and one or several properties, or in its partial form, where only the genus, but much more often only a property (or several), is represented. An example of the complete variety is the following: (56) *Angiotensin-II is a substance produced in your body which causes your blood vessels to narrow thus increasing your blood pressure* (*Actelsar HCT* 91-1). *Angiotesin-II* represents the definiendum, *a substance* is the genus, and the rest comprises three properties: provenance (*produced in your body*) and two effects (*which causes your blood vessels to narrow* and *thus increasing your blood pressure*), with a causal relation being indicated between the two. A definition of this type (based on causal relations among phenomena) is termed an "implication sequence" by Wignell/Martin/Eggins (1989: 382–386), consisting in a sequence of states or phenomena where one state/phenomenon triggers a new one, which in its turn triggers a new one, etc. This type of definition is quite common in the category 'biochemical and microbiological terms'.

As for partial definitions, both genus-only and properties-only definitions occur. A case which must be interpreted as a genus-only definition is (57) *albumin* (*Abraxane* 2.2) → *the human protein albumin* (45-1), which could be rephrased as *albumin is a human protein*, which makes explicit how the definiendum *albumin* is assigned to a superordinate class, viz. *human protein*. A property-only definition occurs in, e. g., (58) *NMDA-receptor* (*Axura 6-5.1*) → *The brain contains so-called N-methyl-D-aspartate (NMDA)-receptors that are involved in transmitting nerve signals important in learning and memory* (*Axura 71-1*), where *N-methyl-D-aspartate (NMDA)-receptors* is the definiendum, *the brain* is a property that indicates systemic location, and *involved in transmitting nerve signals* etc. is another property specifying function.

The two properties identified in example (58), i. e. function and systemic location, can be recognized as two types of properties that recur in multiple instances, with function being in many cases indistinguishable from effect, instanced in (56) together with *provenance*, which amounts to a third type. Another two types have been identified, which are 'site of excretion'

and one for which the label 'indexicality' has been chosen (to be explained below). The full list of property types in definitions – whether complete or partial – occurring in the category 'biochemical and microbiological terms' is thus:

- function/effect,
- systemic location,
- provenance/site of production,
- site of excretion,
- indexicality.

'Site of excretion' occurs, e. g., in (59) *bilirubin* (*Capecitabine Medac* 8-4.4) → *blood bilirubin (excreted by the liver)* (51-4), and 'indexicality' occurs in, e. g., (60) *troponin* (*Akynzeo* 8-4.8) → *high levels of troponin – which indicates heart muscle dysfunction* (29-4). By 'indexicality' is thus meant the semiotic property of a sign signifying another quality or state of affairs in the context in which it occurs (cf. Sebeok 1994: 31–33), as in the way *high levels of troponin* are known to be a sign of *heart muscle dysfunction* in example (60).

3.3 The category 'medicinal products'

The medicinal-products category is a highly uniform one in respect of popularization strategies, since virtually all instances must be interpreted as cases of definition on the target side. As in the biochemical/microbiological category, the individual instances vary between including both a genus and one or several properties and excluding either the genus or the properties. In examples (61–67), both genera and properties are specified:

(61) *ciprofloxacin, doxycycline, cefdinir* (*Fexeric* 4/5-4.5) → *ciprofloxacin, doxycycline, cefdinir: medicines to treat bacterial infections* (22-2)
(62) *valproic acid* (*Fexeric* 4/5-4.5) → *valproic acid: a medicine to treat epilepsy and mental disorders* (22-2)
(63) *sertraline* (*Fexeric* 4/5-4.5) → *sertraline: a medicine to treat depression* (22-2)
(64) *methotrexate* (*Fexeric* 4/5-4.5) → *methotrexate: a medicine to treat rheumatoid arthritis, cancer and the skin disease, psoriasis* (22-2)
(65) *alendronate* (*Fexeric* 4/5-4.5) → *alendronate: a medicine to treat decreased bone mass and density* (22-2)
(66) *levodopa* (*Fexeric* 4/5-4.5) → *levodopa: a medicine to treat Parkinson's disease* (22-2)
(67) *levothyroxine* (*Fexeric* 4/5-4.5) → *levothyroxine: a medicine to treat thyroid hormone deficiency* (22-2)

Examples (61–67) are highly representative, in that in all cases the genus indicated is the ultimate superordinate class *medicine*, and the properties all pertain to the therapeutic area (the type of disorder that the drug is used to treat), e. g. *to treat bacterial infections* (61) and *to treat epilepsy and mental disorders* (62), etc. A variation occurs when the properties are concerned with what must rather be termed therapeutic *effect*, as in (68) *gonadotropin-releasing hormone (GnRH) agonist or antagonist* (*Ovaleap* 4-4.2) → *"gonadotropin-releasing hormone" (GnRH) agonist or antagonist (these medicines reduce your sex hormone levels and stop you ovulating)* (33-2). Here, *reduce your sex hormone levels and stop you ovulating* represents the therapeutic effect, and *medicines* once again the ultimate superordinate class. In a minority of cases, a genus at a more intermediate level in the taxonomic hierarchy of medicinal products is offered,

as in (69) *rosuvastatin* (*Truberzi* 5-4.5) → *rosuvastatin (statin used to treat high cholesterol and to prevent cardiovascular disease)* (40-2), where the definiendum *rosuvastatin* is assigned to the medicinal subcategory *statins*.

3.4 The category 'excipients'

By 'excipients' is meant "a substance that is combined with a drug in order to render it suitable for administration, for example in the form of pills. Excipients should have no pharmacological action themselves" (Martin 2015: [*excipient*]). In other words, excipients in no way contribute to the therapeutic effect of the drug, but merely enable the active substance to be contained in, e. g., a pill that can be taken orally. Out of the four categories of source items examined, excipients form the most uniform category as far as popularization strategies are concerned: Without exception, all excipient terms are reduplicated in the target text without any attempt at popularization whatever, as in examples (70–77) below:

(70) *sodium dihydrogen phosphate dihydrate* (*Ovaleap* 11-6.1) → *sodium dihydrogen phosphate dihydrate* (37-6)
(71) *sodium hydroxide (2 M) (for pH adjustment)* (*Ovaleap* 11-6.1) → *sodium hydroxide (2 M) (for pH adjustment)* (37-6)
(72) *mannitol* (*Ovaleap* 11-6.1) → *mannitol* (37-6)
(73) *methionine* (*Ovaleap* 11-6.1) → *methionine* (37-6)
(74) *polysorbate 20* (*Ovaleap* 11-6.1) → *polysorbate 20* (37-6)
(75) *benzyl alcohol* (*Ovaleap* 11-6.1) → *benzyl alcohol* (37-6)
(76) *benzalkonium chloride* (*Ovaleap* 11-6.1) → *benzalkonium chloride* (37-6)
(77) *water for injections* (*Ovaleap* 11-6.1) → *water for injections* (37-6)

Of these examples, one (no. 71) does, in fact, feature further explanation, viz. *for pH adjustment*. However, the target element has clearly been 'copy-pasted' from the source side, where the item also appears.

4 Discussion of results

The above analyses show a relatively clear picture of the popularization strategies in each of the four source categories: The medical-disorder category exhibited the greatest variety of strategies, spanning direct transfer, (the choice of) EGP equivalents, translation and definition. As opposed to this variety, the category 'biochemical and microbiological terms' was (virtually) limited to definitions, both complete ones consisting of both a genus and one or several properties, and partial ones consisting of either the genus only or the properties only. The medicinal products category, too, was limited to definitions (of both the complete and partial variety). The excipients category, on the other hand, was found to be completely remiss in terms of popularization, consisting without exception in the direct transfer of source terms without any trace of reformulation.

The stance taken here is that these differences in strategy must be interpreted as different degrees of popularization. Most obviously, since the direct transfer of specialized terms without any reformulation represents the very absence of popularization, this strategy (or rather, the lack of it) represents the lowest degree of popularization. The second-lowest degree – which does entail popularization – is represented by definition, since definitions really func-

tion as a combination of, or a bridge between, a specialized and a general-language register (Myers 1991: 17), serving, in fact, to introduce, via an explanation in common terms, the specialized term into the lay reader's vocabulary. This is why definitions are a favored strategy in textbooks, since a basic aim of this genre is to facilitate the student's initiation into specialized field-specific taxonomies (cf. Wignell/Martin/Eggins 1989). Definitions thus involve both the introduction and the exposition of a specialized source term in the target text, rather than the replacement of the term with a reformulation. Replacement via reformulation, therefore, must be regarded as a higher degree of popularization, which encompasses two out of the four strategies manifested in the medical-disorder category, i. e. EGP equivalents and translation. Whether any further distinction can be made with regard to popularization degree among these two replacement-via-reformulation strategies must remain an open question. Possibly, the EGP-equivalent strategy may be taken to represent the higher degree for the simple reason that a one-word target item, which was found to be the most frequent manifestation of this strategy, may be easier to process than the multi-word items that come out of the two translational strategies (morphemic and word-by-word). Further, it may be argued that while both the one-word EGP equivalent and the individual words resulting from a translation are (supposed to be) known to the lay reader, the *combination* of the words in a multi-word target item will typically be new, thus constituting a slightly higher challenge. Most likely, however, any such difference in degree will be negligible.

On the basis of the above deliberations, the highest degree of popularization is thus manifested within 'medical disorders', whereas the popularization of the biochemical and microbiological terms and the medicinal-products category share a lower degree of popularization. At the bottom of the hierarchy was found the excipients category with no popularization at all. This is what has been deduced on the basis of the actual strategies observed. As mentioned in the introductory section, however, we assume that such actuality can be taken to reflect potentiality: Since relatively clear patterns of popularization – and, most importantly, very different patterns – have been uncovered between each of the four terminological categories, we will make the assumption that such differences are not coincidental, but must be interpreted as being indicative of what type(s) and degree of popularization a given terminological category allows. If this assumption can, indeed, be made, what remains is some indication of an explanation for these differences in popularization potential. A crucial part of such an explanation appears to be rooted in etymology: In the medical-disorder category, the reason why many terms lend themselves to a high degree of popularization is that they consist of Greek or Latin morphemes or words that are easily translated into core English lexis, viz. a lexicon largely concerned with body parts and basic bodily functions. In fact, it may be argued that the original Greek/Latin words that enter into the combinations constituting the majority of medical-disorder terms are in no way specialized terms in themselves: Words from classical Greek such as αἱμα (*haima* = 'blood'; Montanari 2015: 50), ἄρθρον (*arthron* = 'joint': Montanari 2015: 294) and γαστήρ (*gastér* = 'stomach'; Montanari 2015: 417) belong to a wholly non-specialized vocabulary, exactly as do their English counterparts. It is, in other words, the ultimately non-specialized origin of the individual components of the medical-disorder terms that forms the basis of their high popularization potential.

In the absence of such etymology, the only other popularization strategy available seems to be definition of specialized items using lay terms. This raises the question why the excipients category does not appear to afford this possibility, as opposed to the biochemical and microbiological terms and the medicinal-product terms, both of which were seen to exhibit this po-

tential. In this case, an explanation must largely rest on speculation, since – given the complete absence of popularization within the excipients category – there is no actuality on which to base a hypothesis. Nevertheless, two possible explanations suggest themselves: one is that most excipient terms denote substances that are only definable by reference to their chemical composition and to their location within a specialized taxonomy of chemical substances and compounds – a taxonomy, in other words, which is bound to be beyond the chemical knowledge of most lay readers. Another potential explanation is that excipients, being substances formulated alongside the active ingredient of a medication, serve purposes (e. g. long-term stabilization, flowability, non-stick properties, etc.) that have little immediate relevance to the medicine user or are communicated in other ways. Hence, the absence of popularization is tantamount to absence of the very relevance of popularization. The terms in the other two categories, on the other hand, were seen to be relatable either to bodily functions or diseases for which lay terms exist, or for which the medical term is typically known to the average lay reader (terms for diseases such as *epilepsy*, *depression*, *cancer*, *Parkinson's disease* etc. from examples 62–66).

5 Conclusion

To sum up, this article has identified patterns of popularization strategies within different categories of medico-pharmaceutical terms and argued that the variation must be explained by differences inherent in the specialized source terms themselves. Most importantly, it has been argued that different terminological subcategories lend themselves to different degrees of popularization, the implication being that popularization, whether mandated by current legislation, justified with reference to scientific ethical imperatives, or strived for by competent knowledge mediators and translators alike, is not always possible. Hence popularization may at best be able to only partially bridge the knowledge divide, or knowledge asymmetry, between experts and non-experts. The investigation has, however, been limited to a particular branch of LSP terminology 'medicine', and a particular language 'English'. Even so, theoretically, the paper may be seen as representing a first step towards creating a taxonomy of popularization strategies that may be further explored and refined in future studies encompassing other specialized domains and other languages than English.

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Appendix

The two sections below contain lists of the SmPCs and PILs referred to by product name in Section 3. The texts are listed by product name (each followed by an author-date reference) in the first subsection, and by author and date in the second subsection.

1 Listing by product name

Abasaglar (Lilly France S.A.S. 2014)
Abilify (Otsuka Pharmaceutical Europe Ltd. 2009)
Abraxane (Celgene Europe Limited 2009)
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