

## **The naming potential of compounds and phrases: An empirical study on German adjective-noun constructions**

### **Abstract**

Using data from two empirical studies, the present article investigates whether German adjective-noun compounds are inherently more appropriate to function as naming units or kind terms than the corresponding phrases. In the first experiment, it was tested whether subjects prefer a non-lexicalized compound (e.g., *Kurzcouch*, *short\_couch*) or the respective non-lexicalized phrasal counterpart (e.g., *kurze Couch*, *short couch*) in order to express a novel complex lexical concept (e.g., It is a very specific couch that is 1.30 meters short because it is designed only for children up to this size.). In the second test, subjects rated on a scale how well the compounds and phrases expressed the newly created concepts. The findings of the two studies support the idea that compounds are better naming candidates than phrases. It is claimed that the effect derives from the specific formal nature of compounds and has consequences on the processing and mental representation of the two construction types.

Keywords: Compound, phrase, naming unit, German, adjective-noun constructions

## 1 Introduction

Languages have different means at their disposal in order to express fixed complex lexical concepts. German, for instance, is known to make abundant use of nominal compounds for this purpose. Although adjective-noun (AN) compounds are not as productive as noun-noun compounds, the former are frequently attested in the German language (see 1).

- (1) a. *Braunbär*  
 brown\_bear  
 ‘specific kind of bear that is brown (= *ursus arctos*)’
- b. *Warmbier*  
 warm\_beer  
 ‘specific kind of beer that is (drunk) warm and that has particular ingredients such as cinnamon’

As the examples show, such compounds typically refer to fixed lexical concepts and differ in meaning from the corresponding AN phrases (see 2), which do not form semantic sub-categories of the nominal heads.

- (2) a. *brauner Bär*  
 brown bear  
 ‘any bear that is brown, independently of the kind of bear’

b. *warmes Bier*

warm beer

‘any beer that is warm, independently of the kind of beer’

The aforementioned functional distinction between compounds and phrases does, however, not always apply. While several German AN phrases designate specific sub-categories of their heads (see 3a; see also, e.g., Gunkel & Zifonun 2009: 209; Schlücker 2014: 148), compounds are occasionally used with a function similar to that of the phrases given in (2) above (see 3b; see also, e.g., Schlücker 2014: 75).

(3) a. *grüner Tee*

green tea

‘specific kind of tea that is green’

b. *Heißwasser*

hot\_water

‘water that is hot (no specific kind of water)’

The examples show that both compounds and phrases can be used to express fixed complex lexical concepts. Nevertheless, we have the intuition that compounds, and not phrases, are predominantly used for this purpose (see also, e.g., Ortner 1991; Motsch 2004: 379–383). A possible explanation for this might be that compounds are by their nature more appropriate than phrases to refer to semantic sub-categories. Put differently, the formal difference between compounds and phrases might directly translate into a functional distinction between the two construction types (see also Barz 1996: 143;

Härtl 2015). The goal of the present article is to investigate on an empirical basis whether this is indeed the case.

In order to find an answer to this question, the paper is structured as follows. §2 presents the theoretical foundations of the current work. It discusses from a formal and functional perspective how compounds and phrases can/might be distinguished. §3 describes two empirical studies that were designed to test whether compounds and phrases differ with respect to how well they are used as expressions for new fixed complex lexical concepts. §4 discusses the findings of the experiments and reflects upon possible implications for the processing and mental representation of compounds and phrases. Finally, §5 concludes the paper.

## **2 Theoretical foundations: The demarcation between German AN compounds and phrases**

### 2.1 Formal criteria

Before comparing German AN compounds and phrases with regard to their function, one has to define the two categories. In the present article, the terms *COMPOUND* and *PHRASE* are defined on a formal, specifically morpho-syntactic basis by using a single factor. Since the distinction between the two construction types is, in the first place, a grammatical or morpho-syntactic rather than a functional, phonetic/phonological, or orthographic one (see Zwicky 1986: 58; Donalies 2003), inflectional agreement represents this single factor and is referred to as the *PRIMARY FACTOR* (see also Schlechtweg 2018). That means, the adjective and the noun in German AN phrases grammatically agree in terms of gender, number, case, and definiteness. Agreement, in turn, is expressed by means of the inflectional suffix that attaches to the adjective (see 4a). In contrast, the

two constituents of compounds do not agree and, hence, the adjective does not carry a suffix (see 4b; see also, e.g., Booij 2009: 224).

- (4) a. *ein schneller Bus*  
 ein    schnell-er                    Bus  
 a      fast-M.SG.NOM.INDF<sup>1</sup>    bus.M.SG.NOM.INDF  
 ‘a fast bus’
- b. *ein Schnellbus*  
 a      fast\_bus  
 ‘an express bus’

The primary factor unambiguously decides whether a construction is a compound or a phrase. An adjectival suffix that expresses agreement signals phrasal status. If no suffix is present or if a suffix does not express agreement, as in a few cases such as the famous example *des Hohepriesters* (see 5a), the AN construction is considered to be a compound. Note that two variants of the aforementioned construction exist, namely one without agreement (see 5a) and one with agreement (see 5b). These conflicting pairs are rare, but if they occur, only the construction without agreement is regarded as a compound and the other one as a phrase.

- (5) a. *des Hohepriesters*  
 des    Hoh-e-priesters  
 of.the high-LE-priest<sup>2</sup>

<sup>1</sup> Abbreviations: M = Masculine, SG = Singular, NOM = Nominative, INDF = Indefinite.

<sup>2</sup> Abbreviation: LE = Linking element.

- b. *des Hohenpriesters*  
 des Hoh-en-priesters  
 of.the high-M.SG.GEN.DEF-priest.M.SG.GEN.DEF<sup>3</sup>

It might be suggested that both (5a) and (5b) are compounds as they have two typical compound features, namely initial prosodic prominence and solid orthography (see discussion further below). However, in the model that is assumed here, this is not permitted because the primary factor applies prior to the other factors and defines a construction as either a compound or a phrase. This has the advantage of avoiding circularity: Once a construction has been defined as either a compound or a phrase, one can analyze whether any additional features such as a specific prosodic prominence pattern characterize the construction.

Apart from the primary factor, further variables, so-called SECONDARY FACTORS, are available (see also Schlechtweg 2018). These factors can characterize compounds and phrases in a great majority of cases but they do not necessarily do so. That is, although most German AN compounds and phrases might show certain features, several instances exist that deviate from the typical pattern. An example of a secondary factor is the prosodic prominence pattern. In the context of the compound-phrase debate, one can generally distinguish between initial and non-initial prominence. Although the literature mentioned in the following focuses on the English language, the overall idea is transferable to German. Traditionally, initial prominence means that the first constituent bears the main prominence of the construction (see, e.g., Chomsky & Halle 1968: 94; Liberman & Prince 1977: 257; Giegerich 1992: 253–257). In contrast, complexes are said to

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<sup>3</sup> Abbreviations: GEN = Genitive, DEF = Definite.

carry non-initial prominence if the main prosodic prominence is placed on the second constituent. Alternatively, one can define initial and non-initial prominence by relying on the distinction between stress and accent (see, e.g., Gussenhoven 2004: 19; Kunter 2011). That is, both constituents of all AN constructions are stressed because both are independent entities at the lexical level. AN constructions differ, however, at the phrasal level: While only the adjective carries an accent in compounds, both the adjective and the noun bear an accent in phrases. In the present paper, it is not further discussed whether the first or second approach is more attractive. Instead, it is simply assumed that initial prominence appears in AN constructions if the main prosodic prominence lays on the adjective. As opposed to that, non-initial prominence means that the main prosodic prominence does not lay on the adjective, i.e., either it lays on the noun or the adjective and the noun are, approximately, equally prominent. That being said, it is well known that German AN compounds such as the examples in (1) typically have initial prominence but phrases, as the examples in (2), non-initial prominence (see, e.g., Fleischer 1971; Motsch 2004: 379). A few exceptional cases exist, however, such as the compound *Schlechtwetter* (bad\_weather, ‘bad weather’), which has non-initial prominence (see, e.g., Schlücker 2014: 24).

Another secondary factor in the compound-phrase distinction is orthography. While German AN compounds are usually represented as one orthographic unit (see 1), a space normally occurs between the constituents of phrases (see 2; see also, e.g., Fleischer 1971). However, other spellings are attested as well. The initial letters of both compound constituents can be capitalized for emphasis or to facilitate the recognition of the individual elements (see, e.g., Altmann 2011: 36). If this is the case, the adjective and the noun can be connected with a hyphen (e.g., *Edel-Schrott*, *Noble-Scrap*, ‘a Ferra-

ri that has been written off”), form a single orthographic unit (e.g., *AktivFrische*, ActiveFreshness), or be separated through a space (e.g., *Frisch Fleisch*, Fresh Meat, ‘fresh meat’) (Simoska 1999: 166). Variation is also observed in phrases, which are attested in hyphenated form as well (e.g., *Rote-Paprika*, red-pepper, ‘red pepper’) (Schuster 2016: 73–74).<sup>4</sup> Overall, the orthography of compounds and phrases is not fixed; nevertheless, in the majority of cases, German AN compounds are written as a solid unit and phrases with a space between the constituents.

Another proposal to distinguish between German AN compounds and phrases refers to the type of adjective that can occur in the first position of combinations. While any attributive adjective can be part of a phrase, it has been claimed that compounds are subject to several restrictions (see, e.g., Barz 1996: 134; Eisenberg 2006: 227; Schlücker 2014: 29–33). That is, compounds typically take simplex adjectives or non-native complex adjectives with the suffixes *-ar*, *-är*, *-al*, and *-iv*. However, it has also been stated that exceptions such as the native suffix *-ig*, which also occurs in compounds, exist (see, e.g., Schlücker 2014: 29–33). In the present article, the focus lays on monomorphemic adjectives that can definitely occur in both compounds and phrases.

In sum, applying the primary factor inflectional agreement, one can clearly differentiate AN compounds and phrases in German. Other factors, such as the prosodic prominence pattern and orthography, do not define the two categories but characterize them in most cases. That is, while compounds usually have initial prominence and a solid orthography, phrases typically bear non-initial prominence and include a space between the adjective and the noun. Finally, several tendencies have been observed with respect to the adjective type that can appear in compounds and phrases. Although these

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<sup>4</sup> Note that spellings that are attested in actual language use, e.g., *Rote-Paprika*, do not always follow the spelling rules of the German language.



trends are confirmed in many instances, no definite rule exists. The German AN compounds and phrases investigated in the present article are defined by the absence/presence of inflectional agreement and are characterized by the features initial/non-initial prominence and solid/spaced orthography, respectively.

## 2.2 Functional criteria

As mentioned earlier, compounds have often been argued to function as names for categories while phrases have been claimed to primarily describe phenomena (see, e.g., Bauer 2003: 135; Schlücker & Hüning 2009; Hüning 2010: 197). Since several counterexamples exist in German (see 3 above; see also, e.g., Booij 2009: 220), one can only speak of a tendency rather than of an absolute rule. Nevertheless, AN constructions of this language show that the aforementioned functional distinction applies in many cases. Before continuing analyzing this issue, however, one has to define the phenomenon of naming more concisely. Throughout the present contribution, NAMING means kind reference and NAMING UNIT means kind-referring unit (see Krifka, Pelletier, Carlson, ter Meulen, Link & Chierchia 1995: 107); other types of names, such as proper names, are ignored. Kinds are specific categories of subjects or objects that share certain characteristics (see, e.g., Zimmer 1971: C15; Krifka et al. 1995). Specifically, the present article focuses on objects that represent a sub-concept of the concept expressed by the nominal head (see, e.g., Gunkel & Zifonun 2009; Schlücker 2016).

Having defined naming, we can now elaborate on the functional distinction between compounds and phrases more precisely. It was proposed earlier that compounds might be more appropriate to function as naming units, i.e., to refer to kinds, than phrases. Theoretical support for this idea comes from several authors. Bücking (2009)

and Härtl (2015) argue that non-lexicalized German AN compounds (see 6c) are more acceptable with kind predicates than non-lexicalized phrases (see 6d). Note generally that kinds can appear with so-called kind predicates such as *become extinct*, *die out*, *exterminate*, or *invent* (Krifka et al. 1995: 10) (see 6a); items that are not kinds do not occur with these predicates (see 6b).

- (6) a. *The polar bear might die out in the next decades.*  
 b. *\*The sweet bear might die out in the next decades.*  
 c. *?Der Blauhund ist ausgestorben.*  
     The blue\_dog is extinct. (Bücking 2009: 196)  
 d. *??Der blaue Hund ist ausgestorben.*  
     The blue dog is extinct. (Bücking 2009: 196)

Moreover, the authors claim that non-lexicalized compounds accept the modifier *sogenannt* ('so-called') more than non-lexicalized phrases (see 7), i.e., compounds seem to occur more naturally in naming contexts.

- (7) a. *?eine sogenannte Warmdecke*  
       a so-called warm\_blanket (Härtl 2015: 400)  
 b. *??eine sogenannte warme Decke*  
       a so-called warm blanket (Härtl 2015: 400)

Bücking (2009) and Schlücker (2013) further illustrate that non-lexicalized compounds (see 8a, c) but not non-lexicalized phrases (see 8b, d) are acceptable in the contexts given in (8).

- (8) a. *Dies ist ein roter Blautee.*  
 This is a red blue\_tea. (Bücking 2009: 185)
- b. *\*Dies ist ein roter blauer Tee.*  
 This is a red blue tea. (Bücking 2009: 185)
- c. *Dieser Tee ist kein Blautee, obwohl er blau ist.*  
 This tea is not\_a blue\_tea, although it blue  
*ist.*  
 is. (Bücking 2009: 185)
- d. *\*Dieser Tee ist kein blauer Tee, obwohl er blau ist.*  
 This tea is not\_a blue tea, although it  
*blau ist.*  
 blue is. (Bücking 2009: 185)

Schlücker (2013: 133–134) explains these acceptability differences between compounds and phrases on a functional basis: Compounds, but not phrases, inherently fulfill a classifying function and refer to a new sub-concept of the head noun. As a consequence, sentences as those in (8a) and (8c) are acceptable as the color adjective of the compound does not necessarily relate to the color of the entire concept represented by, e.g., *Blautee*. The relation within the compound is flexible and the adjective *blau* might refer to a

hidden but semantically related noun rather than to the noun *Tee* (see also, e.g., Barz 1996; Bücking 2009; Härtl 2015).

Hüning (2010) also argues for the idea that the special formal nature of compounds enables them to function as naming units more straightforwardly than phrases. According to Hüning, naming units always express a unique lexical concept and should therefore also have a unique and stable form. German AN compounds fulfill this requirement more than the respective phrases for several reasons. As discussed in §2.1, while the adjective of a phrase takes different inflectional suffixes in order to express gender, number, case, or definiteness agreement, the compound's adjective is never modified in this way. As a consequence, the form of a compound is overall more stable than that of a German AN phrase. Hüning (2010) as well as Van Goethem (2009) further use the criterion of stability in order to explain why Dutch and French often rely on phrasal naming units rather than compounds: Phrases in these languages show much less formal variation than German AN phrases. For instance, in French, AN or noun-adjective phrases are formally quite stable. The constructions do not, as they do in German, take different suffixes that express case or definiteness. Furthermore, although adjectival number suffixes exist in French, they are often not pronounced in spoken language. Therefore, phrases fulfill the stability criterion and compounds are, according to the authors, less likely to be used.

So far, however, only theoretical arguments have been presented in order to examine whether compounds are inherently more prone to function as naming units. In the next step, empirical data is considered. Schlücker & Plag (2011) present evidence that does not seem to support the idea. In a production study, the authors investigated whether subjects preferred German AN compounds or AN phrases if they were asked to

create a complex naming unit for a new lexical concept. Schlücker & Plag (2011) claim that previously acquired constructions decide whether a novel lexical concept is expressed by a compound or phrase. That is, for instance, if a language user knows more AN compounds than AN phrases with a particular adjective, a new construction containing the same adjective is more likely to be realized as a compound. In contrast, if the number of phrases is higher, the novel complex item will probably be a phrase. The study presents valuable data but cannot answer all questions. First of all, it is not entirely clear what happens if an adjective or noun has never occurred in a compound or phrase before. The authors could not test such adjectives because, in their stimuli sets, there were no adjectives that do not appear in any compound or phrase. Although the findings of the nouns that do not occur in compounds and phrases indicate that these nouns were more likely to be produced in phrases, it has been found in previous studies that the influence of the head constituent is smaller than the impact of the modifier constituent (see, e.g., Krott 2009). Therefore, it is overall hard to assess what happens if a constituent does not appear in any compound or phrase. Also, it is not entirely clear either why the nouns that occurred in both compounds and phrases behaved like nouns that occurred in phrases only. Finally, the sets of adjectives and nouns are problematic because several items do not fit in the respective categories. At this point, only two examples are given: The adjective *jung* ('young') is claimed to occur only in compounds; however, the phrase *junges Gemüse* (young vegetables, 'small fry') shows that this is not the case. Moreover, *offen* ('open') is claimed to appear in phrases only; however, the compound *Offenstall* (open\_stable, 'open stable') is a counterexample.

Expanding one's view and looking at AN constructions in other languages, one finds studies that have shown that compoundhood is linked to the naming function

while phrasal constructs tend to be used in a descriptive sense. Hall & Moore (1997) found that (adult) native speakers of English were more likely to select a picture representing a sub-category if they heard English AN items with compound prominence. In contrast, participants chose images expressing a simple descriptive connection between the constituents if they were exposed to constructions with phrasal prominence. McCauley, Hestvik & Vogel (2012) observed that English AN naming units were reacted to more accurately in a lexical-decision task if they carried compound rather than phrasal prominence. Descriptive units, however, showed more correct answers if presented with phrasal rather than compound prominence. These studies support the idea that compounds typically function as naming units while phrases are normally used in a descriptive way. Nevertheless, the aforementioned tests suffer from a central problem: The authors primarily compared lexicalized (e.g., *greenhouse*) and non-lexicalized items (e.g., *green house*). In these cases, lexicalization represented a potentially confounding variable that was not controlled for. Separating effects related to the function from effects that are based on lexicalization only seems to be possible if one investigates non-lexicalized items only.

Härtl (2017) argues that compounds are indeed more suited to function as naming units than phrases. He supports his conclusion with evidence from a corpus study, in which German AN compounds and phrases of comparable frequencies and with a naming function were contrasted. Investigating compounds and phrases of similar frequencies is an advancement in comparison to the studies discussed above. Assuming that frequency can be used to measure the degree of lexicalization (see, e.g., Plag 2006: 158), we can say that items of comparable frequencies are lexicalized or non-lexicalized to similar degrees. Härtl's (2017) analysis revealed two interesting results. First, phrases

occurred more frequently with the modifier *sogenannt* ('so-called') than compounds. Second, in *sogenannt* contexts, phrases were more often explicitly marked with quotation marks than compounds. These results suggest that compounds are by their nature appropriate to function as names for complex concepts. Phrases, in turn, depend more than compounds on explicit means such as *sogenannt* or quotation marks that point to the naming function. Overall, however, the study was rather exploratory in nature, i.e., only five compounds and five phrases were examined.

In sum, it has been assumed for quite a while that compounds represent typical naming and phrases descriptive units. The empirical evidence for this assumption is, however, rather sparse and, crucially, not entirely informative as potentially confounding variables such as lexicalization were often not controlled for in the empirical studies. The current article aims at filling this gap. Focusing on non-lexicalized and endocentric German AN constructions only, the paper approaches the following research question:

Are compounds more appropriate to function as naming units, i.e., to refer to new kinds of objects, than the respective phrases?

### 3 Experimental investigations: The naming potential of compounds and phrases

#### 3.1 Experiment 1

##### 3.1.1 Type of experiment, goal, and hypothesis

The first experiment was a forced-choice task, i.e., subjects saw a by the author newly created concept and had to state whether the given compound or phrase expresses the respective meaning better. An example is presented in (9): (9a) shows the invented concept and (9b) represents the two possible answers that participants could select.

- (9) a. *Es ist eine ganz bestimmte Couch, die deswegen 1,30 Meter kurz ist, weil sie nur für Kinder bis zu dieser Größe ausgelegt ist.*  
 ‘It is a very specific couch that is 1.30 meters short because it is designed only for children up to this size.’
- b. *Kurzcouch*                      *kurze Couch*  
 ‘short\_couch                      short couch’

The study aimed at testing the following hypothesis:

Hypothesis 1: German AN compounds are more appropriate than the respective phrases to function as naming units, i.e., to refer to new kinds of objects.



### 3.1.2 Method

#### 3.1.2.1 Subjects

96 native speakers of German took part in the study (51 females and 45 males). Their mean age was 21.8 years (age range: 18-31, standard deviation: 3.7). None of the subjects participated in Experiment 2.

#### 3.1.2.2 Materials

24 monosyllabic adjectives and 24 monosyllabic concrete/physical inanimate nouns were used to create 24 non-lexicalized German AN compounds and their non-lexicalized phrasal counterparts. For each of the 24 compound-phrase pairs, a new meaning was invented and expressed in a sentence. All compounds and phrases were endocentric. An example is given in (9), the complete list of compounds, phrases, and their meanings is presented in the Appendix.

During the creation of the item set, several potentially confounding variables were considered. First, no compound and no phrase was lexicalized, i.e., it was unknown to the author, who is a native speaker of German, and it did not appear in the *Wortschatz* ('vocabulary') corpus of the German language ([wortschatz.uni-leipzig.de/de](http://wortschatz.uni-leipzig.de/de)) (frequency = zero occurrences). Second, an analysis with the word-information function of the DWDS corpus of the German language (<https://www.dwds.de/>) revealed that the adjectives and nouns chosen for the experiment were on average part of 14 AN compounds and 14 AN phrases. Third, German AN compounds and phrases differ from a semantic point of view, i.e., while both direct and indirect modification relations are attested in compounds, the number of possible internal meaning relations in phrases is more restricted (see, e.g., Ortner 1991). There-

fore, all compounds and phrases investigated in the present study expressed a direct modification relation between the adjective and the noun – a relation that is available for both compounds and phrases (see, e.g., Ortner 1991: 718; Motsch 2004: 387; Schlücker 2016). The example in (9) and all other items listed in the Appendix illustrate how this was achieved. In each case, the direct modification relation was emphasized by stating that the entire construction  $x$  with the head  $n$  referred to an  $n$  that had the property expressed in the adjective  $a$ .

The test sentences containing the compounds and phrases were constructed with two objectives in mind. First, as just mentioned, the direct modification relation should be made explicit; this was realized using the procedure outlined in the previous paragraph. Second, it should become clear that the construction represents a naming unit, i.e., a new sub-concept of the concept expressed in the nominal head. This was achieved in two ways. On the one hand, the meaning specialization typical for AN constructions with a direct modification relation was given (see, e.g., Ortner 1991: 724; Schlücker 2014: 39–41). That is, it was not only stated that the construction  $x$  is an  $n$  with the property  $a$  but also why and how exactly  $n$  has the property  $a$ . For instance, *Kurz-couch/kurze Couch*, the example given in (9), does not simply refer to all couches that are short but to a specific couch that is short – and defined by a precise dimension – for a specific reason. On the other hand, the naming status of the construction was explicitly marked by the expression *ist ein(e) ganz bestimmte(r, s)* ‘is a very specific’.<sup>5</sup>

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<sup>5</sup> Apart from the experimental items described above, 24 fillers, i.e., invented meanings expressed by invented non-words, were added to each questionnaire, both in Experiment 1 and Experiment 2.

### 3.1.2.3 Procedure

Each subject was tested on a total of 24 experimental cases. The sentences represented the meanings of new concepts (see 9a). Below each sentence, a non-lexicalized compound and the non-lexicalized phrasal counterpart were given (see 9b). The questionnaires completed by the subjects were designed in the following way. First, each compound (e.g., *Kurzcouch*) and each equivalent phrase (e.g., *kurze Couch*) appeared equally often in position one and two. That is, in 50 percent of the questionnaires, *Kurzcouch* preceded *kurze Couch* and in 50 percent of the questionnaires *kurze Couch* preceded *Kurzcouch*. Second, within each questionnaire, compounds preceded the equivalent phrases in 50 percent of all cases; in the other 50 percent, the phrases preceded the equivalent compounds. Third, in order to exclude order effects of the items, the order of the examples was randomized for each questionnaire. Subjects were requested to select one of the two items, i.e., either the compound or the phrase, which represented, in their opinion, the meaning introduced before better. Participants were instructed to choose quickly, intuitively, and without longer reflection.

### 3.1.3 Data analysis

Choosing a phrase counted zero points and selecting a compound counted one point. That means, for instance, if a subject favored the phrase 14 times and the compound ten times, she or he received ten points ( $14 \times 0 + 10 \times 1 = 10$ ). Using this procedure, the average behavior can be calculated although the variable itself is dichotomous (see, e.g., Johnson 2013: 309-310). In the subject analysis, the points of all subjects were calculated. It was examined whether the overall subject mean significantly differed from the value twelve. A mean value of twelve signified that compounds and phrases were on

average selected equally often in the 24 cases; hence, they did not significantly differ. A mean value greater than twelve, in turn, showed that compounds were chosen more frequently and a mean value smaller than twelve indicated that phrases were selected more often. A one-sample t-test was used to investigate the dependent variable POINTS, i.e., to see whether the mean subject value significantly differed from twelve (see, e.g., Larson-Hall 2010: 264–265). Overall, a parametric test was preferred because it was assumed that parametric tests are more powerful, informative, and reliable than non-parametric tests (see, e.g., Gries 2013: 335; Schütze & Sprouse 2013: 44). The analysis by subject is called  $t_1$  in the following.

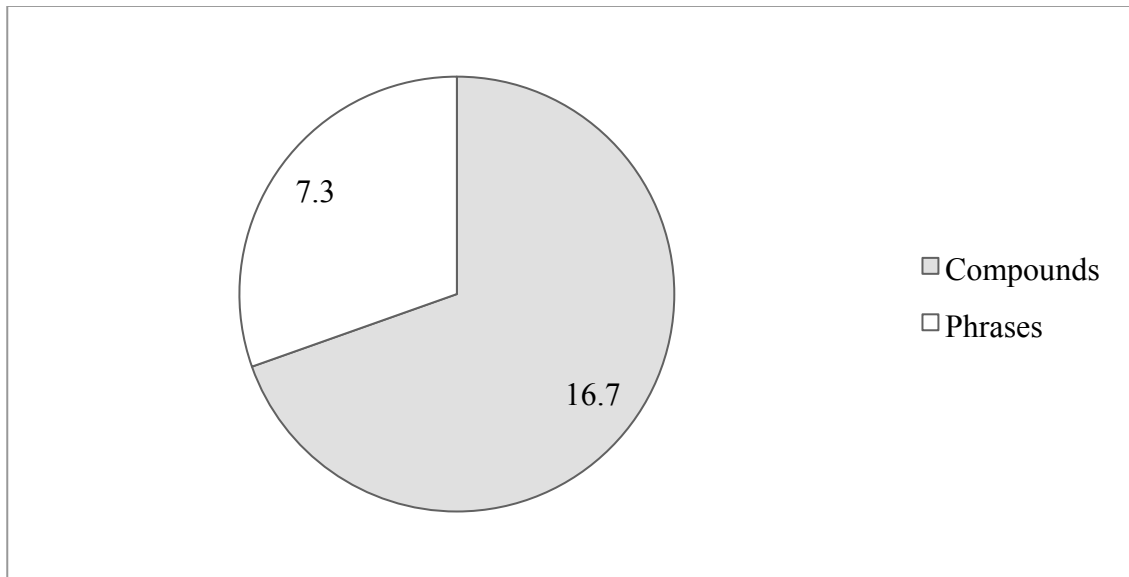
In the item/meaning analysis, a similar procedure was used; the value of reference, however, was not twelve but 48 because each meaning was presented to the 96 subjects who participated in the study. Again, a one-sample t-test was used to investigate the dependent variable POINTS, i.e., to see whether the mean item/meaning value significantly differed from 48. The analysis by item/meaning is called  $t_2$  in the following.

### 3.1.4 Results

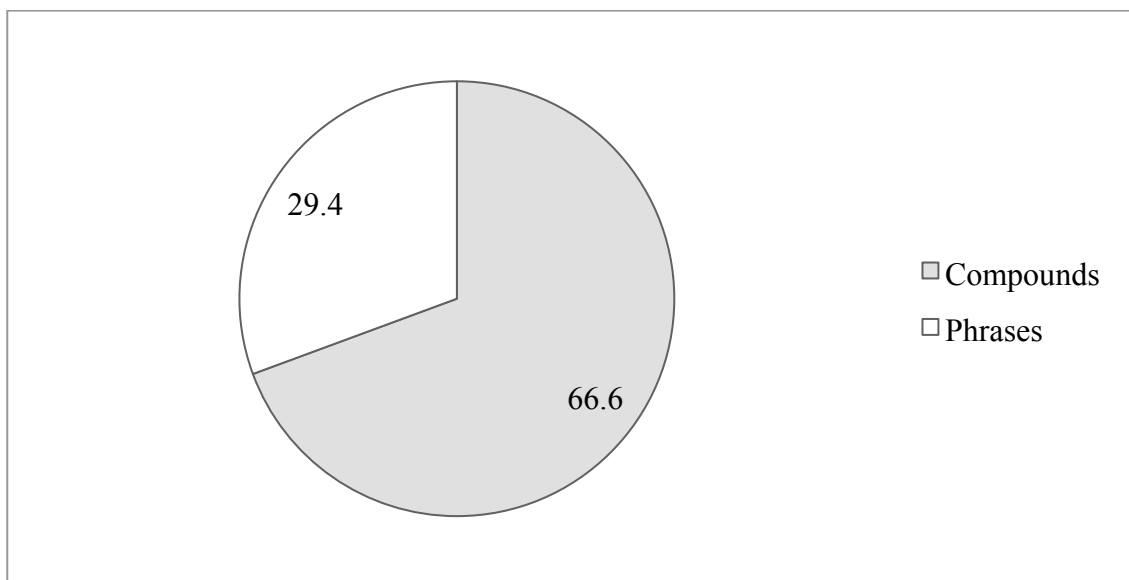
An effect was found in both the subject and the item/meaning analysis ( $t_1 = 17.4$ ,  $p_1 < .001$ ;  $t_2 = 10.4$ ,  $p_2 < .001$ ). Table 1 ( $t_1$  and  $t_2$ ), Figure 1 ( $t_1$ ), and Figure 2 ( $t_2$ ) present the descriptive statistics. Apart from the constructions that contained the adjective *pink* ('pink'), the compounds were always selected more frequently than the respective phrases. That is, the value of 23 pairs was higher than 48, indicating that the compounds were preferred. In the case of *pink*, the value was 47, i.e., the phrase was favored slightly more often than the compound.

**Table 1. Descriptive statistics of subject analysis (t<sub>1</sub>), item analysis in brackets (t<sub>2</sub>)**

	<b>Points</b>
Number of observations	96 (24)
Mean	16.7 (66.6)
Standard deviation	2.6 (8.8)



**Figure 1. Mean selection of compounds and phrases by subjects**



**Figure 2. Mean selection of compounds and phrases by items/meanings**

### 3.1.5 Discussion

Compounds were overall selected significantly more often than phrases as names for newly created concepts. Since potentially confounding variables were controlled for, Experiment 1 provides evidence that German AN compounds and phrases inherently differ on functional grounds, i.e., compounds are more appropriate than phrases to refer to novel complex lexical concepts.

Apparently, as argued by Barz (1996: 143) and Härtl (2015), the special formal nature of compounds has a direct influence on their function. Deviating from the standard, phrasal form, they trigger a deviation from the standard, descriptive function and are more likely to be used as naming units. Phrases, in contrast, are prototypically considered to represent descriptive constructions and adopt the naming function more difficultly.

The results are compatible with the theoretical arguments introduced by Bücking (2009), Schlücker (2013, 2014, 2016), Härtl (2015), and others (see §2.2) and support these claims with empirical evidence. So, for instance, as shown in the examples in (7) and (8), non-lexicalized compounds and phrases differ with respect to acceptability judgments. Crucially, however, the current article does not rely on the intuition of its author but, instead, discusses the ratings of 96 native speakers of German and is, therefore, more convincing and reliable.

In sum, the first experiment presents evidence that compounds and phrases deviate from each other not only on formal but also on functional grounds: Compounds seem to be the better naming units. In the second study, it was examined whether these findings could be confirmed in a rating test, which is not binary in nature and, therefore, yields overall more precise results. Furthermore, one issue that was not approached in

the first experiment is whether subjects considered the suggested items, i.e., the compounds and phrases, to be generally appropriate expressions for the different meanings. That is, the study provides evidence that compounds are more appropriate than phrases but it does not give us information on whether or not the compounds were regarded as good naming units. These two issues were examined in the second study.

### 3.2 Experiment 2

#### 3.2.1 Type of experiment, goal, hypotheses, and conditions

The second experiment was a rating study and aimed at testing the following hypotheses:

Hypothesis 1: German AN compounds are more appropriate to function as naming units, i.e., to refer to new kinds of objects, than the respective phrases.

Hypothesis 2: Only German AN compounds but not the respective phrases are generally considered to be good naming units.

The following two conditions were investigated (see Table 2):

**Table 2. The two conditions of the study**

<b>Condition</b>	<b>Example</b>
Compound	<i>Eine Kurzcouch ist eine ganz bestimmte Couch, die deswegen 1,30 Meter kurz ist, weil sie nur für Kinder bis zu dieser Größe ausgelegt ist.</i> 'A short_couch is a very specific couch that is 1.30 meters short because it is designed only for children up to this size.'
Phrase	<i>Eine kurze Couch ist eine ganz bestimmte Couch, die deswegen 1,30 Meter kurz ist,</i>

---

*weil sie nur für Kinder bis zu dieser Größe ausgelegt ist.*

‘A short couch is a very specific couch that is 1.30 meters short because it is designed only for children up to this size.’

---

### 3.2.2 Method

#### 3.2.2.1 Subjects

A total of 102 native speakers of German participated in the experiment (54 females and 48 males). They were on average 22.2 years old (age range: 18-29, standard deviation: 3.5). None of the subjects had participated in Experiment 1.

#### 3.2.2.2 Materials

The 24 compounds, phrases, and newly created meanings from Experiment 1 were used here again. Subjects were exposed to either the compound or the phrase of a compound-phrase pair. Overall, participants were tested on twelve compounds and twelve phrases. That is, for instance, one subject was tested on *Kurzcouch* but another subject was tested on *kurze Couch*. The assigned meaning of the compound/phrase and the sentence in which the construction appeared were identical. The order of the items in a questionnaire was randomized for each subject.

#### 3.2.2.3 Procedure

Participants saw a sentence that explained the invented meaning of an item (see Table 2). They were asked to rate how well the new item, i.e., a non-lexicalized compound or a non-lexicalized phrase, and the meaning fitted together by using the grades of the German school system. That means, they had six options for each sentence (from 1 to 6). Rating a sentence with 1 meant, for instance, that the participant believed that the



item and the meaning fitted very well together. 6, in turn, meant that they did not at all fit together. Participants were requested to judge quickly, intuitively, and without longer reflection.

### 3.2.3 Data analysis

In the first analysis, the independent and fixed factor CONSTRUCTION TYPE with the two levels compound and phrase as well as the random factors SUBJECT and ITEM were used to examine the dependent variable RATING by means of dependent t-tests (see, e.g., Larsson-Hall 2010: 260; Meindl 2011: 184; Prasada, Otap & Hennefield 2012; Gries 2013: 332). Again, as in Experiment 1, a parametric test was given preference over a non-parametric one for the reasons outlined earlier. One analysis by subject ( $t_1$ ) and one analysis by item ( $t_2$ ) were conducted. CONSTRUCTION TYPE was a within-subject/item factor.

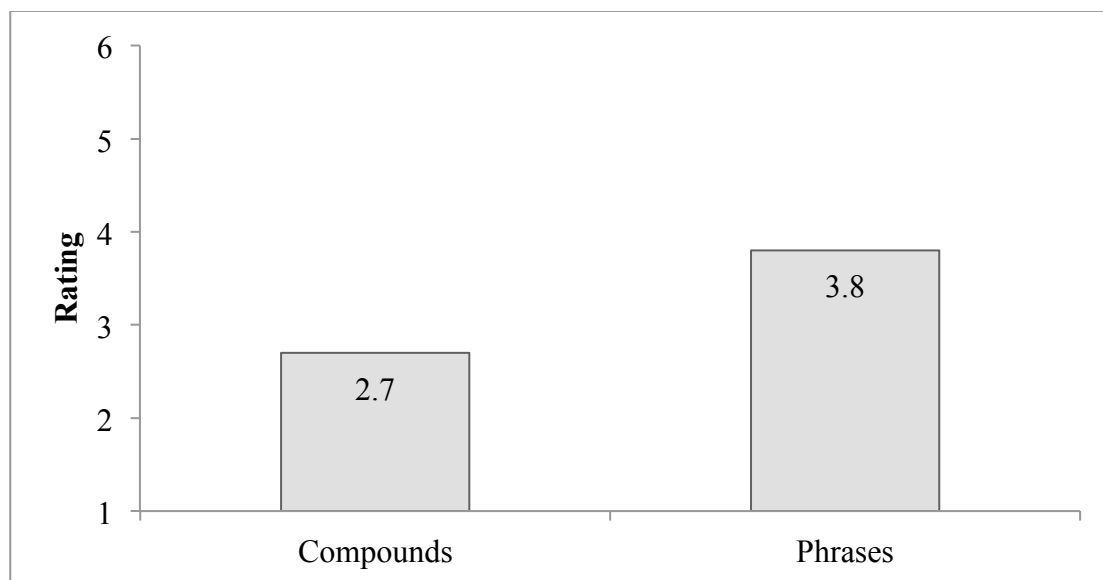
In the second analysis, using one-sample t-tests, the compound and phrase means were compared to the value 3.5, which was the midpoint on the scale from 1 to 6. While values below 3.5 indicated that the term, i.e., the compound or the phrase, was overall considered to represent the newly created concept appropriately, values above 3.5 signaled that the term was generally inappropriate to express the new lexical concept.

### 3.2.4 Results

A main effect of CONSTRUCTION TYPE was found ( $t_1 = -12.0, p_1 < .001$ ;  $t_2 = -11.8, p_2 < .001$ ). Table 3 ( $t_1$  and  $t_2$ ) and Figure 3 ( $t_1$  and  $t_2$ ) present the descriptive statistics. Overall, all compounds were on average rated better than the respective phrases.

**Table 3. Descriptive statistics of subject analysis ( $t_1$ ), item analysis in brackets ( $t_2$ )**

	<b>Compounds</b>	<b>Phrases</b>
Number of observations	102 (24)	102 (24)
Mean	2.7 (2.7)	3.8 (3.8)
Standard deviation	0.6 (0.5)	0.7 (0.5)

**Figure 3. Mean ratings of compounds and phrases by subjects and by items**

In the second analysis, it was found that both values significantly differed from the midpoint 3.5 (compound mean:  $t_1 = -12.4$ ,  $p_1 < .001$ ;  $t_2 = -7.0$ ,  $p_2 < .001$ ; phrase mean:  $t_1 = 4.3$ ,  $p_1 < .001$ ;  $t_2 = 3.0$ ,  $p_2 < .01$ ).

### 3.2.5 Discussion

Experiment 2 confirms and extends the findings of Experiment 1. That is, the ratings show that compounds were regarded as better candidates than phrases to express novel lexical concepts. Therefore, it can be concluded that compounds fulfill the naming function more satisfyingly than the phrasal counterparts. Moreover, the results of Experiment 2 reflect the functional characteristics of the two construction types more precisely

than Experiment 1. Since compounds were on average rated with a value significantly lower than 3.5, they were generally accepted as naming units. Phrases, however, significantly fell above the midpoint, which means that they were overall rejected as new naming units for the newly created concepts. The results are again in line with the theoretical literature that claims that compounds typically serve the naming but phrases the descriptive function (see §2.2 and §3.1).

#### **4 General discussion**

Having distinguished German AN compounds and phrases on formal grounds, the present paper investigated how well these construction types were considered to function as naming units. Both Experiment 1 and Experiment 2 support the idea that compounds are by their nature more appropriate to fulfill the naming function, i.e., to refer to new sub-concepts of the concept denoted by the nominal head. The results of both studies are further compatible, i.e., it can be observed that in 23 out of 24 cases the compound represented the preferred choice in Experiment 1 – indicated by a value greater than 48 – and also received a higher rating than the phrase in Experiment 2.

It was observed earlier that German AN compounds formally differ from their phrasal counterparts: While the adjective and the noun of phrases always agree with respect to grammatical features such as number, the constituents of compounds never do so. Inflectional agreement represents the primary factor and unambiguously defines the two construction types. Further factors, such as orthography, often confirm the distinction in that, for example, compounds are written as a single unit but phrases as two units.

The formal differences seem to translate into functional differences. As the results of the present article indicate, language users tend to prefer a new form, i.e., a new compound, to express a novel lexical concept. Choosing a compound rather than a phrase mirrors the wish to assign a single function to a single, separate form, i.e., to stick to the one-meaning-one-form principle, which would not be possible with phrases as they already have a descriptive interpretation (see also, e.g., Miestamo 2008: 34).

A crucial question in language research in general and in the context of the present investigation in particular is whether the formal and functional aspects of linguistic units have an influence on the way they are processed and represented in the mind. Specifically, it should be asked whether the differentiation between compounds and phrases as discussed in the current article represents the foundation of a cognitive difference between the two construction types. This is a decisive question because naming units have to be stored in the mental lexicon, in opposition to descriptive units (see, e.g., Booij 2010: 169). In the literature on the processing and representation of complex constructions, one finds three general ways in which constructions can be stored and retrieved. First, a construction can be stored and/or processed as a whole (see, e.g., Manelis & Tharp 1977; Butterworth 1983; see also, e.g., Bybee 1985; Rumelhart & McClelland 1986; Sereno & Jongman 1997). These so-called full-listing models assume that the entire form, i.e., e.g., an AN compound as a whole, is stored and represents the unit that is accessed. In contrast, the second type of model, so-called decomposition models, assigns a crucial role to the construction constituents (see, e.g., Pinker 1991; Pinker & Prince 1991; Clahsen & Almazan 2001; see also, e.g., Sandra 1990; Zwitserlood 1994). This might mean, for instance, that AN constructions are preferably accessed via the adjective and noun. Apart from the two extremes just mentioned, several intermediate

positions have been developed over the last decades (see, e.g., Caramazza, Miceli, Silveri & Laudanna 1985; Caramazza, Laudanna & Romani 1988; Baayen 1992; Frauenfelder & Schreuder 1992; Baayen & Schreuder 1999; Giraudo & Grainger 2000). These models assume that complex constructions can be either stored in and retrieved as a single entry or accessed via their constituents. Several factors such as frequency and semantic transparency decide which of the two options is used. For instance, Caramazza et al. (1988) suggest the Augmented Addressed Morphology Model and argue that constructions of higher frequency are more quickly retrieved as a whole, whereas complex items of lower frequency are more likely to rely on decomposition.

The three alternatives described above – full-listing, decomposition, and intermediate models – have been supported and/or weakened with empirical evidence from a great number of experiments. Crucially, however, experiments have so far focused on inflected forms, derivatives, or compounds but not on the comparison of compounds and phrases. In Schlechtweg (2018) and Schlechtweg & Härtl (2016), I reflect upon the question whether compounds and phrases differ in terms of how they are stored and processed (for theoretical discussion, see Olsen 2000; Wunderlich 1986). In two comprehensive studies, subjects participated in learning experiments over several days and were tested by means of a kind of lexical-decision task on how well they had acquired newly created and non-lexicalized AN combinations. Having controlled for a bunch of potentially confounding variables such as constituent frequencies, lexicalization, duration, or number of syllables, one observed that compounds were learned more efficiently than phrases (for a similar result, see Kotowski, Böer & Härtl 2014). Based on the results of these experiments, the so-called Full-Form-Storage Principle for Compounds and Phrases was suggested. The principle connects to the above-named intermediate

models à la Frauenfelder & Schreuder and states that both compounds and phrases can be represented and accessed in the fastest way via a full form in the mental lexicon. The reason for this is that both types can function as naming units; hence, their specific meaning has to be stored. However, the crucial difference between compounds and phrases lays in the point in time when the full-form entry is created: Assuming that a compound and a phrase start as non-lexicalized units and gradually increase in their frequency, the full-form entry of a compound is created earlier, i.e., at a lower frequency, than that of a phrase. The specific formal nature of compounds makes them appropriate candidates for the naming function. Naming units, in turn, have to be memorized and represented in the mental lexicon once they have come into existence. Phrases can surely serve as naming units as well; however, it is argued that they adopt a descriptive function first and can acquire a naming function only later in time (see also Barz 1996; Härtl 2015). The conflict between the descriptive and an additional naming function explains why subjects have more difficulty in learning phrases and, as a consequence, why it is suggested that the full-form entry of a phrase is created later than that of the corresponding compound.

## **5 Conclusion**

The present article supports the idea that compounds fulfill the naming function better than phrases. In two empirical studies, it was shown that language users consider compounds to be more appropriate than phrases to express newly created concepts. Overall, the findings are in line with recent experimental evidence that has shown that compounds and phrases not only differ on a formal and functional but also on a cognitive basis.

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## Abbreviations

AN – Adjective-noun

DEF - Definite

GEN - Genitive

INDF – Indefinite

LE – Linking element

M – Masculine

NOM – Nominative

SG – Singular

## Appendix: The newly created meanings and the compounds and phrases

1. *Es ist eine ganz bestimmte Tram, die deswegen flacher als 2 Meter ist, weil sie unter Dächern geparkt werden soll, die nur 2 Meter hoch sind.*

‘It is a very specific tram that is flatter than 2 meters because it is supposed to be parked under roofs that are only 2 meters high.’

*Flachtram* (flat\_tram)      *flache Tram* (flat tram)

2. *Es ist ein ganz bestimmtes Schild im Straßenverkehr, das nur in Regionen, in denen an mindestens 200 Tagen im Jahr Schnee liegt, zum Einsatz kommt und das deswegen pink ist, damit es von Verkehrsteilnehmern gut gesehen werden kann.*

‘It is a very specific (traffic) sign that is used only in regions in which there is snow on at least 200 days during the year and that is pink so that road users can easily see it.’

*Pinkschild* (pink\_sign)      *pinkes Schild* (pink sign)

---

3. *Es ist ein ganz bestimmter Schirm, der deswegen so hart wie Ahornholz ist, damit er vor starken Hagel schützt.*

‘It is a very specific umbrella that is as hard as maple wood so that it serves as a protection against heavy hail.’

*Hartschirm* (hard\_umbrella)      *harter Schirm* (hard umbrella)

---

4. *Es ist eine ganz bestimmte Couch, die deswegen 1,30 Meter kurz ist, weil sie nur für Kinder bis zu dieser Größe ausgelegt ist.*

‘It is a very specific couch that is 1.30 meters short because it is designed only for children up to this size.’

*Kurzcouch* (short\_couch)      *kurze Couch* (short couch)

---

5. *Es ist ein ganz bestimmter Krug, der aufgrund seines besonderen Materials von Natur aus zwischen 50 und 60 Grad Celsius heiß ist und dazu dient, die Temperatur von Getränken zu halten.*

‘It is a very specific jug that, due to its particular material, has by its nature a temperature between 50 and 60 degrees Celsius / is by its nature hot and serves to maintain the temperature of drinks.’

*Heißkrug* (hot\_jug)      *heißer Krug* (hot jug)



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6. *Es ist ein ganz bestimmter Schuh, der deswegen mindestens 10 Zentimeter dick ist, damit er Fabrikarbeiter vor herunterfallenden schweren Gegenständen optimal schützt.*

‘It is a very specific shoe that is thick / has a thickness of at least 10 centimeters so that it perfectly protects factory workers against falling heavy objects.’

*Dickschuh* (thick\_shoe)      *dicker Schuh* (thick shoe)

---

7. *Es ist ein ganz bestimmter Schrank, der aufgrund seines besonderen Materials 1 Kilogramm leicht ist, damit er von einer Person problemlos gehoben werden kann.*

‘It is a very specific closet that, due to its particular material, weighs 1 kilogram / is light so that it can be easily lifted by a single person.’

*Leichtschränk* (light\_closet)      *leichter Schrank* (light closet)

---

8. *Es ist ein ganz bestimmter Safe, der deswegen so klein wie eine Zigarettenschachtel ist, damit in ihm winzige und sehr wertvolle Gegenstände platzsparend verstaut werden können.*

‘It is a very specific safe that is as small as a package of cigarettes so that tiny and very valuable objects can be stowed in it in a space-saving way.’

*Kleinsafe* (small\_safe)      *kleiner Safe* (small safe)

---

9. *Es ist ein ganz bestimmter Ring, der aufgrund seines besonderen Materials von Natur aus permanent 0 Grad Celsius kalt ist und dadurch während des Tragens Schwellungen am Körper lindert.*

‘It is a very specific ring that, due to its particular material, by its nature has a temperature of 0 degrees Celsius / is cold and, therefore, alleviates swellings while it is worn.’

*Kaltring* (cold\_ring)      *kalter Ring* (cold ring)

---

10. *Es ist eine ganz bestimmte Jacht, die mit Hilfe einer speziellen Technik so laut wie ein Flugzeug ist, um Haie schon auf hoher See davon abzuhalten, sich Stränden zu nähern.*

‘It is a very specific yacht that is, due to a particular technique, as loud as an airplane in order to prevent sharks from approaching beaches at high sea.’

*Lautjacht* (loud\_yacht)      *laute Jacht* (loud yacht)

---

11. *Es ist ein ganz bestimmter Brief, der aus Kostengründen schmal ist, das heißt, nicht dicker als 5 Millimeter sein darf.*

‘It is a very specific letter that is narrow for financial reasons, that is, it must not be thicker than 5 millimeters.’

*Schmalbrief* (narrow\_letter)      *schmaler Brief* (narrow letter)

---

12. *Es ist ein ganz bestimmter Schwamm, der deswegen so dünn wie ein Blatt Papier ist, damit man mit ihm in sehr engen Ecken putzen kann.*

‘It is a very specific sponge that is as thin as a sheet of paper so that one can clean in very tight corners.’

*Dünnschwamm* (thin\_sponge)      *dünner Schwamm* (thin sponge)

---

13. *Es ist ein ganz bestimmtes Pult, das deswegen 1,80 Meter groß ist, damit Menschen mit einer Körperlänge von über 2,30 Metern bequem daran stehen können.*

‘It is a very specific console that has a size of 1.80 meters / is big so that people who are taller than 2.30 meters can stand at it comfortably.’

*Großpult* (big\_console)      *großes Pult* (big console)

---

14. *Es ist ein ganz bestimmter Strumpf, der deswegen 100 Gramm schwer ist, weil er Kindern beim Laufen lernen helfen soll.*

‘It is a very specific sock that weighs 100 grams / is heavy because it is supposed to help children who are learning to walk.’

*Schwerstrumpf* (heavy\_sock)      *schwerer Strumpf* (heavy sock)

---

15. *Es ist eine ganz bestimmte Box, die deswegen 1 Meter breit ist, damit man mit ihr zwei Katzen gleichzeitig transportieren kann.*

‘It is a very specific box that is 1 meter broad so that two cats can be carried in it at the same time.’

*Breitbox* (broad\_box)      *breite Box* (broad box)

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16. *Es ist ein ganz bestimmter Topf, der aufgrund seines besonderen Materials permanent zwischen 40 und 50 Grad Celsius warm ist und dazu dient, die Temperatur von gekochten Speisen in diesem Bereich zu halten.*

‘It is a very specific pot that, due to its particular material, permanently has a temperature between 40 and 50 degrees Celsius / is permanently warm and serves to maintain the temperature of cooked food in this range.’

*Warmtopf* (warm\_pot)      *warmer Topf* (warm pot)

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17. *Es ist ein ganz bestimmtes Rad, das deswegen so rau wie Schmirgelpapier ist, damit man auf vereisten Flächen sicher fahren kann.*

‘It is a very specific wheel that is as rough as sandpaper so that one can safely drive on icy grounds.’

*Raurad* (rough\_wheel)      *raues Rad* (rough wheel)

---

18. *Es ist ein ganz bestimmter Bus, der deswegen mindestens 3,30 Meter hoch ist, damit Menschen mit einer Körpergröße von über 2,30 Metern bequem darin stehen können.*

‘It is a very specific bus that is at least 3.30 meters high so that people who are taller than 2.30 meters can stand in it comfortably.’

*Hochbus* (high\_bus)      *hoher Bus* (high bus)

---

19. *Es ist ein ganz bestimmtes Board, das deswegen 3 Meter lang ist, damit sich das Gewicht des Fahrenden besser verteilt und sie/er nicht zu tief in den Schnee einsinkt.*

‘It is a very specific board that is 3 meters long so that the weight of its user is distributed more efficiently and so that one does not sink in the snow too deeply.’

*Langboard* (long\_board)      *langes Board* (long board)

---

20. *Es ist ein ganz bestimmter Schein, der aus Hygienegründen jung ist, das heißt, nicht länger als einen Monat im Umlauf sein darf.*

‘It is a very specific banknote / bill that is young for hygiene reasons, that is, it must not be used for more than one month.’

*Jungschein* (young\_banknote)      *junger Schein* (young banknote)

---

21. *Es ist eine ganz bestimmte Tür, die aufgrund ihres speziellen Materials von Natur aus so weich wie ein Teppich ist, damit sich Kinder beim Spielen nicht weh tun, wenn sie dagegen stoßen.*

‘It is a very specific door that is, due to its particular material, by its nature as soft as a carpet so that children do not get hurt if they bump against it while playing.’

*Weichtür* (soft\_door)      *weiche Tür* (soft door)

---

22. *Es ist ein ganz bestimmter Sack, der deswegen 2 Meter tief ist, damit man in ihm Gegenstände bis zu dieser Größe verstauen kann.*

‘It is a very specific sack that is 2 meters deep so that one can stow objects up to this size in it.’

*Tiefsack* (deep\_sack)      *tiefer Sack* (deep sack)

---

23. *Es ist ein ganz bestimmter Schal, der deswegen bei seinem Verkauf mindestens 20 Jahre alt ist, weil sein besonderer Stoff erst dann schön kuschelig ist.*

‘It is a very specific scarf that is at least 20 years old when it is sold because its particular material is only cuddly at this time.’

*Altschal* (old\_scarf)      *alter Schal* (old scarf)

---

24. *Es ist ein ganz bestimmtes Beil, das deswegen rund ist, damit es Bäume umkreisen und somit fällen kann.*

‘It is a very specific ax that is round so that it can circle around trees in order to fell them.’

*Rundbeil* (round\_ax)      *rundes Beil* (round ax)

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