

**Greenhouses And Submarine Sandwiches: A Look Into The Creativity and  
Predictability Of Noun-noun Figurative Compounds**

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## **Table of Contents**

<b>1. Introduction</b>	<b>2</b>
<b>2. Literature Review</b>	<b>4</b>
2.1. Compositionality and Related Concepts in Noun-Noun Compounding	4
2.2. Figurative Compounds	8
2.3. Previous Research and Methods	12
<b>3. Data and Methodology</b>	<b>16</b>
<b>4. Analysis and Results</b>	<b>21</b>
<b>5. Discussion</b>	<b>31</b>
<b>6. Conclusions</b>	<b>33</b>
<b>References</b>	<b>34</b>
Declaration of Academic Integrity	39

## 1. Introduction

In 1990, when Tim Berners-Lee first created his prototype browser in his search for a more effective way of managing information at the CERN, he called it *World Wide Web* (James Gillies 2000: 192), a name that he probably considered quite straightforward. Similarly, one can safely assume that the average English speaker would not stop and think for very long if asked about the meaning of *greenhouse* or *submarine sandwich*. However, all words mentioned here belong to a class of compounds that has been regarded as opaque, unpredictable and virtually unanalyzable by much of the existing literature on compounding: exocentric compounds. Many of these compounds, however, include conceptual metaphors that we use daily, such as *green* for ‘related to vegetation or the environment’, or *web* for a mutually connected group of individual elements. Noticing this, authors like authors like Benczes (2006) have argued that

if metaphor and metonymy are everyday processes ... then metaphorical and metonymical compounds are just as normal and everyday constructions as nonmetaphorical or nonmetonymical ones (Benczes 2006: 76-77),

calling for a raincheck on the long-standing academic tradition of denying exocentric or figurative compounds any sort of transparency. Following this principle, the present study will work with the main research question of question of whether, as most prior literature suggests, exocentric compounds are perceived by speakers as opaque; or if rather, as stated by Benczes, some of these compounds are as transparent to us as their ‘endocentric’ counterparts.

The author will begin by presenting an overview of some of the key theoretical concepts that surround this question, presenting an introduction to noun-noun compounding and finally, a review of two of the studies that have served as inspiration for the framework and methods applied in this paper. The second half of the paper will subsequently review the

methodology and results of the experiment conducted, based on the interpretations and predictability ratings of 14 potential English compounds by a group of bilingual speakers of English from Spain and Germany.

## 2. Literature Review

### 2.1. Compositionality and Related Concepts in Noun-Noun Compounding

Compounding as a word-formation process can be defined as the process of combining “independently existing bases combined to form new lexemes” (Biber et al. 1999: 58). The resulting compounds are “lexical unit[s] consisting of more than one base” which function “both grammatically and semantically as a single word” (Quirk et al. 1985: 1567). Within this broad definition, compounds can be classified according to the word class of their components, in

- noun + noun: *chairman, girlfiend, shopkeeper, textbook*
- adjective + noun: *bluebird, Englishman, flatfish, nobleman*
- verb + noun: *cry-baby, guesswork, playboy, washing-machine*
- noun + adjective: *care-free, colour-fast, sky-blue, user-friendly*

(Biber et al. 1999: 58)

Of these, noun-noun compounds are “among the most interesting and salient morphological phenomena”, not particularly for being made up of two nouns, but in terms of

the wide range of possible semantic relations which may take place between the components of the compound, as well as between the compound itself in relation to its components (Benczes 2005: 174),

that is, in regards to their ‘compositionality’.

Compositionality can be broadly understood as the degree to which “the meaning of a complex expression is determined by its structure and the meanings of its constituents” (Szabó 2020: 3) and may therefore be deducted from them (Benczes 2006: 69). In this vein, Biber et.al define compounds according to “their tendency to be pronounced with unity stress (i.e. stress on the first element) and written as one word or with a hyphen” but also, notably,

for their tendency to “have a meaning which is not predictable from the individual parts” (Biber et al. 1999: 58), that is, for their lack of compositionality.

Although traditionally, language has been regarded as fully compositional (Langacker 2008: 39; Szabó 2020: 1), that position has since been challenged, particularly when applied to nominal compounding. To begin with, nominal compounds often include words in counter-intuitive and idiosyncratic positions (e.g. *honey* in *honeymoon*), leading to the widespread belief that some compounds are fully non-compositional (Ackema & Neeleman 2004: 80–81). The idea of partial-compositionality is also particularly popular within the framework of cognitive linguistics (CL), which goes as far as to state that rather than being the norm, full compositionality is “the exceptional condition” (Taylor 2002: 100 as cited in Heyvaert 2009: 237) in compounds. In addition, CL argues that the meaning of a linguistic expression is always only partially compositional, being derived not only from the individual meaning of the components, but from

- (i) the conceptions evoked or created through the previous discourse; (ii) engagement in the speech event itself, as part of the interlocutors’ social interaction; (iii) apprehension of the physical, social, and cultural context; and (iv) any domains of knowledge that might prove relevant[;] (Langacker 2008: 42)

As well as a series of “imaginative and interpretive “phenomena ... such as metaphor” (Langacker 2008: 42).

The insufficiency of studying a compound on the sole base of the relationship between its components is also illustrated in those compounds that have a meaning completely separate to the meaning of their components. This tendency towards fully non-compositional meanings has led to such compounds being compared to idioms and idiomatic expressions. Kavka (2009) argues that some compounds fulfill all characteristics of ‘idiomaticity’ (i.e. the

components must be “bound together lexically and syntactically”) and could therefore be classified as idioms, with their compositionality ranging from “fully compositional (e.g. *shoot a bird*; *red ink*), to semi-compositional (e.g. *shoot a film*; *red carpet*), or non-compositional (e.g. *shoot the breeze*; *blue blood*).” (Kavka 2009: 23) The categorization of compounds as idioms is particularly interesting in light of the contributions of Nunberg et.al. (1994) to construction grammar, defining ‘idiomatically combining expressions’ as “idioms whose parts carry identifiable parts of their idiomatic meanings” (496), such as the construction “*spill the beans*” for ‘reveal the information’ as opposed to “*saw logs*” for ‘sleeping’ (Nunberg et.al. 1994: 497). Going against the popular idea that idioms are always fully non-compositional, the authors defend that idiomatically combining expressions are, in spite of their unconventional meanings, fully compositional, as “speakers of English recognize the meanings of words in idiomatically combining expressions ... as figurative” (Croft 2001: 182) and are able to interpret them. In this sense, Nunberg et. al. (1994) “dissociate conventionality from noncompositionality”, largely treating compositionality as the ability to recognize the meaning of the expression as a sum of its components, even if said meaning is not literal. It is possible then, that figurative compounds could be regarded as compositional even if their meaning differs from that of their components.

The difference between those compounds whose meaning can be predicted from their parts (fully compositional) and those whose meaning cannot has been simplified and re-classified in categories like (1) “Endocentric compounds: AB<sup>1</sup> is an instance of B” (e.g. “chess table”); (2) “Exocentric compounds: AB is neither an A nor a B” (e.g. “redneck”); (3) “Copulative compounds: AB is A and B” (e.g. “singer-songwriter”) (McIntyre 2017: 6); and

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<sup>1</sup> AB meaning the same as the former XY.

this dichotomy between endocentric and exocentric compounds has also been commonly expressed as transparent versus opaque.

Although, similarly to compositionality, there is cases in which a compound will be considered transparent merely because it's meaning as a whole correlates to that of its components (Zwitserslood 1994: 344 as cited in Bell & Schäfer 2016: 158), transparency is largely considered “a property of the individual constituents” rather than the compound as a whole (Benczes 2006: 5). Furthermore, some authors (Kooij 1968; Dirven & Verspoor 2004; Langacker 2008) have shied away from a binary conception of transparency and opacity, rather viewing transparency as a cline or spectrum. Consequently, Libben et.al. (2003) propose a classification of transparency in four different types, allowing for more wiggle room than the traditional binary transparent/opaque:

TT (transparent–transparent) (e.g. *car-wash*)

OT (opaque–transparent) (e.g. *strawberry*)

TO (transparent–opaque) (e.g. *jailbird*)

OO (opaque–opaque) (e.g. *hogwash*)

(Libben et.al. 2003: 53)

Looking more into ‘transparent’ versus ‘opaque’ compounds, some studies based on priming effects have found supporting evidence to the thesis that transparent and opaque compounds are semantically processed in different ways (Sandra 1990: Zwitserslood 1994; as cited in Bell & Schäfer 2016); which could in turn support the idea of exocentric and endocentric compounds being processed differently. The issue with studies of this nature, as stated by Bell and Schäfer themselves, is that transparency is normally based either on the participants’ subjective ratings of the compound or its constituents, also using scales of meaning predictability in some cases. (Bell & Schäfer 2016: 162)



Heavily implemented by Štekauer (2005; 2009; 2011), ‘meaning predictability’ or the lack thereof refers to “which of the usually numerous possible meanings [of a form] is the most predictable one” (Štekauer 2011: 1), and relies on the idea that “linguistic knowledge is not sufficient to interpret a [noun-noun] compound”, rather, the meaning predictability of a form “depends on the interaction of linguistic knowledge ... and extra-linguistic knowledge” (Štekauer 2005: 60). The theory has been applied fundamentally in relation to ‘Onomasiological Word Formation Theory’ (OWFT) which seeks to erase the differences between different word-formation types, defending that

naming units do not come into existence in isolation from factors such as human knowledge, human cognitive abilities, experiences, discoveries of new things, processes, and qualities, human imagination, etc. (Štekauer 2005: 44)

However, it will be applied in the course of the present paper as independent from the OWFT framework, rather being utilized as a more intuitive way of regarding the value of specific meanings proposed for noun-noun compounds (see Data and Methodology) than transparency or compositionality.

## **2.2. Figurative Compounds**

As we saw in the previous section, noun-noun compounds have been classified in different ways, both according to their morphological structure (i.e. ‘noun-noun’), and the relation between their components (e.g. ‘endocentric compound’, ‘subject and object compound’). However, arguably the most interesting aspect of noun-noun compounds is the ways, often “impredictable” in which they combine semantic domains in order to form new meanings (Onysko 2016: 317). The meaning of a compound often cannot be ascertained from that of its components (Quirk et al. 1985: 1568; Biber et al. 1999: 58), for instance the compound *greenhouse*, composed by noun<sub>1</sub> *green* and noun<sub>2</sub> *house*, refers to “[a] structure

with walls and roof made chiefly of glass or translucent plastic in which plants requiring regulated climatic conditions are grown.” (“greenhouse, n”, 2011) This type of compound would be classified as ‘exocentric’, meaning both opaque and noncompositional<sup>2</sup>.

Benczes (2005: 174) defines exocentric or ‘figurative’ compounds as “those in which there is no direct semantic relation between the final meaning of the compound and that of its components” (174); the most interesting of these being the noun-noun compounds that “exist through figurative semantic relations, involving either metaphor, metonymy, or both” (174). The author expands on the shortcomings of descriptivist, generativist and cognitive theories of compounding in regards to the study of exocentric or figurative compounds; finding that they have been often relegated to a background role, with only metonymical compounds being marginally mentioned in almost every case. As an example, in his classification Bloomfield (1933) states that a compound will be considered endocentric if the head serves the same function as the whole, presuming a hyponymical relation; however, he includes only metonymical compounds in his definition of exocentric (Benczes 2006: 16). Jespersen (1954) builds upon Bloomfield’s theory, adding copulative compounds, appositional compounds, cases in which the components are linked with a preposition, and finally bahuvrihi compounds. This latter category, with examples such as “red coat” refers to metonymical compounds which only apply to a living being, however. (Benczes 2006: 18)

Not only have been exocentric compounds delegated to a second plane, if even mentioned, by some of the better known descriptors of the English language, but when accounted for, exocentric compounds are generally regarded as opaque in the literature (Benczes 2006: 176), in regards to compositionality, transparency and even predictability.

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<sup>2</sup> Predictability falls on another axis, as the most predictable meaning need not be the most transparent one.

However, since the processes involved in exocentric or figurative noun-noun compounds rely either on metaphor or metonymy, they can be accessed through “a cognitive linguistic framework” (Benczes 2006: 4) and “can be accounted for with the help of conceptual metaphor and metonymy theory” (Benczes 2005: 173).

Created by Lakoff & Johnson (1980), the ‘Conceptual Metaphor Theory’ (CMT) proposed that, far from being a mere feature of poetic language, the metaphor is a powerful and pervasive instrument of language and thought, being deeply entrenched in our representational system<sup>3</sup>. As proposed by Knowles & Moon (2004: 26) metaphors are “connections between concept areas in terms of correspondences or mappings between elements within source and target domains”, as in the famous example ARGUMENT IS WAR, in which a verbal argument is conceptualized using words that originally relate to a armed conflict. Metaphorical and metonymical noun-noun compounds can therefore also be described in terms of a mapping from one a source domain onto another through a process of conceptualization<sup>4</sup>, as shown in Figure 1.

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<sup>3</sup> The authors differentiate between different types of metaphors, such as “entity”, “substance”, “container” and “personification metaphors”, further explained in *Metaphors We Live By* (1980: 25). Some references to this classification may be made in the course of the qualitative analysis.

<sup>4</sup> Described in depth in Langacker (2008: 4).

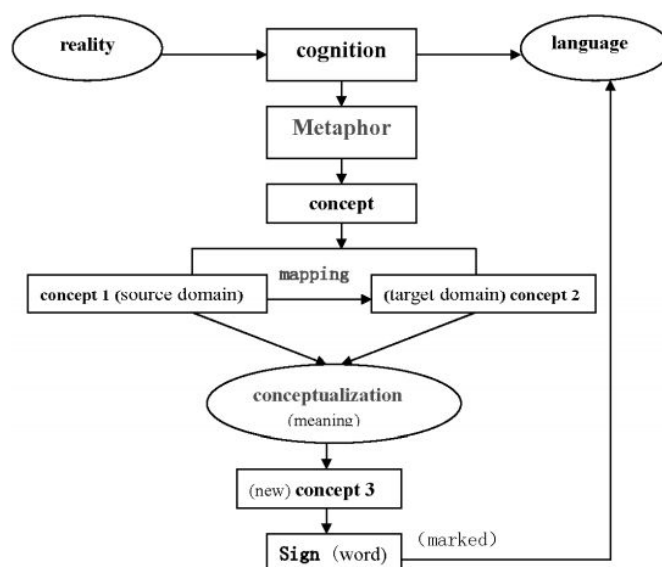


Figure 2.1 the process of conceptualization of language

Figure 1. “The process of conceptualization of language” (Zheng 2017: 13).

A process exemplified in Figure 2, in which the compound *submarine sandwich* is created when the physical aspect of *sandwich* is coconceptualized using the source domain *sumarine*:

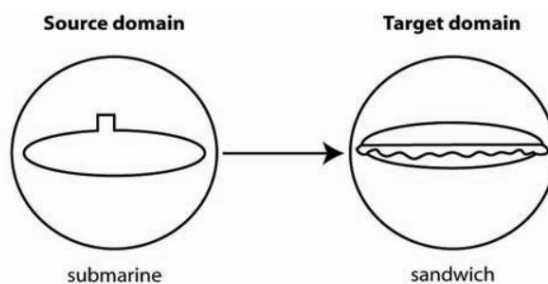


Figure 2. “Mappin[g] between the source and target domains of submarine sandwich” (Benczes 2006: 109).

If, as stated by CMT, metaphor is “an inevitable process of human thought and reasoning ... pervasive both in thought and everyday language” (Kovecses 2010: 5) (James Gillies 2000: 192), there is reason to believe that compounds created through figurative conceptualization would not necessarily be opaque to the average reader (Benczes 2006: 4). It remains to be seen however, how figurative noun-noun compounds could be observed and

analyzed in order to circumvent the tradition that automatically designates them as non-compositional and opaque, and to make use of the tools provided by cognitive linguistics and conceptual metaphor theory. A possible answer might be ‘creativity’.

Rather than compositionality, transparency, predictability or even endocentrality, Benczes (2006) suggests ‘creativity’ as the most useful tool when studying metaphorical compounds[i]f metaphor and metonymy are everyday processes ... then metaphorical and metonymical compounds are just as normal and everyday constructions as nonmetaphorical or nonmetonymical ones. Therefore, the difference between a non-metaphorical compound such as *apple tree* and a metaphorical one such as *information highway* is linguistic creativity: the latter represents a more creative process of word formation (Benczes 2006: 76-77). From the concept of ‘creativity’ Benczes designates the category ‘creative compounds’, such as “*hunchback*”, which are “metaphorical and/or metonymical noun-noun combinations” (Benczes 2006: 6) and “make use of the creative associations that exist between concepts ... based on similarity, analogy or contiguity” (Benczes 2006: 7). The label ‘creative’ will be used interchangeably with ‘figurative’ for the purpose of the present paper.

### **2.3. Previous Research and Methods**

As we have seen, compounds, and particularly noun-noun compounds, exhibit a wide range of non-compositional meanings, particularly those that result from mapping processes such as metaphor, metonymy or analogy. Furthermore, if phenomena such as metaphor are an inherent part of our representational system, these compounds might not be as opaque as the literature suggests, rather being interpreted quite easily by speakers. This section focuses on two experiments who have attempted to clarify to what extent exocentric, figurative compounds are ‘transparent’ to speakers, whose methods will serve as the main inspiration for the ones applied later in the present study.

The first experiment, by Štekauer, presented 10 “possible, non-established<sup>5</sup> naming units to a total of “twenty native speakers and twenty non-native speakers each” (Štekauer 2005: 100) along with the following prompt:

The following are potential English words. Propose as many possible meanings for each of the words as you can think of, and assign a score to each of the meanings proposed, with 10 points indicating the highest probability of occurrence in the language of the meaning proposed (and therefore most predictable), and 1 point the minimum chance of occurrence in the language of such a meaning. (100)

Providing the following example:

(44) *water-mill*  
 – a mill driven by water 10 pts.  
 – a mill near water 4 pts.  
 – a mill having the colour of water 1 pt.  
 etc.

Figure 3. Example offered to participants (Štekauer 2005: 101).

In order to analyze the meanings provided, Štekauer used a measure called Predictability Rate (PR), calculated through the following formula:

$$PR = (r/r_{max}) * (p/p_{max})$$

r = the number of informants identifying a particular meaning as acceptable

r<sub>max</sub> = the total number of informants

p = the sum total of the points assigned to a given meaning by all informants ...

p<sub>max</sub> = the maximum possible number of points assignable by all informants

(Štekauer 2005: 94-95)

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<sup>5</sup> By using “non-established units” the “linguistic advantage of native speakers over non-native speakers is removed (Štekauer 2005: 100).

After reviewing the results, the author found that “metaphorical interpretations remained isolated proposals restricted to a single informant”, with their PR being “very low,” and therefore, that “figurativeness, i.e. semantic shift (metaphor and metonymy), appears to be a serious obstacle to good meaning predictability” (Štekauer 2011: 40-41), except in cases in which “metaphorical meaning has become established, i.e., institutionalised, over time” (Štekauer 2005: 63). I will seek to separate Štekauer’s predictability theory from his onomasiological word formation theory to focus uniquely on metaphorical compounds, to observe whether they are indeed as opaque as the author suggests.

The second experiment, by Onysko (2016) consisted of a list of 12 non-compounds created on the basis of Maguire, Wisniewski & Storms’ (2010) list of semantic domains commonly used together. In addition the constituents chosen were “simple and widely known to ... bilingual speakers”, with the additional objective that “the combination of the constituent terms should result in unusual constructions which would call for figurative interpretation” (Onysko 2016: 319). These 12 potential compounds were then mixed with six established English compounds as a control, and submitted to the participants, 140 Māori and Pākehā bilinguals and Pākehā monolingual speakers of English, of which 117 were considered (320).

Combinations of common semantic domains	Novel noun–noun compounds
WEATHER + BODY PART	<i>fog ear</i> <i>cloud neck</i>
ANIMAL + DWELLING	<i>spider cafeteria</i> <i>snail villa</i>
GARMENT + LANDSCAPE	<i>pyjama beach</i> <i>jandal wood</i>
TOOL + PROFESSION	<i>board poet</i> <i>bucket philosopher</i>
LANGUAGE + VEHICLE	<i>word truck</i> <i>voice canoe</i>
MENTAL STATE + FURNITURE	<i>rage curtain</i> <i>thought fridge</i>

Figure 4. “Test items of novel noun-noun compounds.” (Onysko 2016: 321)

The participants offered meaning suggestions for each of the words, which were classified as ‘figurative’, ‘literal’, ‘analogical’ or ‘related to jargon’ (322). The author found that bilinguals relied heavily on analogy to existing idioms, but also observed that figurative interpretations ranked as the highest overall for all groups (325).

The two studies found conflicting results. Štekauer asked participants to rate the meaning of compounds quantitatively, and then extracted a Predictability Rate for each, finding the PR of metaphorical compounds to be overall very low (Štekauer 2011: 63); whereas Onysko asked participants to provide meanings and then classified them, finding figurative meanings to be very prominent across those suggested (Onysko 2016: 326).



### 3. Data and Methodology

As stated in the introduction, the aim of this paper was to observe the interpretations of potential noun-noun compounds by L2 speakers of English. The initial hypothesis was that figurative meanings would appear as frequently, if not more, than literal meanings, and be rated equally as predictable. The main design of the study followed the direction of Štekauer (2011) and Onysko's (2016) own experiments, outlined in the section prior, attempting to combine the two authors' frameworks in spite of their contrasting results.

As an initial step, a list of 7 non-existent English compounds was prepared, and mixed with 7 real compounds in English. Drawing from Onysko (2016) the non-word compounds were composed with Maguire, Wisniewski & Storms' (2010) list of commonly combined semantic domains in mind, to which the present study added an additional word created through the COLOR-BIRD combination of domains (e.g. *blackbird*, *bluebird*, *red herring*). Also following Onysko's (2016) guidelines, the existing compounds used as a control were selected for being simple and recognizable for L2 speakers, as well as having components that could lead to a "figurative interpretation" (Onysko 2016: 319).

The list presented in Table 1 shows the total number of compounds chosen, including both the semantic domains used for non-existent compounds and the meaning<sup>6</sup> of the established compounds, classified in 'literal' versus 'figurative'. Both the established and the non-existent compounds were chosen according to their non-compositonality, opacity and creativity, all concepts explained in the literature review.

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<sup>6</sup> The full definitions and sources for the established English compounds used in the experiment can be found in Appendix I.

Table 1

*Potential English Compounds Selected for the Experiment*

		Semantic Domains
<b>Non-existent</b>	<i>drill nurse</i>	COLOR + ANIMAL
	<i>droughtmouth</i>	WEATHER + BODY PART
	<i>elephant-tent</i>	ANIMAL + DWELLING
	<i>red dove</i>	GARMENT + LANDSCAPE
	<i>suit coast</i>	TOOL + PROFESSION
	<i>soundcar</i>	LANGUAGE + VEHICLE
	<i>worry cabinet</i>	MENTAL STATE + FURNITURE
		Type of Meaning
<b>Established</b>	<i>backbone</i>	Literal + Figurative
	<i>bedrock</i>	Literal + Figurative
	<i>bellboy</i>	Figurative
	<i>peach fuzz</i>	Figurative
	<i>sheepskin</i>	Literal + Figurative
	<i>snowbird</i>	Figurative
	<i>sunroof</i>	Figurative

Subsequently, a survey<sup>7</sup> was designed using PsyToolkit (Stoet 2010, 2017), presenting the list of 14 words to a list of 30 L2 speakers of English. The speakers were encouraged to state their native tongue (i.e. German, Spanish, or Galician) and then shown an example alongside a few instructions, as shown in Figure 5.

<sup>7</sup> The survey can be tested online at <https://www.psyt toolkit.org/c/3.2.0/survey?s=NX4UR>.

Well done! Now you will receive the [instructions](#)

In this questionnaire, you will be shown a total of 14 **potential English compound words**, and asked to propose three meanings for each. **Please do not look the meaning of the words up**, there are NO wrong answers! After writing your three possible meanings, rank each of them from 1 to 10 according to how likely they are to exist in the English language (1 least likely, 10 most likely), as in the example below:

---

Please enter three possible meanings for the compound *greenhouse*.

Meaning 1  
A house that is green.

Meaning 2  
A space where you plant vegetables.

Meaning 3  
A house designed to minimize its environmental print.

---

Please rate the meanings according to how predictable they would be in English.

Meaning 1  
5

Meaning 2  
10

Meaning 3  
3

Take as much time as you need looking at the example until you understand the process 😊.

Figure 5. Instructions and example offered in the experimental survey<sup>8</sup>.

As one can observe in Figure 5, the participants were asked not only to offer three meanings for each compound, but also to rate them according to their ‘predictability’, from 1 to 10. Both the predictability rating and the instructions’ text were heavily influenced by Štekauer’s (2011) experiment. In this case, predictability was chosen over transparency, compositionality and creativity due to its intuitive meaning: many speakers might confuse transparency with literacy; compositionality is a highly specialized term used in an academic

<sup>8</sup> The ratings assigned in the example were randomly assigned, in order not to skew the process.

context; and creativity could be confused for ‘strange’ meanings. This is not to mean that predictability and transparency are interchangeable in an academic sense, but rather that it is the most available measure to participants. Creativity was partially evaluated in the qualitative analysis.

Of the 30 participants, only data from 17 was usable. Of these, seven marked their L1 as Galician/Spanish, six as German, three as Spanish, and one as Galician: 41.1% of all definitions came from Spanish/Galician natives, whereas 35.2% came from German natives.

The answers were exported into RStudio and classified as follows:

informant	L1	compound	word_type	definition	type	rating
a	spanish/galician	backbone	word	the sum of bones that hold the spinal cord	literal	5
a	spanish/galician	backbone	word	the foundation of something	figurative	8
a	spanish/galician	backbone	word	something that holds anything into place	figurative	8
b	german	backbone	word	a bone in your back	literal	1
b	german	backbone	word	the ability to stand your ground	figurative	10
b	german	backbone	word	a bone who returns	literal	1
c	spanish	backbone	word	vertebral column of a vertebrate, the spine	literal	10
c	spanish	backbone	word	something's support	figurative	7
c	spanish	backbone	word	someone's coccyx	literal	7
d	spanish/galician	backbone	word	a bone of the back	literal	8
d	spanish/galician	backbone	word	synonym of having an ace under your sleeve	analogy	6

Figure 6. Sample of the data collection table utilized.

- The informant (e.g. *a*),
- The L1 of the informant (e.g. *spanish/galician*),
- The compound itself (e.g. *backbone*),
- The status of the compound (word/nonword),
- The definitions offered (e.g. *the sum of bones that hold the spinal cord*),
- The type of the definition (literal/figurative/analogy/naming/jargon/vague)<sup>9</sup>,
- The rating given to the definition.

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<sup>9</sup> In order to accomodate cases that fall neither under figurative, nor literal, the classification of the definitions in ‘literal’, ‘figurative’, ‘analogy’, ‘jargon’, ‘naming’ and ‘vague’ was taken from Onysko (2011), examples can be found in pages 322-324.

A total of 750 observations were collected in total, 42 for each participant.

The data collected was analyzed using a mixed approach. From a quantitative standpoint, frequency counts of each type of compound (e.g. figurative) were extracted, in order to compare the raw counts but also the means of predictability ratings assigned to each compound; variables such as the native language of the participants and the status (word versus non-word) of the compounds were considered in addition to the research question. As a guideline for the qualitative analysis, Štekauer's (2005: 94-95) 'Predictability Rate' or PR (see section 2.3) was calculated for the most salient interpretations for each type, in the seven non-existent compounds studied – in order to avoid results being possibly skewed by the participants' previous knowledge of the established compounds.

#### 4. Analysis and Results

As seen Figure 7, an initial overview of the definitions obtained revealed that of all four types of definition observed, figurative was the most common at 473 observations (66.3%), followed by literal at 156 observations (21.9%), and analogy at 49 (6.9%). Naming and vague definitions remained low, at 15 and 13 respectively, but jargon was the lowest, at only 7 observations.

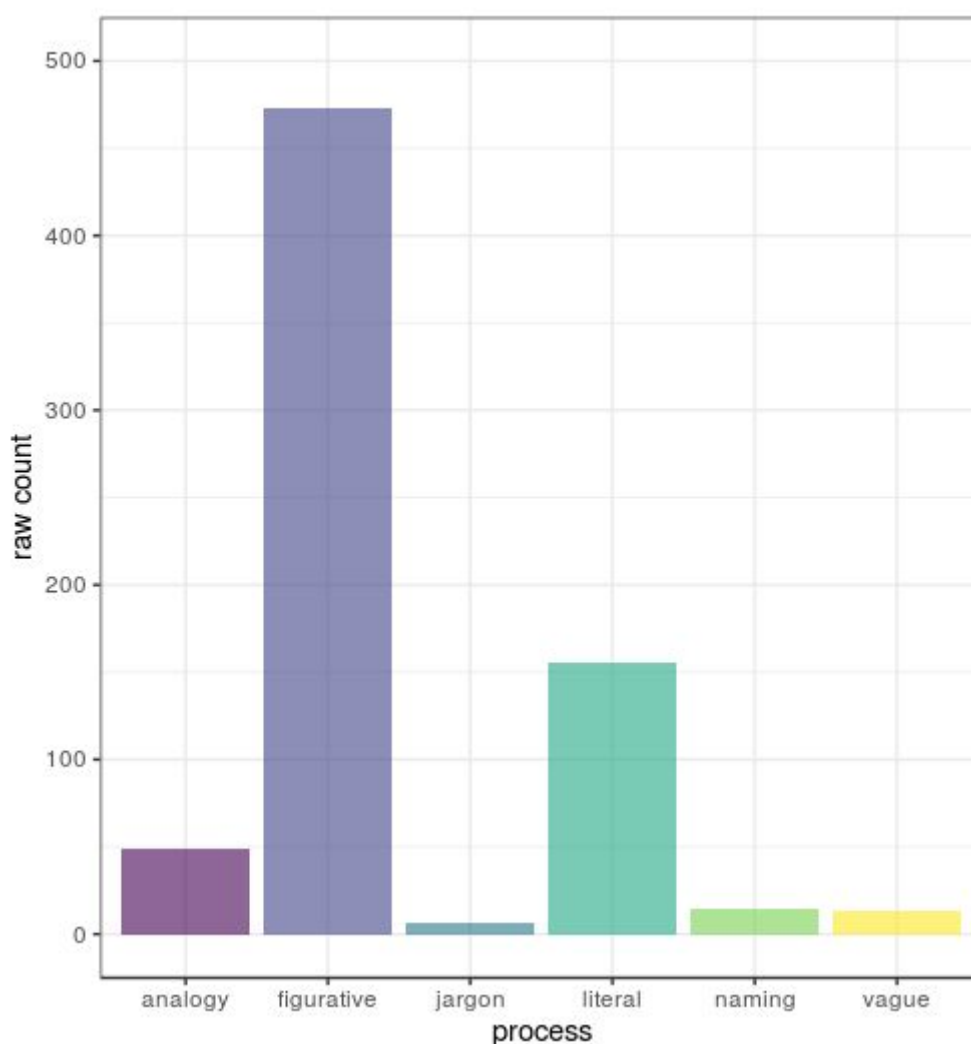
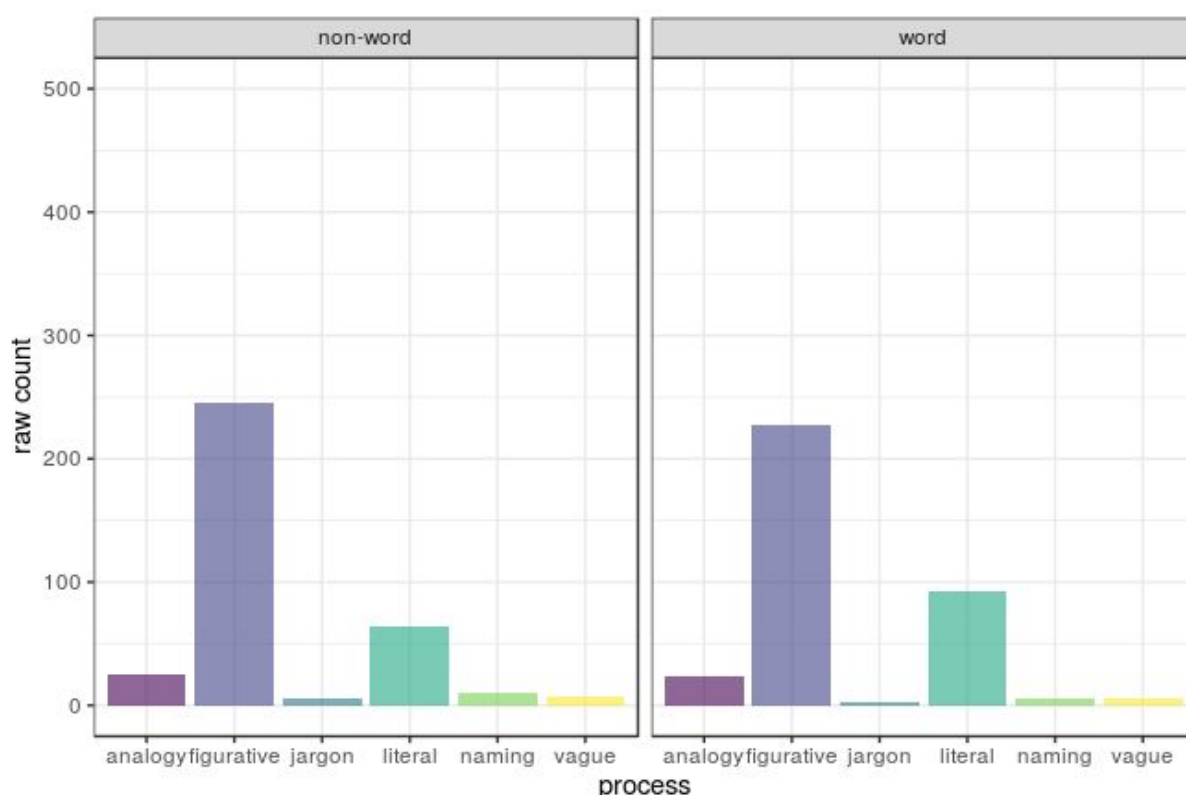


Figure 7. Bar chart showing the raw count of the definitions obtained, by type.

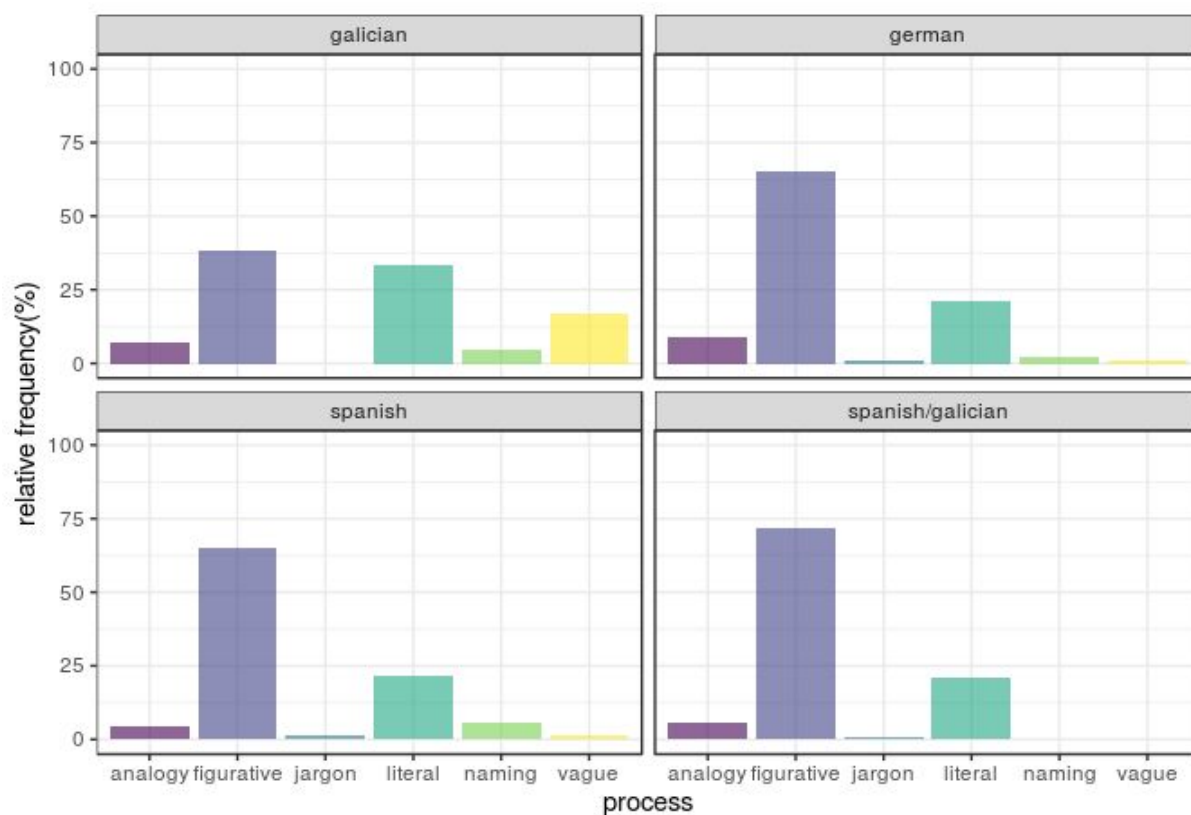
Breaking down the results further in order to see whether the real compounds used as a control – all either figurative or with possible figurative interpretations – one can see that the

results presented in Figure 7 did significantly vary in words versus non-words: figurative interpretations remained the most common, with literal in second position and analogy in third. A small difference can be seen in the number of literal definitions, slightly higher in real compounds than in non-existent compounds (Figure 8).



*Figure 8.* Bar chart showing the raw count of the definitions obtained, by type; separated in words versus non-words.

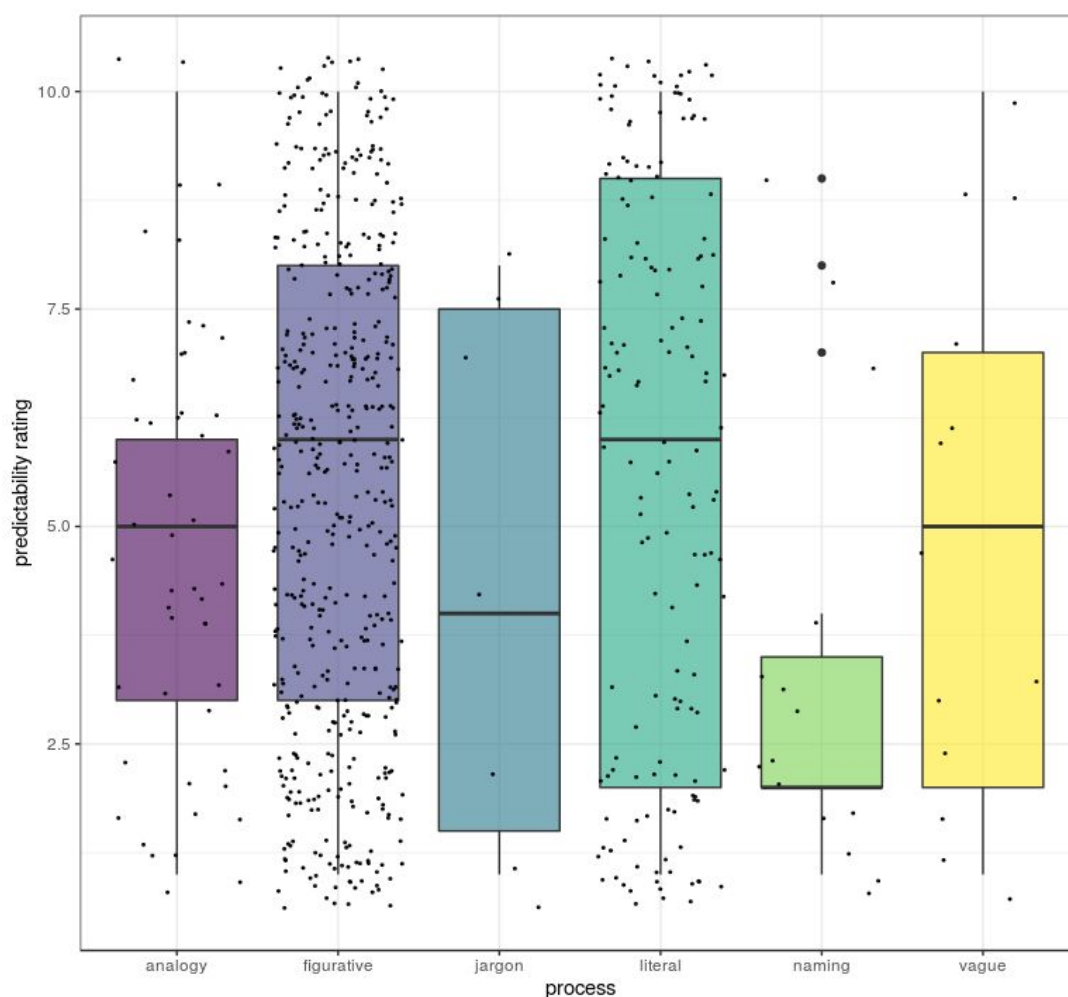
When further sub-dividing the results by L1, the proportions stayed quite consistent, with the exception of a slightly higher occurrence of literal meanings for the single native Galician speaker (Figure 9).



*Figure 9.* Bar chart plotting the percentage of each type of the definition for each L1 collected.

Figurative interpretations were the most frequent among the seven types studied. In order to observe whether figurative definitions were rated as predictable or not by participants, however, one must look at the ratings given by the participants (1= least predictable; 10=most predictable), shown in Figure 10 below.





*Figure 10.* Box chart of the predictability ratings given to each of the interpretation types.

The means of the predictability ratings for figurative and literal were pretty similar (~6.0), analogy and vague interpretations following (~5), jargon definitions with a slightly lower mean and naming with the lowest of all. Although the mean predictability rating was similar for figurative and literal definitions, literal definitions showed a greater range of ratings, both higher and lower than figurative. These differences may be reflected in the individual compounds, as we will see in Figure 11.

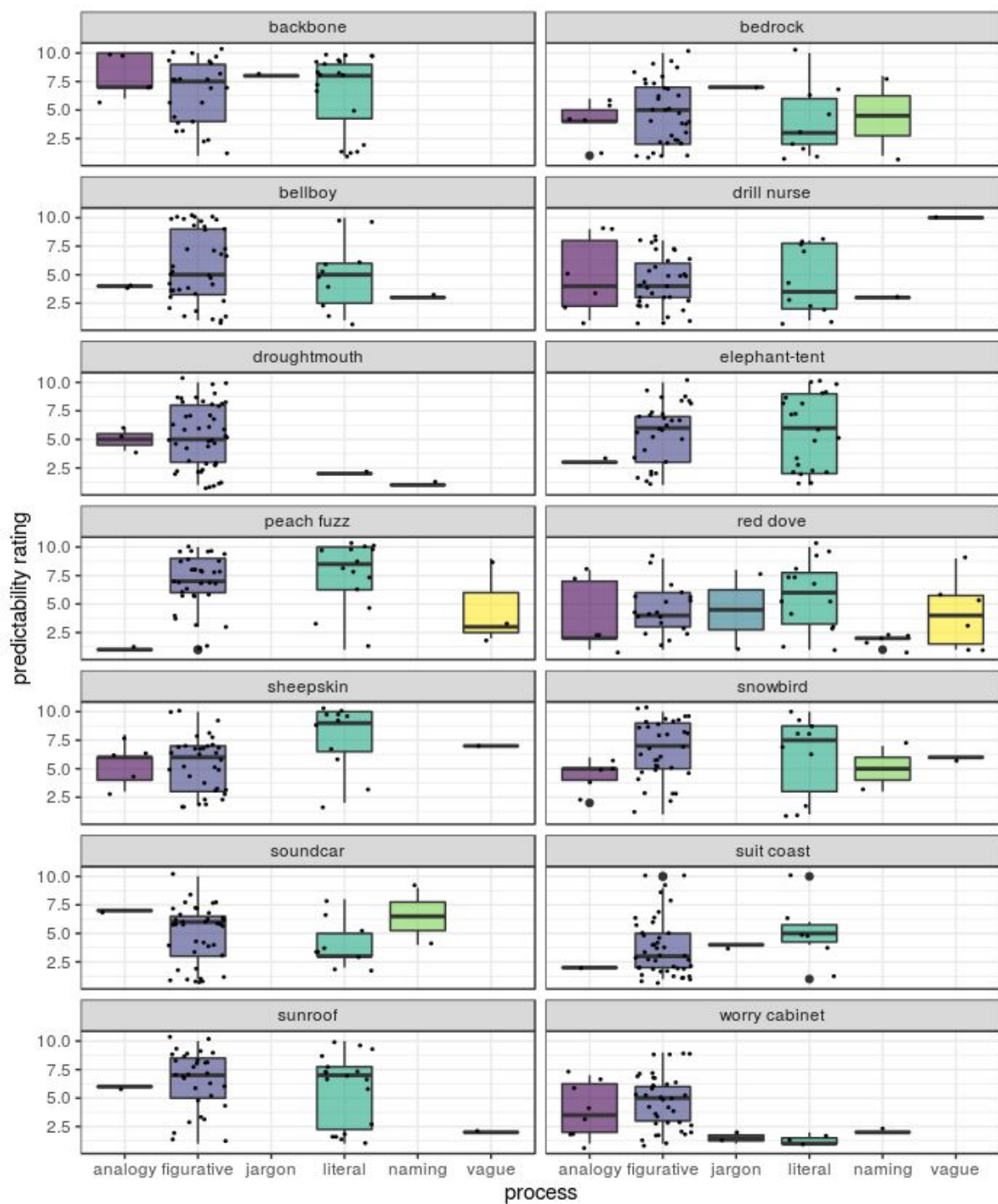


Figure 11. Box plot of the predictability rating for each type of interpretation, by individual compound.

In Figure 11 one can see that there is great variation between predictability ratings for each compound, being difficult to point out a single defining trend in the assignation of

predictability ratings (e.g. figurative having consistently higher or lower ratings than literal interpretations). A more qualitative analysis is therefore needed in order to clarify whether there is any significant difference in the evaluation of literal versus figurative meanings, as well as the other types observed.

As was presented in Table 1, the non-existent compounds created for this analysis were *drill nurse*, *droughtmouth*, *elephant-tent*, *red dove*, *soundcar*, *suit coast*, and *worry cabinet*. The most prominent meanings for these compounds, alongside their calculated PR, will be subsequently presented.

### ***Drill nurse***

Table 2

*Frequent interpretations of ‘drill nurse’*

Interpretations	Process	Predictability Rate <sup>10</sup>
A nurse who drills/the drill she uses	Literal	0.152249135 <sup>11</sup>
A nurse akin to a drill sergeant	Analogy	0.014532872
An annoying nurse	Analogy	0.012456747
A case for a drill	Figurative	0.008304498

Of the main four definitions of *drill nurse*, the most predictable was literal, with a PR of 0.15, perhaps as the image of a nurse using a drill was not counter-intuitive to speakers. Following were two analogical interpretations, one pointing to the ‘drill sergeant’ position in the military, and the other to the idiom ‘to drill someone’, meaning “to intensely or vigorously interrogate someone.” (“drill”, n.d.) Lastly, the figurative definition “a case for a drill” was the least significant. All of the main definitions of *drill nurse* had a relatively low PR,

<sup>10</sup> See section 2.3 and Chapter 3.

<sup>11</sup> Interpretations ranked from highest to lowest PR.

however, due to the internal variation in the definitions. Although varied, most definitions were figurative, with examples such as:

- Example 1: An appliance ensuring an electric drill stays on the right path<sup>12</sup>.
- Example 2: An in-training nurse during practices.
- Example 3: A person who repairs excavating machinery.

### ***Droughtmouth***

Table 3

*Frequent interpretations of 'droughtmouth'*

Interpretations	Process	Predictability Rate
A dry mouth/mouth dryness	Figurative	0.116262976
To be thirsty or dehydrated	Figurative	0.110726644
A dry river	Analogy	0.020761246
Not speaking/absence of words	Figurative	0.07266436

For the compound *droughtmouth*, three of the four main definitions were figurative. In the top two most frequent, the participants extracted 'dryness' and 'absence of water' as the main aspects of *drought*, applying them to the component *mouth* through metonymy. More interestingly, the fourth interpretation, also figurative, used the metaphor WORDS ARE WATER, as *drought* was used to mean 'an absence of words'. The remaining most common definition was 'a dry river', analogically referring to the existing compounds *riverbed* and *river mouth*.

In some cases, the compound was interpreted as a bahuvriri compound, referring in different insulting ways to a certain individual:

- Example 4: Someone who has been a while without kissing others.
- Example 5: An insult for someone who often says little of substance.

<sup>12</sup> All examples extracted from the data collected.

## ***Elephant-tent***

Table 4

*Frequent interpretations of 'elephant-tent'*

Interpretations	Process	Predictability Rate
A really big tent	Figurative	0.426297578
A tent for elephants	Literal	0.277854671
A tent shaped like an elephant	Literal	0.105190311

The compound *elephant-tent* rendered only one significant figurative definition, in which the size of an elephant was applied to that of a tent through a metonymical process. The remaining two were literal, possibly due to the ease of imagining a tent in which elephants inhabit (as opposed to *elephant apartment*, for instance).

## ***Red Dove***

Table 5

*Frequent interpretations of 'red dove'*

Interpretations	Process	Predictability Rate
A bird or dove that is red	Literal	0.377854671
A symbol of war or failed peace	Figurative/Analogy	0.046712803
A name for, or related to, an aircraft	Naming	0.039792388
A warning sign	Figurative	0.024913495

The most predictable definition of *red dove* was literal, with a much higher PR than the remaining three. However, the remaining interpretations showed interesting processes surrounding the conceptualization of the color red: the analogy to *white dove* as a symbol of peace in the second definition assumed red as the opposite of white; and the popular metaphor RED IS DANGER appeared in the last. Curiously, many of the interpretations related to an aircraft, as in the last definition. Apart from naming, this interpretation could be classified as figurative, as the metaphor AN AIRCRAFT IS A BIRD was used.

## ***Soundcar***

Table 6

*Frequent interpretations of 'soundcar'*

Interpretations	Process	Predictability Rate
A car that makes sound for a specific purpose	Literal	0.124567474
A car with sound or audio equipment	Figurative	0.068512111
The sound a car makes	Literal	0.026297578

The one figurative interpretation of *soundcar* used a metonymical process to refer to the sound equipment of a car. In addition, the compound had two prominent literal interpretations, one referring to a car that makes sound, and the other to the sound in itself.

## ***Suit coast***

Table 7

*Frequent interpretations of 'suit coast'*

Interpretations	Process	Predictability Rate
Suit or attire for swimming	Figurative	0.116262976
A coast shaped like a suit	Literal	0.051903114
Vacation destiny for classy or business people	Figurative	0.046020761

The first main interpretation for *suit coast* was figurative, essentially identifying *suit* with 'attire', resulting in 'attire to wear in the coast'. The third used metonymy, using *suit* to refer to business or high-class people, whilst *coast* was generalized into a vacation destiny. The second definition could either be understood as literal or figurative. Although using *suit* for 'suit-shaped' might be slightly metonymical, most definitions seemed to be taking the compound quite literally on the basis of its components.

## ***Worry cabinet***

Table 8

*Frequent interpretations of 'suit coast'*

<b>Interpretations</b>	<b>Process</b>	<b>Predictability Rate</b>
A safe room	Figurative	0.074740484
A person or people who worry a lot	Figurative	0.044982699
Group that takes care of emergencies	Analogy/Figurative	0.010380623
A cabinet to think about worries/to worry	Literal	0.008304498

To conclude, the compound *worry cabinet* showed an overwhelming majority of figurative interpretations, using a variety of processes. While the first pointed to the original definition of *cabinet* as a closet or small room to mean 'a room where you are safe', the second uses the container and substance metaphors A PERSON IS A CONTAINER and EMOTIONS ARE SUBSTANCES to mean 'a person full of worries'. The third used the definition of cabinet as 'a board or group of people', indentifying worries with emergency situations. Lastly, the fourth definition was literal, referring to a cabinet where one worries.

## 5. Discussion

As presented in the literature review, noun-noun compounding is among the most productive and diverse processes of word formation, featuring a high frequency of non-compositional compounds that have been classified as ‘exocentric’, and deemed as universally opaque or unpredictable by a huge portion of the literature on the subject. Relatively recently, Cognitive Linguistics and Conceptual Metaphor Theory have presented an opportunity for studying exocentric compounds in terms of the figurative processes that conform them, giving way to a surge in studies questioning the universal opacity of what Benczes (2006) calls ‘creative’ compounds. Two such studies were put forward by Štekauer (2005) and Onysko (2016), with somewhat conflicting results: where Štekauer found that the PR of figurative compounds was overall quite low, Onysko saw that of the interpretations provided by participants, most were figurative. This paper sought to add evidence to the broad question of whether figurative compounds should indeed be considered opaque, or whether our naturally metaphorical and metonymical conceptualization of the world allows us to easily interpret these compounds as speakers.

The results collected correlate somewhat to the ones obtained by Štekauer and Onysko, as figurative compounds were the overwhelming majority among the answers collected (Figure 7), and their ratings were no higher or lower than those of literal compounds (see Figure 8). Furthermore, when looking at the main interpretations for the non-existent compounds studied, it was found that all of them included at least one figurative interpretation. However, in line with Štekauer’s results, the PR of literal interpretations were overall higher (mean ~0.15) than those of figurative definitions (mean ~ 0.055).

Overall, the study found considerable evidence that figurative interpretations are prominent and commonly suggested by participants, which points at some degree of



transparency of meaning. Although they were overall rated as slightly less predictable than literal interpretations, the difference was not as substantial as the traditional conception of exocentric compounds as completely opaque would suggest.

## 6. Conclusions

The research question to be answered in the present study was whether exocentric compounds are unambiguously opaque, or whether they hold some degree of transparency, as one would expect if we regard metaphor and metonymy as unavoidable aspects of our way to process and describe reality. The starting hypothesis assumed that figurative compounds would be the preferred interpretation process by the participants. The study found that:

- Figurative interpretations were by far the most frequent, more than doubling the number of literal interpretations found.
- The mean of the predictability ratings of the participants for figurative and literal interpretations was almost identical, revealing that figurative interpretations were not rated significantly lower.
- Of the primary interpretations for the non-existent compounds suggested, at least one of them was figurative in every case. The Predictability Rate (see section 2.3) calculated for these meanings was, however, lower for figurative interpretations than literal. Nonetheless, the qualitative analysis of the definitions provided by participants revealed that many of them inadvertently suggested metaphorical meanings, rating them as predictable.

Overall, in spite of the limitations encountered, both in terms of participant size and capacity of analysis, the study found some evidence pertinent to the research question. Figurative interpretations were neither scarce nor universally rated as unpredictable, which supports Benczes' (2006) idea that rather than being deemed as opaque, exocentric compounds should be understood to have some degree of transparency, and studied in terms of the considerable complexity of our representational system, as described by Conceptual Metaphor Theory.

## References

- Ackema, Peter & Ad Neeleman. 2004. *Beyond Morphology: Interface Conditions on Word Formation* (Oxford Studies in Theoretical Linguistics). Oxford, New York: Oxford University Press.
- Bell, Melanie J. & Martin Schäfer. 2013. Semantic transparency: challenges for distributional semantics. In *Proceedings of the IWCS 2013 Workshop Towards a Formal Distributional Semantics*, 1–10. Potsdam, Germany: Association for Computational Linguistics. <https://www.aclweb.org/anthology/W13-0601> (14 August, 2020).
- Bell, Melanie J. & Martin Schäfer. 2016. Modelling semantic transparency. *Morphology*. Springer 26(2). 157–199.
- Benczes, Réka. 2005. Creative noun-noun compounds. *Review of cognitive linguistics*. Amsterdam: John Benjamins (3). 250–268.
- Benczes, Réka. 2006. *Creative Compounding in English: The Semantics of Metaphorical and Metonymical Noun-Noun Combinations*. Amsterdam: John Benjamins.
- Biber, Douglas, Stig Johansson, Geoffrey Leech, Susan Conrad & Edward Finegan. 1999. *Longman Grammar of Spoken and Written English*. Harlow: Longman.
- Bloomfield, Leonard. 1933. *Language*. University of Chicago Press.
- Booij, Geert. 2009. Compounding and construction morphology. In Rochelle Lieber & Pavol Stekauer (eds.), *The Oxford Handbook of Compounding*, 201–216. Oxford University Press.
- Croft, William. 2001. *Radical Construction Grammar: Syntactic Theory in Typological Perspective*. Oxford University Press.

- Dirven, René & Marjolyn Verspoor. 2004. *Cognitive exploration of language and linguistics*. Vol. 1. Amsterdam: John Benjamins Publishing.
- drill. *The Free Dictionary*. <https://idioms.thefreedictionary.com/drill> (17 August, 2020).
- Heyvaert, Liesbet. 2009. Compounds in cognitive linguistics. In Rochelle Lieber & Pavol Stekauer (eds.), *The Oxford Handbook of Compounding*, 233–254. Oxford University Press.
- James Gillies. 2000. *How the Web was born*. Oxford University Press.
- <http://archive.org/details/howwebwasbornsto00gill> (17 August, 2020).
- Jespersen, Otto. 1954. *A Modern English Grammar on Historical Principles. Part VI: Morphology*. London: Bradford and Dickens.
- Kavka, Stanislav. 2009. Compounding and idiomatology. In Rochelle Lieber & Pavol Stekauer (eds.), *The Oxford Handbook of Compounding*, 19–33. Oxford University Press.
- Knowles, M., & Moon, R. (2004). *Introducing metaphor*. Amsterdam: Routledge.
- Kooij, J. G. 1968. Compounds and idioms. *Lingua* 21. 250–268.
- [https://doi.org/10.1016/0024-3841\(68\)90052-1](https://doi.org/10.1016/0024-3841(68)90052-1) (10 August, 2020).
- Kovecses, Zoltan. 2010. *Metaphor: A practical introduction*. Oxford University Press.
- Lakoff, George & Mark Johnson. 2008. *Metaphors We Live By*. University of Chicago Press.
- Langacker, Ronald W. 2008. *Cognitive grammar: A basic introduction*. New York: Oxford University Publishing, USA.

- Libben, Gary, Martha Gibson, Yeo Bom Yoon & Dominiek Sandra. 2003. Compound fracture: The role of semantic transparency and morphological headedness. *Brain and Language* (Brain and Language Special Issue) 84(1). 50–64.  
[https://doi.org/10.1016/S0093-934X\(02\)00520-5](https://doi.org/10.1016/S0093-934X(02)00520-5) (14 August, 2020).
- Lieber, Rochelle & Pavol Stekauer. 2009. *The Oxford Handbook of Compounding*. Oxford University Press.
- Maguire, Phil, Edward J. Wisniewski & Gert Storms. 2010. A corpus study of semantic patterns in compounding. *Corpus Linguistics and Linguistic Theory*. De Gruyter Mouton 6(1). 49–73.
- Mäkisalo, Jukka. 2000. To what extent are compounds morphological? A review of problems in linguistic theories. *SKY journal of linguistics*. Linguistic Association of Finland (13). 183–210.
- McIntyre, Andrew. 2017. Morphology [class material] In *Humboldt-Universität zu Berlin*.  
<https://zope.angl.hu-berlin.de/departement/staff-faculty/academic/mcintyre/unterrichtsmaterialien/intro-morph-new.pdf> (9 August, 2020).
- Nunberg, Geoffrey, Ivan A. Sag & Thomas Wasow. 1994. Idioms. *Language*. Linguistic Society of America 70(3). 491–538.
- Onysko, Alexander. 2016. Enhanced creativity in bilinguals? Evidence from meaning interpretations of novel compounds. *International Journal of Bilingualism*. SAGE Publications Ltd 20(3). 315–334. <https://doi.org/10.1177/1367006914566081> (29 July, 2020).

- Quirk, Randolph, Sidney Greenbaum, Geoffrey Leech & Jan Svartvik. 1985. *A Comprehensive grammar of the English language*. Harlow: Longman.
- Sandra, Dominiek. 1990. On the representation and processing of compound words: Automatic access to constituent morphemes does not occur. *The Quarterly Journal of Experimental Psychology Section A*. SAGE Publications Sage UK: London, England 42(3). 529–567.
- Stekauer. 2009. Meaning predictability of novel context-free compounds. In Rochelle Lieber & Pavol Stekauer (eds.), *The Oxford Handbook of Compounding*, 272–297. Oxford University Press.
- Štekauer, Pavol. 2005. *Meaning Predictability in Word Formation: Novel, context-free naming units*. Amsterdam: John Benjamins.
- Štekauer, Pavol, Ana Díaz-Negrillo & Salvador Valera. 2011. Meaning predictability and conversion. *Folia Linguistica*. De Gruyter Mouton 45(1). 165–197.
- Szabó, Zoltán Gendler. 2020. Compositionality. In Edward N. Zalta (ed.), *The Stanford Encyclopedia of Philosophy*. Fall 2020. Metaphysics Research Lab, Stanford University. <https://plato.stanford.edu/archives/fall2020/entries/compositionality/> (7 August, 2020).
- Tarasova, Elizaveta. 2013. *Some New Insights Into the Semantics of English N+N Compounds: A Thesis Submitted to the Victoria University of Wellington in Fulfilment of the Requirements for the Degree of Doctor of Philosophy*. Victoria University of Wellington.
- <https://www.semanticscholar.org/paper/Some-new-insights-into-the-semantics-of-English-N%2BN-Tarasova/12e6432dbfcd836d1a1f6acfd021e153f9dcaa6e> (9 November, 2020).

- Taylor, John R. 2002. *Cognitive Grammar*. Oxford University Press.
- Zheng, Meihua. 2017. *A Conceptual Metaphor Account of Word Composition: Potentiality of "light" in English and Chinese*. Cambridge Scholars Publishing.
- Zwitsersloot, Pienie. 1994. The role of semantic transparency in the processing and representation of Dutch compounds. *Language and cognitive processes*. Taylor & Francis 9(3). 341–368.
2011. greenhouse, n. *Oxford English Dictionary*. Oxford University.  
<https://www.oed.com/view/Entry/81202?redirectedFrom=greenhouse> (9 August, 2020).

### **Declaration of Academic Integrity**

I Luz Andrea Alvariño Gabeiras hereby confirm that this paper on “ Greenhouses and submarine sandwiches: a look into the transparency and creativity of noun-noun metaphorical compounds” is solely my own work and that I have used no sources or aids other than the ones stated. All passages in my paper for which other sources, including electronic media, have been used, be it direct quotes or content references, have been acknowledged as such and



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I agree to have my paper checked in order to rule out potential similarities with other works and to have my paper stored in a database for this purpose.



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## Appendix I

### Definitions and Sources of the Established Compounds Provided in the Experiment

1. *Backbone*: “The series of vertebrae extending from the skull to the pelvis; the spine”, “the chief support of a system or organization.” (“backbone”, n.d.)
2. *Bedrock*: “Solid rock underlying loose deposits such as soil or alluvium”, “the fundamental principles on which something is based.” (“bedrock”, n.d.)
3. *Bellboy*: “An attendant in a hotel who performs services such as carrying guests' luggage.” (“bellboy”, n.d.)
4. *Peach fuzz*: “The down on the chin of an adolescent boy whose beard has not yet developed.” (“peach fuzz”, n.d.)
5. *Sheepskin*: “A sheep's skin with the wool on, especially when made into a garment or rug,” “(in South Africa) a party with country dancing.” (“sheepskin”, n.d.)
6. *Snowbird*: “A northerner who moves to a warmer southern state in the winter”, “a widespread and variable junco (songbird) with grey or brown upper parts and a white belly.” (“snowbird”, n.d.)
7. *Sunroof*: “A panel in the roof of a car that can be opened for extra ventilation.” (“sunroof”, n.d.)

### Sources

- Backbone. *Lexico Dictionaries | English*. Oxford University Press.  
<https://www.lexico.com/definition/backbone> (12 September, 2020).
- Bedrock. *Lexico Dictionaries | English*. Oxford University Press.  
<https://www.lexico.com/definition/bedrock> (12 September, 2020).
- Bellboy. *Lexico Dictionaries | English*. Oxford University Press.  
<https://www.lexico.com/definition/bellboy> (12 September, 2020).
- Cooper, Richard. Compound Word Lists Complete. *Center for Alternative Learning: Learning Disabilities Resources*.  
[http://learningdifferences.com/Main%20Page/Topics/Compound%20Word%20Lists/Compound\\_Word\\_%20Lists\\_complete.htm](http://learningdifferences.com/Main%20Page/Topics/Compound%20Word%20Lists/Compound_Word_%20Lists_complete.htm) (30 July, 2020).
- Peach Fuzz. *Lexico Dictionaries | English*. Oxford University Press.  
[https://www.lexico.com/definition/peach\\_fuzz](https://www.lexico.com/definition/peach_fuzz) (12 September, 2020).
- Sheepskin. *Lexico Dictionaries | English*. Oxford University Press.  
<https://www.lexico.com/definition/sheepskin> (12 September, 2020).
- Snowbird. *Lexico Dictionaries | English*. Oxford University Press.  
<https://www.lexico.com/definition/snowbird> (12 September, 2020).
- Sunroof. *Lexico Dictionaries | English*. Oxford University Press.  
<https://www.lexico.com/definition/sunroof> (12 September, 2020).