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Ways of classification: German *Art* and *Typ*

In this paper, the meaning and use of the two taxonomic nouns *Art* and *Typ* in German is examined from the point of view of semantics/pragmatics. It is hypothesized that *Art* and *Typ* differ in their way of classification: Classification by *Art* refers to (natural) kinds and thus individuals belonging to an *Art* share essential properties that are closely connected to lexical meanings. Classification by *Typ*, on the other hand, refers to classes in arbitrary (artificial) systems, and tokens of a *Typ* match a model or prototype represented by the *Typ*. This entails that while classification by *Art* makes use of linguistic knowledge in a broad sense, classification by *Typ* tends to be based on expert-knowledge. The hypothesis was successfully tested against lexicographic data and corpus data and was, moreover, subject of an online experiment. The experimental results not only confirmed the hypothesis, but in addition provided insight into subtle differences between classification by *Art* and by *Typ* in cases in which, at first sight, both ways of classification appeared equally appropriate. The findings on the difference in meaning of *Art* and *Typ* are finally considered against the background of the notions of *kind* and *type* as used in formal semantics, highlighting their respective role in semantic theory.

Kinds, types, essential properties, prototypes, linguistic knowledge, expert knowledge

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1   Introduction

There are nouns in many languages expressing classification, for example in English *sort*, *class*, *kind* and *type*. They are called *taxonomic nouns*; see Mihatsch (2016). Although from a broader perspective all taxonomic nouns fulfil the same task, that is, classification, there are at a closer look differences in meaning and usage which are interesting beyond matters of style, since they reveal differences in their way of classification. The focus in this paper is on the German taxonomic nouns *Art* ('kind'/'species'/ 'manner') and *Typ* ('type'/'model') which are, at first sight, nearly synonymous, as in the example in (1).

(1)   Kapitalismus lässt sich verschieden klassifizieren. Der rheinische **Typ des Kapitalismus**/die rheinische **Art des Kapitalismus** zeichnet sich beispielsweise durch viel Mitbestimmung und durch eine funktionierende Zivilgesellschaft aus.

'Capitalism can be classified differently. The Rhenish *Typ/Art* of capitalism, for example, is characterized by a lot of codetermination and a functioning civil society.'

While the example in (1) seems to suggest that there is no difference between *Art* and *Typ*, substitution of one by the other is hardly acceptable in the examples in (2) – (6).[1]

(2)   Die alten Streifenwagen haben ausgedient. Ab 2004 werden die ersten drei Streifenwagen **vom Typ (*von der Art) Opel Vectra** in Betrieb genommen.

'The old patrol cars have had their day. From 2004, the first three patrol cars of the *Typ/Art* Opel Vectra C will be put into operation.'

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[1] Most examples in this paper are taken from the DEWAC corpus provided by the corpus linguistics group at Humboldt-University Berlin with grateful thanks for access permission. Examples are often slightly simplified. English translations are intended to clarify the structure of the examples and are not always optimal due to structural differences between German and English.

(3)   Frau Däubler-Gmelins Gegner werfen ihr gern vor, dass sie kompromissunfähig sei. Sie wolle "das deutsche Recht umkrempeln", behauptet die FAZ, die wohl eine weibliche Version **des Typs (?? der Art) Lafontaine** in ihr fürchtet.

'Ms. Däubler-Gmelin's opponents like to accuse her of being incapable of compromise. She wanted "to revise German law," claims the FAZ, which probably fears a female version of the *Typ/Art* Lafontaine in her.'[2]

(4)   Fledermäuse stoßen Laute aus, die sehr schnell hintereinander folgen und sich hinsichtlich ihrer Lautstärke unterscheiden. **Die Art (*der Typ) "Große Hufeisennase"** stößt Ortungslaute aus, deren Schalldruck der Lautstärke eines Presslufthammers entspricht.

'Bats emit sounds that follow each other very quickly and differ in their volume. The *Art/Typ* "Big Horseshoe Nose" emits location sounds whose sound pressure corresponds to the volume of a jackhammer.'

(5)   Das Ausmaß und die Intensität des Antisemitismus in Europa haben sich stets verändert. Unterschiedlich waren auch der Grad und **die Art (?? der Typ) von Diskriminierung der Juden**.

'The extent and intensity of anti-Semitism in Europe has always changed. The degree and *Art/Typ* of discrimination against the Jews has also differed.'

(6)   Jandl, der zu den führenden Vertretern der experimentellen Literatur in der Nachkriegszeit gehörte, verstarb im Juni 2000. **Die Art (?? der Typ) seiner Vorträge** war für seine wortmalerische Lyrik von besonderer Bedeutung.

'Jandl, one of the leading exponents of post-war experimental literature, passed away in June 2000. The *Art/Typ* of his presentations was of particular importance for his lyrics.'

As a first guess one might think that *Typ* is used in technical domains, while *Art* is used to refer to biological classification, i.e., species, as in (2) and (4). This idea is refuted by the example in (3), which is about a type of politician, and the examples in (5) and (6), in which *Art* refers to a kind of discrimination and a manner of presentation. One might think, then, that the use of *Art* and *Typ* is selected by the particular noun or name: the noun *Vortrag* 'talk' selects *Art* and the proper name *Lafontaine* selects *Typ.* This is refuted by (1) as well as (7) where both *Typ* and *Art* are licensed. However, while the alternatives in (1) appear synonymous, the example in (7) exhibits a subtle difference between the *Typ* and the *Art* alternative: *Typ des Handy*s seems to refer to different models, say, *iPhone 3* as opposed to *Nokia Lumina* and *Moto G*, while *Art des Handys* refers to, for example, the difference between a classical feature phone, an outdoor phone and a smartphone.

(7)   Per Fernbedienung wird die Sendeleistung jedes Handys individuell geregelt. Je nach *Typ/Art* des Handys beträgt die maximale Sendeleistung zwischen 1W und 20W.

'Depending on the *Typ/Art* of mobile phone, the maximum transmission power is between 1W and 20W.'

The difference in meaning between the *Typ* variant and the *Art* variant in (7) provides evidence that the two taxonomic nouns have not, at least not in the first place, specialized in a particular domain, but rather employ different ways of classification: classes referred to by *Art* differ from those referred to by *Typ*, which raises the question of how to characterize the difference.

The research on *Art* and *Typ* described in this paper grew out of a talk that argued against the widely held supposition that kinds and types – more precisely, the notion of *kind* and the notion of *type* as employed in semantics – are roughly the same. The main argument in that talk addressed the

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different roles of kinds and types in the semantic analyses: while kinds in many semantic frameworks are considered as basic ontological entities in addition to (regular) individuals, types are part of the framework as such ensuring the well-formedness of composition and consistency of representations. Different from the talk, the perspective in this paper is an empirical one. The focus will be on the comparison of the meaning and, in particular, the classificatory potential of the German taxonomic nouns *Art* and *Typ* on the basis of lexicographic, distributional and experimental data. The question to what extent the findings match with the roles of kinds and types in semantic theory is only addressed at the end of the paper.

The first hypothesis in comparing *Art* and *Typ* will be that classification by *Art* does what it is expected to do, i.e., refer to kinds – natural kinds and beyond. Kinds are generally assumed to be associated with essential properties as opposed to accidental ones, though it is meanwhile understood that such properties are not strictly necessary. For example, a dog is four-legged in virtue of being a dog, even though an accidentally three-legged dog still counts as a dog. For ease of presentation these properties will be called *essential* in this paper without implicating that they are necessary. They are properties that entities have simply because they are the kind of things they are; they accommodate exceptions and, most importantly, they are part of what speakers acquire when learning a language. It may be argued that knowledge of these properties is encyclopedic rather than linguistic as such. Still, it is knowledge associated with words and must be acquired when learning the meaning of the words. Therefore, the assumption that the taxonomic noun *Art* refers to kinds entails that classification by *Art* relies on linguistic knowledge (in a broad sense).

In the case of *Typ* it is more difficult to formulate a clear hypothesis. There seems to be no generally established idea of what a type is apart from the distinction between *type* and *token* (Peirce 1931) according to which types are abstract entities and tokens are particular instances. Types occur in a wide variety of contexts and there is no indication that they are rooted in essential properties of the objects they classify. They seem to be defined instead by models or prototypes provided by a community of experts, independent of general linguistic knowledge.

Here is an example illustrating this idea: when I am asked what kind of heating system (*welche Art von Heizung*) we have in our house, I may answer that it is gas operated and supplies heat as well as hot water and was installed just two years ago (and was fairly expensive). I know that these features are relevant because I am familiar with the meaning of the word *Heizung* 'heating system' and with what counts as essential properties of heating systems. However, if you asked me for the type (*Typ*) of the heating system in our house, I would be lost and refer you to our heating engineer. I might of course try the same answer as in the case of *Art* (gas-operated, heat as well as water, etc.) and run the risk that this was not what you wanted to know. At the same time, it would be infelicitous if I were to answer the *Art* question by naming a *Typ* telling you, e.g., that we have a *B-2248 Weishaupt Eco*.[3] The hypothesis pursued in this paper is therefore as follows:

***Art&Typ* hypothesis**

classification by *Art*	(i) refers to (natural) kinds,
	(ii) indicates that individuals share essential properties, and
	(iii) is based on general linguistic knowledge (in a broad sense).

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[3] Many thanks to one of the reviewers for pointing out the infelicity of answering the *Art* question in this way.

Classification by *Typ*	(i) refers to classes in arbitrary systems,
	(ii) indicates that individuals match a model or blueprint or prototype, and
	(iii) is based on expert knowledge.

In the remainder of this paper, this hypothesis will be tested against three different sets of data. In section two, *Art* and *Typ* will be examined from a lexicographical point of view exploring synchronic as well as diachronic data. In section three, distributional characteristics will be considered, based on corpus data. In section four, an experimental study will be presented testing preferences in usage. In section five, we will finally address the role of kinds and of types in semantics.

Finally, there is a caveat: throughout the rest of this paper the focus will be on German *Art* and *Typ*. English *kind* and *type* are close in meaning but not fully equivalent to the German terms. For nouns corresponding to *type* across Romance languages see Mihatsch (2016).

2   Lexical meaning

In this section, *Art* and *Typ* will be examined from a lexicographical point of view. We start with their entries in the *Duden* (lexicon of modern German), look at their provenience in the *Grimm* (Grimm & Grimm 1854-1969, etymological lexicon of German) and briefly consider the English counterparts *kind, species, manner* and *type* in the Oxford English Dictionary (OED). In concluding this section, the implications for the *Art&Typ* hypothesis will be considered.

2.1   *Art*
The *Duden* lists five senses of *Art*:[4]

(8) a. *angeborene Eigenart / Wesen / Natur*
         'innate nature', 'character'

     b. *(Art und) Weise*
         'manner'

     c. *gutes Benehmen*
         'good manners'

     d. *Einheit im System der Tiere und Pflanzen, in der Individuen zusammengefasst sind, die in allen wesentlichen Merkmalen übereinstimmen und die untereinander fruchtbare Nachkommen hervorbringen können*

         'unit in the system of animals and plants including those individuals which are consistent in all essential characteristics and which can produce fruitful offspring among each other.' (English *species);*

     e. *eine besondere, bestimmte Sorte von etwas* ('sort', 'kind').

The sense in (8e) is the general taxonomic one. Since the paraphrase by *Sorte* ('sort') is not very helpful, we refer to the more informative entry in Adelung (1811) which is a High German dictionary from the nineteenth century:

Adelung entry on *Art*

(9) *Die Ähnlichkeit einzelner Dinge in wesentlichen Eigenschaften, und solche Dinge zusammen genommen*
     'The similarity of individual things in essential properties, and the collection of these things'

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[4] Dudenredaktion (o. J.): „Art" auf Duden online; https://www.duden.de/node/8848/revision/8875

The etymology of the word *Art* is not fully transparent. Following the *Grimm* dictionary, a Slavic root *roditi* meaning *give birth* or *generate* seems to be relevant.

English translations of the taxonomic meaning of German *Art* are *kind* or *species*, and also *sort* or *type*. *Species* is a technical term in biology. *Kind*, like German *Art*, refers to "the essential quality […] as determining the class or type to which a thing belongs".[5] Note that the Oxford English Dictionary includes *type* as a sense of *kind* indicating a less strict division line between *kind* and *type* than that between German *Art* and *Typ*.

2.2 *Typ*
The *Duden* lists five senses of German *Typ*:[6]

(10) a. *durch bestimmte charakteristische Merkmale gekennzeichnete Kategorie; Art (von Dingen oder Personen);*
'category characterized by characteristic features; kind of things or persons';

b. *Modell oder Typ einer Konstruktion*
'model or type of a construction';

c. *Urgestalt, Grundform, Urbild, das ähnlichen oder verwandten Dingen oder Individuen zugrunde liegt;*
'basic form or archetype underlying similar or related things or individuals';

d. *als klassischer Vertreter einer bestimmten Kategorie von Menschen gestaltete, stark stilisierte, keine individuellen Züge aufweisende Figur*
'highly stylized figure, designed as a classical representative of a certain category of human beings, without individual features'

e. *männliche Person* 'male person' (as in *einen Typen kennenlernen* 'get to know a guy').

In (10a) the *Duden* lists a sense of *Typ* that is equivalent to *Art* in being defined by characteristic features, which will be discussed in section 2.4 below. The senses in (c) and (d) are synonymous with *Typus*, which is a common term in philosophy and literature studies. The sense in (e) is very colloquial. According to the etymological *Grimm* dictionary, the origin of *Typ* is the Greek verb for *strike/ beat* suggesting a connection to minting and printing. The latter is still visible in the printing sector where movable metal letters are called *Typ*en (and 'types' in English).[7]

English *type* is also rooted in the Greek verb for *strike/beat*. It has a taxonomic use analogous to German *Typ*, denoting either a class or kind, or a prototype – note that the Oxford English Dictionary also lists *kind* as a synonym of *type*, see (11a).

Oxford English Dictionary, *type* [8]

(11) a. A kind, class, or order as distinguished by a particular character;

b. A person or thing that exhibits the characteristic qualities of a class; a representative specimen; a typical example or instance.

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[5] Oxford English Dictionary (OED) https://www.oed.com/viewdictionaryentry/Entry/103444 (accessed Nov 15, 2020).

[6] Dudenredaktion (o. J.): „Typ" auf Duden online; https://www.duden.de/node/187038/revision/187074

[7] However, the singular forms are different; a movable letter is called *die Type*, with feminine gender, whereas the classification noun is masculine – *der Typ*.

[8] OED Online. https://www.oed.com/view/Entry/208330?rskey=rALWIs&result=2&isAdvanced=false (accessed November 15, 2020).

2.3 *Unterart* and *Untertyp*

The core idea of taxonomic nouns is two-fold. Firstly, there is the dichotomy between class and instance – *set* vs. *element*, *Art* vs. *Individuum*, *type* vs. *token,* etc. On the other hand, there is the idea of a taxonomy establishing a hierarchy such that a subordinated class inherits the features of the superordinated class. This idea is found in biology, but also in mathematics and computer science. Accordingly, there are in English the notions of *subspecies* and *subkind* and, in mathematics and computer science, the notion of *subtype*. In German, there is *Unterart* covering *subspecies* and *subkind*, as in (12). However, while *Unterart* is found in various contexts, the expression *Untertyp* occurs nearly exclusively in the context of diseases, as in (13a); it is rarely found in other contexts and, if so, appears marked, see (13b). This is surprising since in mathematics and computer science *type* is translated into German by *Typ*, and the prefix *Unter-* is fully productive in German.

(12) Der in verschiedenen Unterarten vorkommende Besenginster wird meist bis zu 2 m hoch.
'The common broom, which occurs in different subspecies, is usually up to 2m high.'

(13) a. Wie die Krankheit verläuft, hängt davon ab, mit welchem Untertyp des Erregers der Patient sich angesteckt hat.
'How the disease progresses depends on the subtype of the pathogen the patient has been infected with.'

b. Die Auswahl der Panzer ist beeindruckend: Fast jeder Panzertyp und Untertyp, der damals aus den Rüstungsfabriken rollte, steht auch in *Panzer Elite*[9] zur Verfügung.
'The choice of tanks is impressive: almost every type and subtype of tank that rolled out of the arms factories is also available in *Panzer Elite*.'

2.4 Implications for the *Art&Typ* hypothesis

The dictionary entries support the *Art&Typ* hypothesis in many ways. The core part where *Art* is concerned – individuals share essential properties – is provided as a defining characteristic in the entry in Adelung, see (9). Furthermore, the Slavic root *roditi* (*give birth* or *generate*) mentioned in the *Grimm* suggests that *Art* is diachronically connected to descent and inheritance, which is additional support for the constitutive role of essential properties.

The entry for *Typ* in the *Duden* highlights the role of a model or basic form (10b and 10c), which is the core part of the hypothesis concerning *Typ*. The origin of *Typ* in the Greek word for 'beat' and its use to denote movable letters in printing confirms the idea that a *Typ* is specified by a prototype. In fact, the word *Typ* developed into a common term from the eighteenth century on, that is, only after movable type printing had become established as a technique.[10] It does not seem too speculative to assume that the taxonomic noun *Typ* is still connected to the idea of types in printing – produce any number of indistinguishable tokens – which is strong evidence that the idea of a prototype is at the core of its meaning.

The constitutive role of the prototype is the key point distinguishing classification by *Typ* from that by *Art*. Note that unlike a stereotype, a prototype is not just a collection of properties but an actual individual. In *der Typ Lafontaine* in (3) the actual politician Oscar Lafontaine serves as a prototype

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[9] Computer game
[10] Mihatsch (2016) also observes for Romance languages that type nouns appeared later than the other taxonomic nouns.

characterizing the tokens of this type. By contrast, the *Art Große Hufeisennase* is not constituted by a prototypical exemplar – bats of this species are related by descent. The role of the prototype is taken to the extreme when *Typ* no longer denotes a class but a man: *Sie hat einen Typ kennengelernt* ('She has met a guy'); see (10e). This usage is colloquial and derogative, and it seems to be saying that the guy she met is a prototypical male lacking other relevant properties.

However, the *Duden* entry of *Typ* includes in addition a sense in which a *Typ* is established by characteristic features, see (10a), entailing that the dividing line between *Art* and *Typ* is not as clear-cut as suggested by the *Art&Typ* hypothesis. An example for this sense is *Fehler dieses Typs* (listed in the *Duden*) which appears equivalent to *Fehler dieser Art* ('errors of this *Typ/Art*'). We have already seen in the heating example in the introduction that a question addressing the *Typ* may be answered in the same way as a question addressing the *Art*, by naming characteristic features. But we also noted that this is only true in one direction: a question addressing the *Art* cannot adequately be answered by naming a *Typ*. We will return to overlapping interpretations in section 4.3.

In English, the dividing line between *kind* and *type* appears even more vague. The Oxford English Dictionary mentions *type* as (one) synonym of *kind* and vice versa. That might indicate that in English the prototype characteristic is less distinctive. The fact that *type* is not used as a synonym of 'man' or 'guy' also points to the less prominent role of the prototype in English.

The almost complete absence of *Untertyp* in German is a puzzle. It might be considered to support the *Art&Typ* hypothesis, namely that the use of *Typ* is strongly related to the concept of a prototype. The fact that a "sub-prototype" is hard to conceive of thus explains why *Typ* might not readily support the inheritance of properties from a superordinated to a subordinated class. This would again point to a less prominent role of the prototype in English where *subtype* is highly frequent and indicates inheritance of properties.[11]

3 Distribution

In this section, DPs headed by *Art* and *Typ* will be examined with respect to grammatical form and meaning. The analysis is based on a corpus study (*DEWAC* corpus, see footnote 1). There are two major constructions. In the first, the taxonomic noun is combined with another noun by juxtaposition while in the second the taxonomic noun is complemented by a partitive genitive or a *von* ('of') PP.

Art+N, Typ+N	*die Art Große Hufeisennase,*
	der Typ Opel Vectra, Bundesschatzbriefe Typ A,
	Politiker des Typs Lafontaine;
	'the species Big Horseshoe Nose', 'Opel Vectra type [of car]', 'Type A federal saving bonds', 'politicians of the type of Lafontaine';

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[11] Janebová, Martinková & Gast (2022) explore the contrast between two major type nouns in Czech, *druh* and *typ*, by means of statistical analyses of their distribution in discourse. Their meanings appear close to German *Art* and *Typ*: While *druh* denotes a group of individuals sharing the same characteristics, *typ* refers to a model, example, or prototype. They note that *typ* is a 19th-century borrowing which came into Czech via German and, as in German, can be used with the meaning of 'a strange man' in addition to its taxonomic uses.

Art+von/des+N, Typ+von/des+N	*eine besondere Art von Wald, (der viel Wasser speichert),*
	eine Art [von] Gegengift,
	der rheinische Typ des Kapitalismus,
	der Typ der ultraviolett leuchtenden Galaxien,
	der Typ des Kleinkriminellen;
	'a special kind of forest (that retains a lot of water)', 'a kind of antidote', 'the Rhenish type of capitalism', 'the type of ultraviolet luminous galaxies', 'the petty criminal type';

The two forms will be demonstrated below. The focus will be on how the denotation of the taxonomic DP relates to that of the embedded noun, by identity or by subsumption. Cases with a hedging interpretation are discussed at the end of the section.

3.1   *Art+N, Typ+N*

Art and *Typ* can both be combined with nouns by mere juxtaposition which is a form of apposition (see *Duden Grammatik* 2006). In the case of *Art* we have to distinguish between combinations that block a partitive genitive or *von* ('of') prepositions and those that do not. The former (strict) variety requires the noun to be the name of a species, e.g., *Große Hufeisennase*.[12] Other nouns are blocked even if they allow for a kind reading: **Die Art Batterie / Die Batterie wurde von Volta erfunden* ('The kind of battery / The battery was invented by Volta'). Moreover, the strict variety of *Art*+N requires a definite article which is explained by the fact that names of species are unique – there is exactly one kind of *Große Hufeisennase*. The semantics of these Art+N constructions is such that the denotation of the full DP is identical to that of the noun (on a kind reading): *die Art Große Hufeisennase* and *die Große Hufeisennase* denote the same kind of bat.

 Art+N constructions may also occur with nouns other than species names and with an indefinite article if they allow for a partitive genitive or the preposition *von* ('of') without change of meaning, as in *eine Art [von] Smartphone* 'a kind of smartphone'. For this reason they are subsumed under the form *Art+von/des+N* (see below).

When *Typ* is combined with a noun by juxtaposition, the noun is always a proper name. In *der Typ Opel Vectra* the term *Opel Vectra* is the name of the type. Similarly, in *Bundesschatzbriefe Typ A (*'type A federal saving bonds') and *Politiker des Typs Lafontaine* ('politicians of the type of Lafontaine') the terms *A* and *Lafontaine* are names of types. Even in *Autofahrer vom Typ "Hauptsache ich"* ('"Me first" type of car drivers') the phrase *Hauptsache ich* is understood to be the name of the type.

 Type names are less commonly known and exhibit a high degree of freedom compared to the names combined with *Art*. This corresponds to the idea that types classify artefacts or refer to prototypes, and are not conventionalized, whereas names of species adhere to the conventions of biological classification.

 From the semantic point of view, phrases of the form *Typ+N* are identical in reference to that of the name alone, provided that the name is interpreted as the name of a type. This can be tested with

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[12] *Große Hufeisennase* is the name of a species, not a combination of adjective and noun.

the help of predicates that block a token reading.[13] In (14a) *Der Opel Vectra* must have a type reading because the verb *produzieren* ('produce') along with the time span blocks a token reading, and in this reading (14a) is equivalent to (14b). In (14c) only the token reading is possible since a type cannot be owned by a person, which is confirmed by the unacceptability of (14d).

(14) a. Der Opel Vectra wurde von 1988 bis 2008 produziert.
     b. Der Typ Opel Vectra wurde von 1988 bis 2008 produziert.
       'The [type] Opel Vectra was produced from 1988 to 2008. '
     c. Der Opel Vectra gehört meinem Bruder.
     d. *Der Typ Opel Vectra gehört meinem Bruder.
       'The [type] Opel Vectra is owned by my brother.'

In cases like *der Typ Opel Vectra* the type name is primary in the sense that the type/model existed before an instance was generated. This is different in cases like *der Typ Lafontaine* in which the politician Lafontaine is used as a prototype generating the type/model. When occurring without the taxonomic noun a type reading of *Lafontaine* is licensed only if combined with an indefinite article, as in (15b); (for proper names combined with indefinite articles see von Heusinger 2010).

(15) a. Der neue Vorsitzende ist vom Typ Lafontaine.
     b. Der neue Vorsitzende ist ein Lafontaine.
       'The new chairman is the Lafontaine type / is a Lafontaine.'

The ambiguity of proper names between a token and a type reading may lead to the idea that a phrase of the form *Typ+N* denotes a superclass including two individuals, the subject of the classification and the one serving as a prototype (for example in 15a the new chairman and Oskar Lafontaine).[14] This seems reasonable if a prototype is provided by the name of a person. We nevertheless remain with the analysis such that the proper name has a type reading in *Typ+N* constructions because type readings of proper names with indefinite articles are attested.

3.2 *Art+von/des+N, Typ+von/des+N*

Art and *Typ* can both be combined with nouns in the form of a partitive genitive or *von* 'of' PP.[15] *Art* phrases of this form are not restricted to species but instead combine with all sorts of everyday domains including abstract entities, see (16). They may occur with indefinite as well as definite articles (provided uniqueness is guaranteed), and also with quantifiers, see (17). We subsume here cases of the form *Art+N* which allow for insertion of genitive or prepositional marking without change of meaning, as in (18), where we assume a covert preposition *von* 'of'.

(16) eine Art von Fledermäusen, eine (besondere) Art von Baumwollstoff, eine (neue) Art von Vampiren, eine (neue) Art von Abschreckung

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[13] We adopt this test from the one testing for kind readings: Kind readings can be tested with the help of kind level predicates like *extinct* which cannot be predicated of (regular) individuals, see Krifka et al. (1995). Compare the individual reading in (a) to the kind reading in (b):
     a. Die Große Hufeisennase ist ausgeflogen. ('The Big Horseshoe Nose flew away.')
     b. Die Große Hufeisennase ist ausgestorben. ('The Big Horseshoe Nose is extinct.')
[14] Many thanks to an anonymous reviewer for pointing out this possibility.
[15] Lawrenz (1993) argues that *Art* is a relational noun such that the subsequent nominal or prepositional phrase has the status of a complement instead of an adjunct.

'a kind of bat, a (special) kind of cotton fabric, a (novel) kind of vampire, a (novel) kind of deterrence'

(17) a. eine / die (neue) Art von Wald (die die dem Klimawandel standhalten kann).
         'A / the (novel) kind of forest that can withstand climate change.'

      b. jede Art von Wald
         'every kind of forest'

(18) eine/die *Art* [von] Handy, die den Benutzer als Künstler ausweist
      'a/the kind of mobile phone that identifies the user as an artist'

The relation between the kind denoted by the *Art* phrase and the domain denoted by the nominal complement is that of subsumption – *eine neue Art von Wald* ('a novel kind of forest') denotes a subkind of the kind forest. If combined with indefinites, *Art+von/des+N* phrases preferably include information distinguishing the subkind from the superordinated kind, as in 'a novel kind of forest', otherwise they tend to be understood as a form of hedging; see section 3.3.

Finally, there is a form of *Art* phrase that does not pattern with either *Art+N* or *Art+von/des+N*. In these cases, *Art* has the meaning of manner and is specified by a relative clause headed by *wie* ('how'); see (19a). The relative clause may also occur without being headed by *Art* with the same meaning, as in (19b). These cases express identity of the *Art* phrase and its complement. There is no corresponding construction with *Typ*.

(19) a. Die Art, wie sie sich mit ihm unterhielt, erinnerte mich an frühere Zeiten.

      b. Wie sie sich mit ihm unterhielt, erinnerte mich an frühere Zeiten.
         'The way/How she talked to him reminded me of earlier times.'

Moving on to *Typ*, phrases of the form *Typ+von/des+N* prefer artefacts and also diseases[16] as their domain of classification, see (20a), while everyday domains and abstract notions occur only rarely, see (20b).

(20) a. ein (neuer) Typ von aufladbarer Batterie, drei Typen von Fibromyalgie
         'a novel type of rechargeable battery, 'three types of fibromyalgia'

      b. der zweite Typ des fortgeschrittenen Trainings, der rheinische Typ des Kapitalismus
         'the second type of advanced training', 'the Rhenish type of capitalism'

In other respects, *Typ+von/des+N* phrases exhibit the same characteristics as in the case of *Art*. They can be indefinite or definite or quantified, as shown in (21). The relation between the denotation of the *Typ* phrase and the denotation of the nominal is that of subsumption: *Ein neuer Typ von Hybridfahrzeug* ('a novel type of hybrid vehicle') denotes a subtype of hybrid vehicles.

(21) Ein/der (neue)/jeder *Typ* von Hybridfahrzeug
      'a/the (novel)/every type of hybrid vehicle'

There are also *Typ+von/des+N* phrases expressing identity instead of subsumption. In (22a), for example, *der Typ der ultraviolett leuchtenden Galaxien (*'the type of ultraviolet luminous galaxies') does not denote a particular subtype of ultraviolet luminous galaxies but instead a type that is described as

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[16] The use of *Typ* when classifying diseases is not surprising taking into account that diseases are frequently classified by way of "clinical pictures", that is, by way of prototypical appearance.

ultraviolet luminous galaxies. Likewise, in (22b) the *Typ* phrase does not denote a subtype but the type as such.

(22) a. Entdeckungen, die zum *Typ* der ultraviolett leuchtenden Galaxien gehören.
'Discoveries that belong to the/a type of ultraviolet luminous galaxies.'

b. Eigentlich ist er nicht der *Typ* des Kleinkriminellen.
'He is not the petty criminal type.'

3.3 Hedging via *Art*

It was observed above that indefinite *Art+von+N* phrases preferably include information distinguishing the subkind from the superordinated kind, as in *eine Art von Wald, die dem Klimawandel standhalten kann* ('a kind of forest that can withstand climate change').[17] Without distinguishing information, indefinite *Art+von+N* phrases and also indefinite *Art+N* phrases tend to be understood as a form of hedging: when the speaker uses the expression *eine Art [von] Smartphone* ('a kind of smartphone') instead of *ein Smartphone* she seems to be reluctant to call the referent a smartphone even though this term is the closest she can think of. The same effect is shown in (23): *eine Art Gegengift* is something close to an antidote but not what is usually meant by this term and *eine Art von Dialog* differs from a real dialogue – you cannot have a proper dialogue with your tools and medium.

(23) a. [In seiner Übertreibung ist diese Erzählung] eine *Art* Gegengift zu Gaarders Innerlichkeit.
'[In its exaggeration, this narrative is] a kind of antidote to Gaader's inwardness.'

b. Sicher steht ein Künstler in einer Art von Dialog mit seinem Werkzeug und seinem Medium.
'Certainly, an artist stands in a (particular) kind of dialogue with his tools and his medium.'

The puzzle with this form of hedging is the following: why call something *eine Art von Smartphone* if it is not a smartphone in the first place? In fact, these phrases appear ambiguous in an elusive way, because there seems to be no clear difference between the regular (subkind) interpretation and the hedging interpretation. One might test whether speakers agree that *eine Art von Smartphone* is a smartphone. The prediction will be that they agree and at the same time argue that *eine Art von Smartphone* is not a genuine smartphone.

There is no room in this paper to do justice to the broad literature on hedging (beginning with Lakoff 1973). However, for the *Art* variety there is a straightforward semantic explanation as to how the hedging effect comes about. First, assume that inheritance in taxonomies is a default: by default, every subkind of smartphone inherits the features of the kind smartphone, but there may also be exceptional subkinds. Secondly, the Gricean maxim of manner allows us to reason as follows: if the speaker uses the expression *Art von Smartphone* instead of the simpler expression *Smartphone* without explicating the distinctive features of the kind she has in mind, the hearer will wonder why she not simply calls this thing a smartphone. Therefore, the hearer concludes that it is a smartphone (because it is a subkind of smartphone), but it is not a smartphone (because it is not called that, although there seems to be no better term available), and solves the dilemma by concluding that it is an exceptional smartphone (not inheriting all of the smartphone features).[18]

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[17] Information distinguishing the subkind from the superkind might also be hinted at by accenting the indefinite article – *EINE Art von Smartphone* – thereby indicating that the distinguishing property will be subsequently mentioned (such indefinites are analyzed as cataphors in Umbach 2004).

[18] Manfred Bierwisch (p.c.) argues that even though *eine Art Smartphone* is clearly a hedging expression, *eine Art von Smartphone* need not be. A similar observation is reported for English in Anderson (2013): "A sort of

From this point of view, hedging via *Art* is not a matter of fuzzy boundaries of a concept but instead a matter of non-strict taxonomic inheritance (from a logical point of view, it is not a matter of indeterminate truth values but of non-monotonic inference). This explanation for the hedging use of *Art* is supported by the observation that the hedging flavour is lost as soon as *Art* is modified: *eine neue Art von Smartphone* ('a novel kind of smartphone') denotes a subkind of smartphone without any trace of hedging (see also Kolde 2004 on the grammar of the German *Art* when used for hedging).

Finally, unlike *Art* phrases, *Typ* phrases never license a hedging interpretation. Similarly, English *kind* is used as a hedging device, but not English *type*. However, in many languages, the word corresponding to *type* is a prominent hedging device, for example Swedish *typ* (see Rosenkvist & Skärlund 2013) and Italian *tipo* (for Romance languages see Mihatsch 2010).[19]

4 Empirical study

Summarizing the results of section two and three, the dictionary entries in section two provided evidence that the taxonomic nouns *Art* and *Typ* are notably different in origin. *Art* is diachronically connected to descent and inheritance, whereas *Typ* appears connected to minting and printing. This supports the general hypothesis in this paper that classification by *Art* is based on essential properties whereas classification by *Typ* is based on a model or prototype.

In section three, the analysis of *Art* and *Typ* phrases provided evidence that they are either combined with a name (or an expression that functions as a name) by juxtaposition (*Art+N, Typ+N*), or they are combined with a genitive or *von*-PP (*Art+von/des+N, Typ+von/des+N*). The former express identity of the denotation of the taxonomic phrase and the referent of the name, while the latter express subsumption – the denotation of the taxonomic phrase is subsumed by the denotation of the complement nominal phrase. Regarding lexical content, it was found that *Typ* is preferred with artefacts and diseases and also with humans, while *Art* is used in biological domains but more importantly (and more frequently) in classifying everyday items and abstract issues.

These results raise the question as to what extent the taxonomic nouns *Art* and *Typ* are specialized. The idea that *Art* makes use of essential properties while *Typ* makes use of prototypes predicts that *Art* is more suitable for use in biology and *Typ* is more suitable for technology. However, it does not predict that classification by *Art* and classification by *Typ* exclude each other. Why should it not be possible to classify a domain on the basis of essential properties and, alternatively, classify it on the basis of models or prototypes? In fact, such a case was presented in the example in (7) in the introduction which was evidence that the same domain may be subject to classification by *Art* and by *Typ* and that, moreover, the two ways of classification yield different results.

4.1 Experimental design

The experiment described below aims at detailing the differences between classification by *Art* and by *Typ*. We used (slightly simplified) corpus examples with *Art* or *Typ* phrases as stimuli. Each example

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fairytale is a type of fairytale, but a sorta fairytale can be taken to mean something that is only like a fairytale in some respect." These observations seem to indicate that the intonation and information structure of the phrase play a role.

[19] For Czech, Janebová, Martinková & Gast (2022) observe that *druh* 'kind' may function as hedge when occurring in a non-head position determined by a reflexive pronoun. *Typ*, on the other hand, was not attested in a hedging function.

occurred in two variants: the original one and one in which *Art* and *Typ* was substituted with the other term. The variants were presented simultaneously in a forced choice acceptability design, with one or two sentences of preceding contexts. Participants were informed that they would see texts from newspapers and blogs with two different final sentences. They were instructed to decide which of these was the original one, assuming that they consider the more acceptable version to be the original. In (24) and (25) two experimental items are shown, the first occurred originally with *Art* and the second with *Typ*. Judgments for these two items were in agreement with the original variant: in the first, around 90% of the participants decided in favour of *Art* while in the second, around 90% chose *Typ*.

(24) (originally *Art*)

Schäuble vertrat […] die Auffassung, dass das Instrumentarium der internationalen Gemeinschaft nicht mehr ausreicht, um den Herausforderungen der Gegenwart zu begegnen.

a. Er forderte eine neue *Art* von Abschreckung.

b. Er forderte einen *Typ* von Abschreckung.

'Schäuble proposed […] that the means of the international community were insufficient to meet present challenges. He called for a novel *Art/Typ* of deterrence.

(25) (originally *Typ*)

Das Ziel der Militäroperation „Grand Slam" war ein sowjetisches Raketentestgelände, das die Piloten jedoch nie erreichten.

a. Abfangjäger fingen das US-amerikanische Aufklärungsflugzeug des *Typ*s U-2 kurz vor Erreichen des Ziels ab.

b. Abfangjäger fingen das US-amerikanische Aufklärungsflugzeug der *Art* U-2 kurz vor Erreichen des Ziels ab.

'The target of the military operation "Grand Slam" was a Soviet missile test site which the pilots never reached. Interceptors caught the US reconnaissance aircraft of *Typ/Art* U-2 shortly before reaching its goal.'

The predictions resulting from the previous section are:

for phrases of the form *Art+N* and *Typ+N*

(i)   if N is a biological name, *Art* is preferred (*die Art Große Hufeisennase*);

(ii) if N is the name of a technical device, *Typ* is preferred (*der Typ Opel Vectra*);

(iii) if N is the name of a person, *Typ* is preferred (*der Typ Lafontaine*);

for phrases of the form *Art+des/von+N, Typ+des/von+N*

(iv) if N denotes entities created in mass production, *Typ* is preferred (*ein neuer Typ von Batterie*);

(v)   if N denotes schemata imposed by definitions, *Typ* is preferred (*der rheinische Typ des Kapitalismus, der klassische Typ der Depression*);

(vi) if N is an abstract noun, *Art* is preferred (*die Art von Abschreckung/Kommunikation);*

(vii) in all other cases, *Art* is preferred (*die Art der Nahrungsmittel / des Materials);*

These predictions relate to preferences in certain domains for *Art* over *Typ* or vice versa. The main hypothesis of our experiment is, however, that there are *equal preference items*, that is, cases where neither *Art* nor *Typ* is preferred, but classification by *Art* and by *Typ* yields different results.

The experiment included ten *Art* and ten *Typ* items of the form *Art/Typ+des/von+N*, as well as ten *Art* and ten *Typ* items of the form *Art/Typ+N*. We also added five items of the form *Art+N* for which

we assumed an implicit *von*-phrase, as in (18). The items were presented online in a forced choice acceptability design. We had 25 participants. For equal preference items we conducted informal post-hoc interviews.

4.2   Results

The results agree with some but not all of the predictions listed above. Since the main hypothesis relates to the equal preference items, we did not perform a full statistical analysis and the percentages mentioned below describe tendencies. Starting with the *Art* items, (i) was fully confirmed: in the case of biological names (e.g. *Großer Brachvogel*, *Crassula brevicaule*), more than 80% of the participants preferred *Art*, although, surprisingly, the preference for *Art* was never absolute. Prediction (vi) was confirmed to a large extent: nouns denoting abstract entities like *Erfolg* 'success', *Variation* 'variation', *Diskriminierung* 'discrimination', *Reaktion* 'reaction' etc. yielded a preference for *Art* of more than 75%. This included combinations of the form *Art+des/von+N* with implicit *von*-phrases.

For *Typ* items results were more diverse. On the one hand, prediction (ii) and (iii) were fully confirmed: technical names yielded a preference of more than 90% for *Typ* and personal names a preference of more than 80% for *Typ*. However, predictions (iv) and (v) failed: most of the *Typ+des/von+N* items yielded no *Typ* preference and sometimes even a slight *Art* preference. This included nouns like *Hörgerät* 'hearing aid', *Persönlichkeitsstörung* 'personality disorder', *Schlaganfall* 'stroke' and *Dokument* 'document'. Cases like these will be discussed in the next section.

Summing up the results, the predictions for constructions of the form *Art/Typ+N* have been confirmed. Moreover, for those of the form *Art/Typ+des/von+N* there were a number of equal preference items. Equal preference results might be explained by assuming that the domains of classification in these items are insensitive to the choice between *Art* and *Typ*. However, if classification by *Art* and by *Typ* are two distinct ways of classification, the participants may opt for either way depending on what they consider more relevant in the context.

4.3   Equal preference items

In this section, selected equal preference items will be discussed. We asked some of the participants post-hoc why they chose a particular alternative and what they thought was the difference between, for example, *eine Art von Smartphone* ('a kind of smartphone') as opposed to *ein Typ von Smartphone* ('a type of smartphone'). The interviews were conducted orally and informally with a limited number of participants. The most interesting results are discussed below.

Handy

The equal preference item shown in (7) in the introduction is repeated in (26). It occurred in the corpus with *Typ*. The text is about the regulation of transmission power, which is highly technical topic. Post-hoc assessments provide evidence that *Art* and *Typ* convey slightly different meanings which are, nonetheless, both reasonable in this context. *Art von Handy* classifies mobile phones according to form and function, e.g., smartphones, children's phones, slider phones, flip phones, outdoor phones, etc. By contrast, *Typ von Handy* refers to a classification imposed by the manufacturer, e.g., *Samsung Galaxy iPhone 3, Nokia Lumina* and *Moto G.* The results of classification are distinct: when classifying by *Art* there is, for example, a class of outdoor phones including a wide range of phones sharing outdoor fitness as an essential property. When classifying by *Typ* there is, for example, a class named *Samsung Galaxy* including instances of this model. Two exemplars may differ in their date of manufacture and in colour and traces of use, but otherwise, they are clones – tokens of the same type.

(26) (originally *Typ*)

Per Fernbedienung wird die Sendeleistung jedes Handys individuell geregelt.

a. Je nach *Typ* des Handys beträgt die maximale Sendeleistung zwischen 1W bis 20W.

b. Je nach *Art* des Handys beträgt die maximale Sendeleistung zwischen 1W bis 20W.

'The transmission power of each mobile phone is individually controlled by remote control. Depending on the *Typ/Art* of mobile phone, the maximum transmission power is between 1W and 20W.'

The semantic difference between *Art* and *Typ* found in the above example is supported by examples like (27) – (30) (which were not part of the study). In (27), smartphones are said to be the preferred *Art* of mobile phones implying that a smartphone is in fact considered an *Art* of mobile phone. Using *Typ* in (27) would not be unacceptable but less appropriate. In (28), the fact that mobile phones are in general banned on the factory site is expressed by quantifying over *Art*. Quantifying over *Typ* would not fulfil the intention of the ban, which is (presumably) to prohibit simple feature phones as well as smartphones with cameras, irrespective of manufacturer and model.[20] Finally, the coordination of *Art* and *Typ* in (29) would not be acceptable if there were no semantic difference, and in (30), which is taken from a technical data sheet, the notions of *Geräteart* and *Gerätetyp* ('kind vs. type of device') are used side by side. *Geräteart* refers to the function of the device, in this case a TV, while *Gerätetyp* refers to the model.

(27)   Smartphones sind inzwischen ohne Zweifel die bevorzugte *Art* von Handy.
'Smartphones are undoubtedly the preferred *Art* of mobile phone.'

(28)   Außerdem gibt es auf dem Werksgelände bestimmte Bereiche, zu denen der Zutritt mit jeder *Art* von Handy untersagt ist.
'In addition, there are certain areas on the factory site to which access is prohibited with any *Art* of mobile phone.'

(29)   […] Fahrzeuge, die von der Art und vom Typ her generell nicht gewerblich genutzt werden.
'[…] vehicles that are generally not used commercially in terms of their *Art* and *Typ*.'

(30)   Geräteart : LCD TV   'kind of device'
Hersteller : Sony   'manufacturer'
Gerätetyp : KDL 46xxx   'type of device'

Depression

We saw in the previous section that variants of a disease are usually classified using *Typ*. The item in (31), however, does not exhibit preference for either *Typ* or *Art*. In post-hoc interviews participants indicated that the use of *Art* is closer to everyday language than that of *Typ*: "*Typ* klingt technischer, oder medizinischer, *Art* eher umgangssprachlich" ('*Typ* sounds more technical or medical, *Art* more colloquial'). This suggests that the notion of depression licenses classification by *Art* because the disease is sufficiently well-known that participants are able to think of essential properties of

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[20]An anonymous reviewer argued that a ban of any *Typ von Handy* (including, for example, *Galaxy S8, iPhone 10, Huawei P3 …*) would essentially mean the same thing as with *Art*, namely that mobile phones in general are banned on the factory site. However, this view does not take into account differences when it comes to exceptions. It might make sense to allow a particular kind of mobile phone, for example, one without a camera. But it would not make sense to allow a particular model, e.g., a *Galaxy S8* while banning an *iPhone 10*.

depression. At the same time half of the participants opted for classification by *Typ*, pointing to the idea of a clinical picture as a prototype.

(31)　(originally *Typ*)
　　　Eine endogene Depression ist nicht durch erkennbare körperliche Erkrankungen oder einen äußeren seelischen Anlass begründbar.
　　　　a.　Sie ist der klassische *Typ* der Depression.
　　　　b.　Sie ist die klassische *Art* der Depression.

　　　'Endogenous depression is not due to recognizable physical disease or external mental illness. It is the classic *Typ/Art* of depression.'

Windkraftanlage

The item in (32) refers to a technical device, as in the case of mobile phones, but it yielded a slight *Typ* preference (around 70%). This preference appears plausible when thinking about what *Art der Windkraftanlage* ('kind of wind power plant') might refer to. Unlike mobile phones, wind power plants are not everyday objects, and German native speakers are not normally familiar with their essential properties. Therefore, *Arten von Windkraftanlagen* are difficult to conceive of by non-expert speakers. Speakers are, of course, not familiar with *Typen von Windkraftanlagen* either, but they know that a wind power plant is a technical device and, moreover, the context in (32) is a technical one. So, when opting for *Typ*, participants presumably presuppose that there is a classification scheme defined by experts that they may not know.[21]

(32)　(originally *Typ*)
　　　Bei der Entscheidung, neue Windkraftanlagen zu bauen, steht der Referenzertrag der Anlage im Fokus.
　　　　a.　Das ist die für den jeweiligen *Typ* der Windkraftanlage spezifische Strommenge, die in fünf Betriebsjahren erbracht wird.
　　　　b.　Das ist die für die jeweilige *Art* der Windkraftanlage spezifische Strommenge, die in fünf Betriebsjahren erbracht wird.

　　　'When deciding to build new wind power plants, the focus is on the plant's reference yield. This is the amount of electricity specific to each *Art/Typ* of wind power plant, which will be provided over five years of operation.'

Hörgerat

Surprisingly, there are a number of items showing a slight preference for *Art* even though the original was a *Typ* sentence. Examples are *Typ des Hörgeräts* 'hearing aid', *Typen von Persönlichkeitsstörungen* 'personality disorders', *Typ von Schlaganfall* 'stroke' and *Typ des Dokuments* 'document'. These terms are familiar in everyday language and, moreover, the items included non-expert contexts, such as (33). The results support the tendency we saw above: in the case of everyday terms, when speakers are familiar with their meaning and essential properties, *Art* is a good choice, and in a non-expert context may even be the preferred one.

(33)　(originally *Typ*)
　　　Menschen mit Hörgeräten können unter Umständen Störgeräusche wahrnehmen, wenn in deren Nähe schnurlose Geräte verwendet werden.

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[21] It would be interesting to see whether experts familiar with wind power plants would rate items like (32) differently.

    a. Der Grad der Störung ist abhängig vom Typ des Hörgeräts und dem Abstand zur Störungsquelle.

    b. Der Grad der Störung ist abhängig von der Art des Hörgeräts und dem Abstand zur Störungsquelle.

'People with hearing aids may experience noise when cordless devices are used nearby. The degree of interference depends on the *Typ/Art* of the hearing aid and the distance to the source of the interference.'

Vampir

The item in (34) originally contained *Art*. The term *Vampir* 'vampire' belongs to everyday language and speakers of German are familiar with vampires and their essential properties, which would support classification by *Art*. The equal preference result may be explained by taking into account that the context is about the presentation of vampires in animated film which is an expert context, and the vampire in question is an animation instead of a "real" one.

(34)   (originally *Art*)

Michael hat mit seiner Freundin einen Animationsfilm über Vampire gesehen und freut sich über die Darstellung: "Sie sind robuster und haben einen netten Unterkiefer. Sowas habe ich echt noch nicht gesehen und es ist auch einfach zu genial, wie sich das Gesicht öffnet, eine Zunge hervorkommt und den Anderen aussaugt." ...

    a. "Ich finde diese neue *Art* von Vampiren wirklich äußerst gelungen."

    b. "Ich finde diesen neuen *Typ* von Vampiren wirklich äußerst gelungen."

'Michael saw an animated film about vampires and is pleased with the presentation: "They are more robust and have a nice jaw, something I've really never seen, and it's just too awesome when the face opens, a tongue comes out and sucks the other out. I really like this new *Art/Typ* of vampire."'

Herrscher

Finally, the item in (35) originally contained *Art*. Since the term *Herrscher* 'ruler' belongs to everyday language and the context is a non-expert one, the question arises as to why we do not find a clear preference for *Art*. A possible explanation is as follows: recall that *Typ* is not only preferred with technical items but also with persons (*Typ Lafontaine*). When choosing *Art*, the sentence is about classifying behaviour – the manner of ruling. When choosing *Typ* it is about classifying persons on the basis of prototypical rulers. But even though the ways of classification differ, the outcome will be the same: in the case of *Art* the president belongs to a class comprising rulers that came to power in a particular manner, namely in a coup d'état, whereas in the case of *Typ* the president belongs to a class of rulers matching a prototype who came to power in a coup d'état.

(35)   (originally *Art*)

Der damalige Präsident von Togo machte sich das Konzept der ethnischen Zugehörigkeit zunutze.

    a. Er war die *Art* Herrscher, die durch Staatsstreich an die Macht gekommen das Land mit Terror überzieht.

    b. Er war der *Typ* Herrscher, der durch Staatsstreich an die Macht gekommen das Land mit Terror überzieht.

'The former president of Togo took advantage of the concept of ethnicity. He was the *Art/Typ* of ruler who came to power in a coup d'état covering the country with terror.'

5   Kinds and types in semantics

As mentioned in the introduction, the research on *Art* and *Typ* described in this paper grew out of a talk that argued against the widely held supposition that kinds and types – more precisely, the notions of kinds and types employed in semantic theory – are roughly the same. While in the talk the theoretical status of these notions was considered, this paper took an empirical approach to comparing the meaning, and in particular the classificatory potential, of the German taxonomic nouns *Art* and *Typ*. The question as to what extent the findings in the paper match with the notions of kinds and types in semantic theory will be addressed in this section.

Kinds

The concept of kinds as a theoretical notion in semantics is rooted in the philosophical notion of natural kinds (Putnam 1975) and plays a major role in the analysis of generic expressions; see Carlson (1980) and Krifka et al. (1995). In English and German (and many other languages), kinds can be denoted by bare plurals. The bare plural in (36a) refers to a plural individual of whales (say, a group of whales), while the same expression in (36b) refers to the kind *Cetacea.* The fact that kind-denoting terms must be distinguished from individual-denoting terms is obvious in (36c): the predicate *be an endangered species* cannot be applied to a (plural) individual. This observation led to the idea that kinds are basic ontological entities, in addition to (regular) individuals. This step provides a straightforward interpretation of taxonomic phrases using *kind*/*Art*, as in (36d) or (36e).

(36)   a. There are whales to be seen.
      b. Whales are mammals.
      c. Whales are an endangered species.
      d. Die Art des Wals ist eine gefährdete Spezies. / The kind 'whale' is an endangered species.
      e. Zwei Unterarten des Wals, nämlich der Blauwal und der Finwal, wurden unter Artenschutz gestellt. / Two subkinds of whale, namely the blue whale and the fin whale, were put under protection.

In philosophy as well as psychology there is a longstanding debate about the question of whether kinds (or concepts)[22] are associated with so-called essential properties. Recent research in the area of genericity shows that there are in fact particular properties associated with kinds, although contrary to what was long thought, such properties are not necessary but allow for exceptions. Greenberg (2002) refers to them as "in virtue of" properties. For example, a dog is four-legged in virtue of being a dog, even though an accidentally three-legged dog still counts as a dog. Likewise, Prasada and Dillingham (2006) present a series of experiments showing that there are principled connections between kinds and properties – so-called *k-properties* – which differ from merely statistically correlated properties and nevertheless allow for exceptions. Carlson (2010) argues that Greenberg's "in virtue of" properties and Prasada & Dillingham's k-properties are in fact the same.

These properties play a core role in classification by *Art/kind* because entities have these properties simply by virtue of being the kind of entities they are. They are learned when learning the meaning of a word, that is, the kind (or concept) denoted by a word. Even if this is encyclopedic rather than core linguistic knowledge, it is something speakers of a language are in command of. This is why classification by *Art/kind* feels more colloquial.

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[22] I follow Carlson (2010) in assuming that kinds correspond to labeled concepts.

The notion of kinds in semantics has meanwhile been subject to further specification. There are *well-established kinds,* which in English allow for singular definite generic expressions; compare *the Coke bottle* as opposed to *the green bottle, see (Krifka 1995).[23] Furthermore, Rothstein (2013) distinguishes *taxonomic kinds*, which are expressed by bare singulars in Hebrew, from general intensional kinds. She argues that while intensional kinds are provided by regularities across worlds taxonomic kinds are particular individuals (and rigid designators in the sense of Kripke 1972).[24]

Another variety of kinds are those that are generated ad hoc by the use of similarity demonstratives like German *so* and English *such/like this* (see Umbach & Gust 2014). Suppose that the speaker points to a table while uttering the sentence in (37a)*.* The nominal phrase *so ein Tisch* will denote a set of tables similar to the one the speaker points to. This set constitutes a kind ad-hoc created by similarity, which is evidenced by the fact that (37b) is equivalent to (37a).[25]

(37) a. So einen Tisch hat Berta auch.
          'Berta has a table like this, too.'

      b. Diese Art von Tisch hat Berta auch.
          'Berta has a table of this kind, too.'

The core issue raised by similarity-based kinds is the question of which properties of the target of pointing gesture, i.e. the table being pointed to in (37), are suited in determining similarity. Consider (38). In (38a), being a diesel as well as being a Japanese car leads to the interpretation that Berta has a Japanese car and a diesel, respectively. By contrast, in (38b) being a new car does not qualify as a feature of comparison for determining similarity – the second sentence cannot be understood such that Berta has a new car.

(38) a. Anna fährt ein japanisches Auto / einen Diesel. Berta fährt auch so ein Auto
          (nämlich ein japanisches Auto / einen Diesel).

          'Anna drives a Japanese car / a diesel. Berta drives such a car, too (namely a Japanese car / a diesel).'

      b. Anna fährt ein neues Auto. Berta fährt auch so ein Auto (*nämlich ein neues Auto).
          'Anna drives a new car. Berta drives such a car, too (namely a new car).'

Umbach & Stolterfoht (in preparation) present a sequence of experimental studies testing these restrictions and argue that properties suited in kind-formation by similarity have to be "in-virtue-of" properties in the sense of Greenberg (2003) and Prasada & Dillingham (2006). Their findings confirm the idea that classes generated by similarity demonstratives (combined with nominal and verbal expressions) are kinds, even if ad hoc kinds. It is thus predicted that the expressions including *Art* phrases are subject to the same restrictions as found for similarity demonstratives, which appears plausible, see (39).[26]

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[23] From the point of view of this paper, *the Coke bottle* might be more of a type than a kind.

[24] Hebrew bare singulars are primarily used to denote species and sub-species as well as "types of machines such as cellular phones, food processors and so on" (Rothstein 2013, p. 36). The latter characteristic is strongly reminiscent of types in the sense of this paper.

[25] Kinds ad-hoc created by similarity are also observed with verbal expressions, but not with adjectives: *Diese Art zu laufen* 'this way of running' vs. ?? *Diese Art groß (zu) sein* 'this kind of being tall'.

[26] Janebová et al. (2022) observe for Czech *typ* that it has a non-taxonomic use when combined with individuals (*Neni to typ Pavarottiho* 'He is not the Pavarotti type'). They suggest that this use of *typ* evokes similarity to certain properties of the individual, creating an ad hoc category, as argued above for (the deictic use of) German *so*. This idea appears plausible when presuming that the individual (Pavarotti) takes over the role of the target of the pointing gesture. Janebová et al. furthermore observe a correlation between Czech similarity

(39) Anna fährt ein japanisches/ein neues Auto. Berta fährt auch diese Art von Auto.
      (nämlich ein japanisches Auto/*nämlich ein neues Auto).

      'Anna drives a Japanese car/a new car. Berta also drives this kind of car (namely a Japanese car/a new car).'

By contrast, it is predicted that expressions including *Typ* phrases should not be picked up by similarity demonstratives, which seems to be refuted by the fact that the *so* phrase in (40) is fully acceptable. On a closer look, however, the *so* phrase does not pick up the type Opel Vectra – Berta need not have the same type of car. Instead, it picks up Opel Vectra features in creating a kind of car (medium size, small motor, etc). This is evidenced by the fact that the *Art* continuation but not the *Typ* continuation is congruent with the *so*-phrase.

(40) Anna fährt einen Opel (vom Typ) Vectra. Berta fährt auch so ein Auto.
      (nämlich ein Auto derselben Art/*ein Auto desselben Typs).

      'Anna drives an Opel Vectra. Berta drives such a car, too (namely a car of the same kind/ namely a car of the same type).'

Types

Types play a major role in semantics as an analytical tool. They provide a *regime* (Chatzikyriakidi & Cooper 2018) for structuring the universe and safeguarding semantic representations. Their role as semantic objects depends on the respective semantic theory. Standard Montague-style semantics makes use of *simply typed λ-calculus* where types are built from two basic types, e(ntities) and t(ruth values) and functions thereof, and guide the denotations of natural language expressions in order to avoid inconsistencies. The other strand of semantic theory is oriented towards *constructive type theory* (Martin-Löf 1984). One of these systems is *Type Theory with Records* (Cooper & Ginzburg 2015, Cooper in preparation) in which basic types can be freely chosen. In this system, types may themselves serve as denotations of, e.g., nouns and verbs (for an overview see Chatzikyriakidi & Cooper 2018).

Setting formal issues of type theory aside, the notion of types in semantics goes back to Peirce's distinction between *type* and *token* (Peirce 1931). Following Peirce, types are abstract entities and tokens are particulars instantiating or exemplifying types. Even though the relation between a type and a token is similar to that between a set and an element, the perspective is reversed. While the idea of sets is to collect distinct objects into a single unit, the idea of types is to generate arbitrarily many clone-like tokens. This is why the classificatory capacity of a type is not determined by common origin or common characteristics but is instead rooted in the type itself – the prototype or model – independent of whatever tokens there are.

6 Conclusion and future prospects

We started out with the idea that the German taxonomic nouns *Art* and *Typ* denote two distinct ways of classification: classification by *Art* makes use of essential properties shared by the instances of a kind while classification by *Typ* makes use of models or prototypes being a blueprint for the tokens of a type. Essential properties of a kind are associated with the meaning of the corresponding word and are thus part of what speakers learn when they learn a language. Models or prototypes, on the other

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demonstratives (*takový*) and *typ*. This points to an interaction of similarity demonstratives and taxonomic nouns the nature of which needs to be clarified in future work.

hand, are specified by expert communities and need not be familiar to non-expert speakers of a language. This idea was stated in the *Art&Typ* hypothesis in the introduction.

Support for this idea was found in dictionaries (section two), in corpus data (section three) and in the results of an experimental study (section four). While the dictionary entries of *Art* highlight the sharing of essential properties, the entries of *Typ* point to the role of a model or prototype. From a diachronic point of view, *Art* and *Typ* notably differ in origin: while *Art* is connected to descent and inheritance, *Typ* is connected to minting and printing.

The corpus search showed that there are two basic forms of *Art*/*Typ* phrases in which the specified noun is either juxtaposed or embedded in a genitive or *von*-phrase. If the noun is juxtaposed, *Art* phrases preferably denote biological species whereas *Typ* phrases refer to technical devices, diseases, or persons. In genitive or *von*-phrases, *Art* occurs with terms from everyday domains as well as abstract entities while *Typ* still prefers technical issues and diseases.

The experimental study confirmed the division of domains between *Art* and *Typ* to some degree. However, the main result is the existence of equal preference items for which classification by *Art* is as acceptable as classification by *Typ* while showing subtle differences in meaning.

Languages other than German have not been taken into consideration in this paper. English *kind* and *type* appear close in meaning to *Art* and *Typ*, but they are not equivalent. One hypothesis that could be explored in future work is that languages cross-linguistically include taxonomic expressions denoting classification based on linguistic knowledge and also expressions denoting classification by language-independent expert knowledge.

The original interest in the topic of this paper was not so much about the semantic difference between the expressions *Art* and *Typ* but rather about the difference in the role of kinds and types in semantic theory. This question was addressed in the final section. Even though the semantics of the lexical expressions *Art* and *Typ* is not decisive in theory formation, the empirical results provide some evidence challenging the idea that kinds and types are roughly the same.

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