

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

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1. Introduction

There are nouns in many languages referring to some sort of classification, for example English *sort*, *class*, *kind* and *type*. They are called *taxonomic nouns*, see for example Mihatch (2016). Even though from a broader perspective all taxonomic nouns fulfill 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 the way of classification. The focus in this paper is on the German taxonomic nouns *Art* ('kind' / 'species' / 'manner') and *Typ* ('type') which are, at first sight, near synonymous, see 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.

'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).²

(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.

(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.¹³

² Most examples in this paper are taken from the DEWAC corpus provided by the corpus linguistics group at Humboldt-University Berlin – many thanks for providing access. Examples are often slightly simplified.

³ Hertha Däubler-Gmelin and Oskar Lafontaine are German politicians, FAZ (Frankfurter Allgemeine Zeitung) is a German newspaper.

- (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 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 shown to be wrong 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: *Vortrag* 'talk' selects *Art* and *Lafontaine* selects *Typ*. This is refuted by (1) as well as (7), where both *Typ* and *Art* are licensed. However, while the variants in (1) appear synonymous, the example in (7) exhibits a subtle difference between the *Typ* and the *Art* variant: *Typ des Handys* seems to refer to different models, say *iPhone 3* as opposed to *Nokia Lumina* and *Moto G*, while *Art des Handys* refers to, e.g., the difference between a classical feature phone, an outdoor phone and a smart phone.

- (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 are 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 that referred to by *Typ*, raising the question of how to characterize the difference.

In this paper, it will be argued that classification by *Art* does what is expected, i.e., refer to kinds – natural kinds and beyond. The semantic notion of kinds plays a major role in the analysis of generic expressions, see Carlson (1980), Krifka et al. (1995). In English, kinds can be denoted by bare plurals, as in *Tigers are dangerous*. They can also be denoted by taxonomic nouns combined with superordinated common nouns as in *Every kind of predator is dangerous*.

In philosophy as well as psychology there is a longstanding debate about the issue of whether kinds (or concepts)⁴ are associated with particular properties. Recent research in the area of genericity shows that there are in fact properties kinds are associated with. But these properties are not necessary, they allow for exceptions. In Greenberg (2002) distributional differences between certain types of generic sentences are explained by referring to "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 will play an important role in this paper. For ease of presentation they will be called *essential properties* without implicating that they are necessary (and without committing to a particular philosophical stance). They are properties entities have simply because they are the kind of things they are and allow for exceptions. Crucially, these properties, or at least their existence, is something speakers of a language learn when learning the meaning of the corresponding words. In this sense the knowledge of kinds is part of linguistic knowledge. Therefore, assuming that the taxonomic noun *Art* refers to kinds entails that classification by *Art* relies on linguistic knowledge which will be the core hypothesis in this paper.

In the case of *Typ* it is more difficult to make a clear hypothesis. There is no well-established notion of type in semantics apart from the functional one distinguishing between *type* and *token* (Peirce 1931), and the formal one where type provide a *regime* (Chatzikyriakidi & Cooper 2018) of classification in order to safeguard logical expressions against inconsistency and control for granularity.⁵ Intuitively, the hallmark of types seems to be that they are not rooted in essential properties of the objects they classify. They are defined by a model or prototype provided by some community of experts, and are thus independent of general linguistic knowledge.

Here is an example illustrating this idea: When I am asked what kind of heating (*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 has been 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' and what counts as essential properties of heatings. But if you ask me for the type (*Typ*) of the heating I would be lost and refer you to our heating engineer.

So the hypothesis pursued in this paper is this:

- classification by *Art* (i) refers to kinds,
(ii) indicates that individuals share essential properties, and
(iii) is based on general linguistic knowledge;
- classification by *Typ* (i) refers to classes in arbitrary systems,
(ii) indicates that individuals match a model or blueprint or prototype, and
(iii) is not 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 dictionaries. 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.

⁴ I follow Carlson (2010) in assuming that kinds correspond to labeled concepts.

⁵ Type theory is a modern branch in mathematics, see Martin-Löf 1984.

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.

2. Lexical meaning

The most prominent lexicon of modern German is the *Duden*. The most prominent etymological German lexicon is *Grimmsches Wörterbuch*. We start with the entries of *Art* and *Typ* in *Duden*, have a look at their provenience in Grimm and briefly compare them to the English counterparts *kind*, *species*, *manner* and *type* in OED (online). In concluding this section the compounds "Unterart" and "Untertyp" will be looked at.

2.1 *Art* in *Duden* and Grimm

The *Duden* lists five senses of *Art*:

- (2-1) a. *angeborene Eigenart / Wesen / Natur* (English *innate nature or character*);
b. *(Art und) Weise* (English *manner*);
c. *gutes Benehmen* (English *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* (English *kind*).

The last sense is the taxonomic one. Paraphrasing it by *Sorte* ('sort') appears not very helpful. A more informative description of the taxonomic use of *Art* is provided by Adelung (1811) which is a High German dictionary from the 19th century:

- (2-2) *Die Ähnlichkeit einzelner Dinge in wesentlichen Eigenschaften, und solche Dinge zusammen genommen.*

'The similarity of individual things in essential properties, and such things taken together.'

Regarding the origin of the word *Art*, the Grimm dictionary points to a Slavic root *roditi* meaning *give birth* or *generate*.

English translations of the taxonomic meaning of German *Art* are *kind* or *species*, and also *sort* and *type*. *Species* is the technical term in biology. *Kind*, like German *Art*, originally referred to the nature or descent of items, later bleaching to "a class or category of things distinguished by common characteristics and attributes possessed by its members" (OED). Note that OED also lists *type* as one sense of *kind* indicating a less strict division line between *kind* and *type* than that between *Art* and *Typ*.

2.2 *Typ* in *Duden* and Grimm

The *Duden* lists five senses of German *Typ*:

- (2-3) a. *durch bestimmte charakteristische Merkmale gekennzeichnete Kategorie*
('category characterized by characteristic features');⁶
- 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, 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 men, without individual features')
- e. *männliche Person* 'male person', as in *einen Typen kennenlernen* 'get to know a guy'.

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.

Following the Grimm dictionary, the origin of *Typ* is the Greek verb for *strike / beat* suggesting a connection to coining and printing. The latter is still visible in the printing sector where movable metal letters are called *Typen*. Actually, the word *Typ* developed into a common term from the 18th century on, that is, only after printing was established as a technique. It does not seem too speculative to assume that the taxonomic noun *Typ* is still connected to the role of types in printing, that is, produce any number of indistinguishable tokens.

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 (OED) – note that OED doesn't make a difference between *kind* and *type*.

- (2-4) 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.

2.3 Subkind and subtype

The core idea of taxonomic nouns is two-fold. There is the dichotomy of class and instance – *Art* vs. *Individuum*, *type* vs. *token* etc. On the other hand, there is the idea of a taxonomy establishing a hierarchy of classes which is exploited 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 (2-5). However, while *Unterart* is found in various contexts, the expression *Untertyp* is

⁶ The Duden lists *Art* as an equivalent to this sense of *Typ*. This is surprising since in the Duden's examples substitution by *Art* is inadequate. For instance, *der Typ des Spießbürgers* is not equivalent to *die Art des Spießbürgers* ('the *Typ/Art* of the philistine'): In the former *Spießbürger* is the name of the type while in the latter *Art* means *manner*.

very rare and, apart from the context of diseases, appears marked, cmp. (2-6 a and b).⁷ 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. We will come back to this issue below.

(2-5) Der in verschiedenen Unterarten vorkommende Besenginster wird meist bis zu 2 m hoch.
'The broom, which occurs in different subspecies, is usually up to 2 m high.'

(2-6) 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.'

b. Die Auswahl der Panzer ist beeindruckend: Fast jeder Panzertyp und Untertyp, der damals aus den Rüstungsfabriken rollte, steht auch in Panzer Elite zur Verfügung.

'The choice of tanks is impressive: Almost every tank type and subtype that rolled out of the arms factories is also available in Panzer Elite⁸.'

2.4 Implications for the *Art/Typ* hypothesis

The dictionary entries support the *Art&Typ* hypothesis in many ways. In the entry for *Art* in Adelung (2-2) similarity with respect to essential properties is given as a definition which is a core piece of the hypothesis. The Slavic root *roditi* (*give birth or generate*) mentioned in Grimm suggests that *Art* is diachronically connected to descent and inheritance supporting the idea that in the species as well as the the non-species sense there are non-accidentally shared properties.

The entry for *Typ* in the Duden mentions the role of a model and moreover points to the notion of *Typus*, which is not a class but an individual. Synonymy with *Typus* entails that *Typ* can be used to denote an individual – the prototype – which is impossible for *Art*. You can refer to an *Art* by its name – *die Art Große Hufeisennase* – but there is no prototype *Große Hufeisennase*, bats of this species are related by descent. *Typ* in the sense of *Typus* can also be used for characterizing humans by way of a prototyp, see *Typ Lafontaine* in (3). The colloquial (and derogative) use of *Typ* seems to be saying that this person is a prototypical male, without other relevant properties.

The origin of *Typ* in Greek *beat* and its use to denote movable letters in printing⁹ confirms the idea that *Typ* may denote the individual serving as the prototype such that the class is given by generating tokens of this type.

The almost complete absence of *Untertyp* in German is a puzzle. This finding might be considered as supporting the *Art/Typ* hypothesis: *Typ* does not readily support inheritance because it is not based on properties that could be inherited. It is instead based on a prototype, but it is difficult to think of a "sub-prototype". This line of argumentation raises, however, the question of why there is the notion of subtype in English. English *type* appears less specific covering cases where in German *Art* would be preferred – we have to leave this issue for future research.

⁷ Six occurrences in the DEWAC1 corpus of 250 Mio tokens.

⁸ Computer game

⁹ It has to be noted, though, that a movable letter is called *die Type*, genus feminine.

3. Distribution

In this section, the structure of DPs headed by *Art* and *Typ* will be examined. The analysis is based on a corpus study (DEWAC corpus, see footnote 2). There are two major forms of DPs headed by *Art* and *Typ*:¹⁰

- (i) *Art / Typ* N
- die Art Große Hufeisennase, eine Art Gegengift,
der Typ Opel Vectra, [Bundesschatzbriefe] Typ A,
[Politiker] des Typs Lafontaine*
(‘the species Big horseshoe nose, a kind of counter poison,
[cars] of type Opel Vectra, type A [federal saving bonds],
[politicians] of the type Lafontaine)
- (ii) *Art / Typ von / des* N
- eine (besondere) Art von Wald / des Walds, (der ...),
der rheinische Typ des Kapitalismus,
der Typ der ultraviolett leuchtenden Galaxien,
der Typ des Kriminellen*
(‘a special kind of forest (that ...), the Rhenish type of capitalism,
the type of ultraviolet luminous galaxies, the type of a criminal’)

The two forms will be demonstrated below, subsuming under (i) proper names as well as common nouns and including under (ii) also cases of the form *Art wie* (*die Art wie sie redete* ‘the way she talked’). The focus will be on the question of how the denotation of the DP relates to that of the complement of the taxonomic noun: by identity or by subsumption? Cases with a hedging interpretation are discussed at the end of the section.

ad (i) *Art / Typ* N

Art as well as *Typ* can directly be combined with proper names and common nouns. When *Art* is combined with a proper name it has to be the name of a species. In these cases the proper name as well as the full DP denote the species – *die Große Hufeisennase* as well as *die Art Große Hufeisennase* denote the kind named *Große Hufeisennase*.¹¹ So the relation between the kind denoted by the DP and the kind denoted by the proper name is identity. Phrases of the form “*Art* + proper name” (without modifiers) require the definite article which is obvious since proper names should be unique – there is exactly one kind named *Große Hufeisennase* (for indefinites see the subsection on hedging below). If the DP modifies another kind term it must be a subkind: *Welse (*Rinder) der Art Tiger-Spatelwels* (‘catfish/*cattle of the species *Pseudoplatystoma tigrinum*’).

When *Typ* is directly combined with a nominal expression, it is understood as a proper name. In *der Typ Opel Vectra* the term “*Opel Vectra*” is the name of the type. Similarly, in *Bundesschatzbriefe Typ*

¹⁰ Anaphoric forms like *diese Art [von] Wald* or *EINE Art von Wald* are neglected here.

¹¹ The name of a kind may also be used to refer to an individual, which is neglected here. Kind readings can be tested with the help of kind level predicates like *extinct* which cannot be predicated of (regular) individuals, see. e.g., Krifka et al. 1995. Compare

Die Große Hufeisennase ist ausgestorben (‘The Big horseshoe nose is extinct’) – kind reading

Die Große Hufeisennase ist ausgeflogen (‘The Big horseshoe nose flew away’) – individual reading

A ('type A federal saving bonds') and *Politiker des Typs Lafontaine* ('politicians of the type Lafontaine') the terms *A* and *Lafontaine* are names of types even though these names may appear less commonly known and more volatile than that combined with *Art*. Names of types may even be phrases, as in *Autofahrer vom Typ "Hauptsache ich"* ('car drivers of the type "main thing I"').

The high degree of freedom in the choice of names for types corresponds to the fact that these types classify artefacts, e.g., technical devices, or refer to prototypes, while names of species adhere to biological conventions even if familiar to experts only (like *Große Hufeisennase*), names of artefacts are not conventionalized in any way. This is evidence again that classification by *Typ* refers to artificial and maybe short-lived classes.

ad (ii) *Art/Typ von/des N*

Art as well as *Typ* can be combined with genitives and *von*-phrases (called 'complements' following Lawrenz (1993)).¹² Genitives and *von*-phrases provide the domain classified by the taxonomic nouns. So the phrase *eine Art von Fledermäusen* does not denote the entire species *Fledermaus* ('bat') but instead introduces a subspecies, like *Große Hufeisennase*. Similarly, the phrase *ein neuer Typ von Hybridfahrzeug* introduces one particular model of hybrid vehicles. So the relation between the kind or type denoted by the DP and the domain denoted by the complement is that of subsumption.

We start with DPs headed by *Art*. Definiteness is blocked unless there is a specifying modifier. This finding indicates that the DP must denote a proper subset of the domain. The unmodified definite in (3-2a) is not acceptable (unless it is an anaphor) but when modified, as in (3-2b, c), the definite phrases are acceptable because (restrictive) modification guarantees subsumption. The indefinite variants are all o.k. (3-22a-c). Finally, DPs of the form "*Art von/des N*" may also be quantified over, see (3-23).

- (3-2) a. ??die Art von Wald ('the kind of forest')
 b. die neue Art von Wald ('the novel kind of forest')
 c. die Art von Wald, die dem Klimawandel standhalten kann.
 ('the kind of forest that can withstand climate change')

- (3-22) a. eine (neue) Art von Wald ('a (novel) kind of forest')
 b. eine Art von Wald, die dem Klimawandel standhalten kann.
 'a kind of forest that can withstand climate change'

- (3-23) jede Art von Wald ('every kind of forest')

There are cases of DPs headed by *Art* where the complements lack genitive marking or embedding in a *von*-phrase but which nevertheless indicate a subsumption relation. The topic in (3-3) is clearly not the kind mobile phone but instead a subkind of mobile phones. We assume that these cases include a covert preposition *von*.

- (3-3) eine / die *Art* [von] Handy, die den Benutzer als Künstler ausweist
 'a kind of mobile phone that identifies the user as an artist'

¹² From the point of view of syntax constructions of the form "*Art/Typ von/des N*" may be considered as appositions. Lawrenz (1993) argue, however, that *Art* is a relational noun such that the subsequent nominal or prepositional phrase has the status of a complement instead of an adjunct.

One distributional difference between *Art* and *Typ* phrases results from the fact that German *Art* includes manner. Therefore, relative clauses may also be headed by *wie* ('how'), see (3-4). In all of these cases *Art* can be substituted by the fixed phrase *Art und Weise*. Notably, the *wie*-clause without the taxonomic noun also denotes a manner. So these cases express identity: *die Art, wie sie sich mit ihm unterhielt* and *wie sie sich mit ihm unterhielt* both denote the way she talked to him.

- (3-4) a. Experten sind sich darüber einig, dass die Art, wie in der Schule gelernt wird, den Kindern nicht gerecht wird
'Experts agree that the way of learning in school is not suited for children'
b. Die Art, wie sie sich mit ihm unterhielt, erinnerte an frühere Zeiten.
'The way she talked to him reminded of earlier times.'

Combinations of the taxonomic noun *Typ* with a genitive or *von*-phrase complement exhibit the same characteristics as in the case of *Art*. DPs of the form "*Typ des/von N*" require either indefiniteness, see (3-5a), or additional modification, see (3-5 b, c), or quantification, see (3-5 d). Accordingly, the relation between the type denoted by the DP and the domain denoted by the complement has to be that of subsumption.

- (3-5) a. ein *Typ* von Hybridfahrzeug, ?? der *Typ* von Hybridfahrzeug
('a / the type of hybrid vehicle')
b. ein neuer *Typ* von Hybridfahrzeug
('a novel type of hybrid vehicle')
c. ein *Typ* von Hybridfahrzeug, der große Reichweite hat
('a type of hybrid vehicle that has a large reach')
d. jeder *Typ* von Hybridfahrzeug
('every type of hybrid vehicle')

There are, however, cases of DPs headed by *Typ* expressing identity even though they include a genitive complement. *Der Typ der ultraviolett leuchtenden Galaxien* ('the type of ultraviolet luminous galaxies') does not denote a particular type of ultraviolet luminous galaxies but instead a particular type that is described as ultraviolet luminous galaxies, see (3-6a). These DPs must be definite, if they are indefinite the relation is not identity but subsumption, cmp. (3-6b). They are particularly interesting when referring to humans because they highlight the prototype role – the criminal in (3-7) is clearly a prototype.

- (3-6) a. Entdeckungen, die zum *Typ* der ultraviolett leuchtenden Galaxien gehören.
b. Entdeckungen, die zu einem *Typ* der ultraviolett leuchtenden Galaxien gehören.
' Discoveries that belong to the / a type of ultraviolet luminous galaxies.'

- (3-7) Eigentlich ist er nicht der *Typ* des Kriminellen.
' He is not the type of a criminal.'

Considering lexical content, in phrases combining *Art/Typ* with proper names *Art* names mostly refer to species (3-100a) and *Typ* names refer to technical devices, diseases¹³ and to humans (3-10 a). In

¹³ The use of *Typ* when classifying disease is not surprising taking into account that diseases are frequently classified by way of "clinical pictures", that is, by way of prototypical appearance.

phrases combining *Art/Typ* with genitives or *von*-phrases lexical content is less constrained. *Typ* phrases mostly denote artefacts or diseases (3-10 b) but other domains may also occur (3-10 c). *Art* phrases are fairly free with respect to the content of their complements. They combine with all sorts of every-day domains (3-100b) as well as abstract entities (3-100c).

- (3-100) a. die Art Große Hufeisennase ('the kind Big horseshoe nose')
- b. eine Art von Wald, die Art des Materials, die neue Art von Vampiren
(a kind of forest / the kind of material / the novel kind of vampires')
- c. die Art der Kommunikation, eine neue Art von Abschreckung, jede Art von Populismus
(the kind of communication, a novel kind of deterrence, every kind of populism')
- (3-10) a. der Typ Opel Vectra, Diabetes Typ 1, der Typ Lafontaine
(the type Opel Vectra, type 1 diabetes, the type Lafontaine')
- b. ein neuer Typ von aufladbarer Batterie, der Typ des Webservers,
(a novel type of rechargeable battery, the type of webserver')
drei Typen von Fibromyalgie
(three types of fibromyalgia')
- c. der zweite Typ des fortgeschrittenen Trainings
(the second type of advanced training')
dieser Typ eines Museums, der rheinische Typ des Kapitalismus
(this type of a museum, the Rhenish type of capitalism')

Hedging

It was argued above that DPs where *Art* is directly combined with a proper name have to be definites. However, such DPs are frequently found with an indefinite article and a common noun instead of a proper name. They are cases of hedging, that is, what they refer to is not exactly the kind named by the noun but some variant: in (3-8) *eine Art Gegengift* is something close to counter poison but not what is usually meant by this term. Similarly, *eine Art Zusammenfassung* and *eine Art Tradition* is something where the speaker seems reluctant to call it *Zusammenfassung* ('summary') and *Tradition* ('tradition') respectively, but these terms are the closest she can think of.¹⁴

- (3-8) a. eine Art Gegengift zu Gaarders Innerlichkeit
(kind of a counter poison to Gaarders inwardness')
- b. Scipio gibt in seiner Schlussrede noch einmal eine Art Zusammenfassung.
(In his final speech Scipio presents a kind of summary.)
- c. Feuerwehrleute sind bekannt für ihre sorgfältig geplanten Streiche - sie sind eine Art Tradition in amerikanischen Feuerwachen.
(Firefighters are known for their carefully planned pranks - they are a kind of tradition in American fire stations.)

¹⁴ The observation that the hedging effect in *Art+N* constructions is triggered by the use of the indefinite article is reminiscent of the use of the indefinite article with proper names, as in "*Ein Peter hat angerufen.*" ('A Peter has called') where the speaker seems to suggest that the referent is not familiar to her, see Hinterwimmer & Umbach (2015). It would be interesting to develop an analysis of the hedging cases above starting from this idea.

When combined with *von*-PPs instead of common nouns, *Art*-phrases may also have a hedging interpretation in addition to their regular subkind interpretation: *Eine Art von Dialog* in (3-9a) refers, first of all, to a not yet specified kind of dialog. But there is also a hedging interpretation such that the speaker doesn't want to be committed to the plain notion of dialog – can you have a proper dialog with your tools and medium? In the hedging interpretation the speaker seems to refer to a subkind in order not to be committed to the regular meaning of *dialog*.

The puzzle is that these phrases appear ambiguous in an elusive way. Setting aside stress on the determiner (*EINE Art von Dialog*) 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 Dialog* is a dialog. The prediction will be that they agree and at the same time argue that it is not a regular one, thereby entailing that subkinds need not inherit the full set of properties from the superordinated kind. Surprisingly, the hedging flavor is lost if *Art* is modified, as in (3-9b), *eine besondere Art von Dialog* is a subkind of dialog without any trace of hedging. This puzzle will be postponed for future research.

- (3-9) a. Sicher steht ein Künstler in einer *Art* von Dialog mit seinem Werkzeug und seinem Medium.
b. Sicher steht ein Künstler in einer besonderen *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.'

One final remark on hedging by taxonomic nouns: Unlike *Art* phrases, *Typ* phrases never license a hedging interpretation, regardless of their form.

4. Empirical study

Stepping back, 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 coining and printing. This supports the general hypothesis in this paper that classification by *Art* makes use of essential properties whereas classification by *Typ* makes use of a model or prototype.

When examining the structure of *Art* phrases and *Typ* phrases in the preceding section we saw that there are basically two forms. Either the taxonomic noun is directly combined with a name expressing identity, or it is combined with a genitive or *von*-phrase complement expressing subsumption. Considering lexical content it was found that *Typ* is preferably used with artefacts and also with humans, see (3-10), while *Art* is used in biological domains but more importantly (and more frequently) in classifying everyday items and abstract issues, see (3-100).

These results raise the question to what extent the taxonomic nouns *Art* and *Typ* are specialized. The hypothesis that *Art* makes use of essential properties while *Typ* makes use of models predicts that *Art* is close to biology and *Typ* is close to technology, and this is what we find. It does not predict, however, that there is no overlap. One would in fact expect that in at least some areas both taxonomic nouns are acceptable because there is no reason to assume that one way of classification excludes the other. Why should it not be possible to classify a domain based on essential properties

and alternatively based on models or prototypes? In fact, we saw such a case in the example in (7) in the introduction. These predictions were examined with the help of an experimental study.¹⁵

Design

We used (slightly simplified) corpus examples with *Art* or *Typ* phrases and substituted one term by the other. The variants were presented simultaneously in a forced choice acceptability design, with 1-2 sentences of preceding contexts. Subjects were informed that they see texts from newspapers and blogs with two different continuations. They were instructed to decide which of the continuations was the original one, assuming that subjects consider the more acceptable version to be the original. Two items are shown in (4-1) and (4-2). The first occurred originally with *Art* and the second with *Typ*. For the first, 90% of the subjects decided that *Art* was the original term, for the second, 93% of the subjects decided that *Typ* was the original term.

(4-1) (originally *Art*, 90% preference for *Art*)

Schäuble vertrat in einer Rede vor der Adenauer-Stiftung im November 2003 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.

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

(4-2) (originally *Typ*, 93% preference for *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 *Typs* 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 aim of the military operation "Grand Slam" was a Soviet missile test site, which the pilots never reached. Interceptors caught the US reconnaissance aircraft *Typ / Art* U-2 shortly before reaching the finish.

The study included two parts. The first had a somewhat exploratory character and served as a basis to detail the predictions to be tested in the second experiment. The hypotheses of the second experiment were

- if *Art/Typ* are combined with proper names:
 - (i) biological names prefer *Art* (*die Art Große Hufeisennase*);
 - (ii) names of technical devices prefer *Typ* (*der Typ Opel Corsa C*);
 - (iii) names of persons prefer *Typ* (*der Typ Lafontaine*);
- if *Art/Typ* are combined with genitives or von-phrases:

¹⁵Many thanks to Julia Otterpohl who developed the stimuli and implemented the studies.

(iv) nouns denoting items created in mass production prefer *Typ* (*ein neuer Typ von Batterie*);
(v) nouns denoting schemata imposed by definitions prefer *Typ* (*der rheinische Typ des Kapitalismus*);

(vi) nouns denoting neither of these, in particular abstract nouns, prefer *Art* (*die Art der Nahrungsmittel/des Materials, die Art von Abschreckung / Kommunikation / Dialog*);

After presenting the results some particularly interesting items will be discussed.

Results

In the first experiment we tested 13 (originally) *Typ* items and 13 (originally) *Art* items. Constructions of the form "*Typ* + proper name" were mostly (above 90%) rated to be originally *Typ*, that is, subjects rejected the use of *Art* in these items.¹⁶ The other *Typ* items were of the form "*Typ* des/von N". They exhibited medium *Typ* preference (around 70%) or no preference (around 50%) but never favored *Art* instead of *Typ*. In the *Art* group some items yielded above 90% *Art* preference, mostly cases denoting a species and cases of hedging.¹⁷ Items of the form "*Art* des/von N" were gradually decreasing in *Art* preference.¹⁸

The second 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* + proper name". We also added items of the form "*Art/Typ* + noun" where we assumed an implicit *von*-phrase, as in (3-3) above. The items were presented online in a forced choice acceptability design (see above). We had 25 participants..

The results confirmed only part of the hypotheses. Starting with the *Art* group, hypothesis (i) was fully confirmed: In the case of biological names (e.g. *Großer Brachvogel*, *Crassula brevicaule*), more than 80% of the subjects preferred *Art*.¹⁹ Hypothesis (vi) was confirmed to a large extent: nouns denoting abstract entities like *Erfolg* 'success', *Variation* 'variation', *Diskriminierung* 'discrimination', *Reaktion* 'reaction' etc. yielded more than 70% *Art* preference.²⁰ This included combinations of the form "*Art* des/von N" as well as those with implicit *von*-phrase. There was one item showing neither *Art* nor *Typ* preference, 52% (*Herrscher* 'ruler', to be discussed below).

In the *Typ* group, results were more diverse. On the one hand, hypothesis (ii) and (iii) were fully confirmed: technical names yielded more than 90% and personal names more than 80% *Typ* preference. Hypothesis (iv) was not confirmed: Most of the "*Typ* des/von N" items yielded no *Typ* preference or even reverse, i.e. *Art* preference. This included nouns like *Hörgerät* 'hearing aid', *Persönlichkeitsstörung* 'personality disorder', *Schlaganfall* 'stroke' and *Dokument* 'document'. Cases like this will be discussed in detail below cases like this below.

Summing up the results of the experiment, the hypotheses for constructions of the form "*Art/Typ* + proper name" are fully confirmed, but for those of the form "*Typ/Art* des/von N there are a number of

¹⁶ We found more than 90% *Typ*-preference for *Aufklärungsflugzeug des Typs U-2* ('reconnaissance aircraft of type U-2'), *Bundesschatzbrieife des Typs A* ('type A federal saving bonds'), *Mercedes-Benz des Typs W177* ('Mercedes Benz type W177'), *Fertighaus des Typs "Edition 3 V5"* ('prefabricated house of the type "Edition 3 V5"'), *Rad des Typs "Cannondale S6 EVO"* ('bicycle of the type "Cannondale S6 EVO"'), and 75% *Typ*-preference for *Autofahrer des Typs „Hauptsache ich“* ('car drivers of the type "main thing I"').

¹⁷ The greater horseshoe bat ("Rhinolophus ferrumequinum") is a European bat of the "Rhinolophus" genus.

¹⁸ *Art* des Vergehens 'kind of offense' (football): 96%, *Art* der Abschreckung 'kind of deterrence': 90%, *Art* des Handballs 'way of (playing) handball': 83%, Häuser dieser *Art* 'houses of this kind': 73% neue *Art* von Vampiren 'new kind of vampires': 60%, Lehrveranstaltungen dieser *Art* 'this kind of seminars': 70%,

¹⁹ Surprisingly, the preference for *Art* was not above 90%.

²⁰ Actually, all but 3 were over 80%.

items showing no notable preference for either *Art* or *Typ*. The simplest explanation for this result would be that in these items the domain of classification is irrelevant for the choice between *Art* and *Typ*. The other explanation starts by questioning whether preferences around 50% should be considered as no preference. If classification by *Art* and by *Typ* are two distinct ways of classification differing in their semantic effects – which is at the core of the *Art/Typ* hypothesis put forward in the beginning of this paper – then preferences reflect the way of classification a subject opted for. If neither context nor domain is biased towards a particular way of classification, subjects will be free to opt for either.

For this reason, the most interesting results of the study are provided by items in which *Typ* and *Art* are rated equally good ("equal preference" items). Is there a semantic difference between classification by *Art* and by *Typ*? If so, how to describe it? Below we will take a closer look at a number of individual items with apparently no preference for either *Art* or *Typ* checking for biases in the context and evaluating posthoc assessments of subjects.

"equal preference" items

The equal-preference item shown in (7) in the introduction is repeated in (4-3). It occurred in the corpus with *Typ*. The text is about the regulation of transmission power, that is, highly technical. Post-hoc assessments provide evidence that *Art* and *Typ* convey slightly different meanings which are, however, both reasonable in this context. *Art von Handy* classifies mobile phones according to form and function, e.g., Smartphones, Children phones, slider phones, flip phones, outdoor phones etc.. In contrast, *Typ von Handy* refers to a classification imposed by the manufacturer, e.g., *Samsung E850*, *Samsung Galaxy* etc. The results of classification are distinct: When classifying by *Art* there is, for example, a class 'outdoor phone' including a wide range of phones sharing outdoor fitness as an essential property. When classifying by *Typ* there is, for example, a class 'Samsung E850' including instances of this model. Two exemplars may differ in their date of manufacture and in color and traces of use, but otherwise, they are clones – tokens of the same type.

(4-3) (originally *Typ*, 50% preference for *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 type 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 confirmed by cases like (4-5) – (4-7) (which were not part of the empirical study). In (4-5) smart phones are said to be the preferred *Art* of mobile phones implying that smart phones are in fact considered as an *Art* of mobile phones. Using *Typ* in (4-5) would be clearly less appropriate, though not infelicitous. In (4-6) the fact that mobile phones are in general banned on the factory site is expressed by quantifying over *Art*. Quantifying over *Typ* would not make sense. Finally, there are the notions of *Geräteart* and *Gerätetyp* ('kind vs. type of device') The example in (4-7) is taken from a technical data sheet, in this case a Sony

TV of type KDL 46xxx. *Geräteart* refers to the function of the device, in this case a TV, while *Gerätetyp* refers to the model.

- (4-5) Smartphones sind inzwischen ohne Zweifel die bevorzugte *Art* von Handy /?? *Typ* von Handy.
'Smartphones are undoubtedly the preferred kind/type of mobile phone.'
- (4-6) Außerdem gebe es auf dem Werksgelände bestimmte Bereiche, zu denen der Zutritt mit jeder *Art* von Handy / ?? jedem *Typ* von Handy untersagt sei.
'In addition, there are certain areas on the factory site, to which the access is prohibited with any kind/type of mobile phone.'
- (4-7) Geräteart : LCD TV 'kind of device'
Hersteller : Sony 'manufacturer'
Gerätetyp : KDL 46xxx 'type of device'

The item in (4-8) is similar to (4-3) in referring to a technical device but it yielded a 70% *Typ* preference raising the question of why preferences are not balanced,, as in the case of mobile phones. However, when thinking about what *Art der Windkraftanlage* ('kind of wind power plant') might refer to lower preference for *Art* appears plausible. Unlike mobile phone, wind power plants are no everyday objects. German native speakers are not normally familiar with the kind *Windkraftanlage* and the essential properties of this kind. Therefore, *Arten von Windkraftanlagen* are difficult to conceive of by non-expert native speakers. Non-expert speakers are, of course, not familiar with *Typen von Windkraftanlagen* either. But a wind power plant is a technical item and the context is technical, too, So when opting for *Typ* subjects presumably presuppose that there exists a classification scheme defined by experts that they need not think about.²¹

(4-8) (originally *Typ*, 70% *Typ* preference)

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.

The item in (4-9) demonstrates that *Typ* is not confined to technical devices. In (4-9) it is used to classify variants of a disease. As shown by the corpus search in section three *Typ* is readily combined with nouns referring to diseases, see (3-10) and footnote 13. Nevertheless, the item in (4-9) does not exhibit preference for either *Typ* or *Art*. Analogous to (4-8), post-hoc interviews indicated that the use of *Art* is closer to every-day language than that of *Typ*. Subjects surmised along the lines of "'*Typ*' klingt

²¹ It would be interesting to test whether experts familiar with wind power plants would rate items like (4-8) differently.

technischer, oder medizinischer, 'Art' eher umgangssprachlich" ('Type' sounds more technical or medical, 'kind' rather colloquial'). This suggests that the notion of depression licenses classification by *Art* because the disease is sufficiently well-known so that subjects are able to think of essential properties of depression. At the same time (the other half of) subjects opted for classification by *Typ* pointing to the idea of a clinical picture as a prototype.

(4-9) (originally *Typ*, 53% *Typ* preference)

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.'

Surprisingly, the results of the study included items showing a clear preference for *Art* even though the original was a *Typ* sentence, for example *Typ des Hörgeräts* 'hearing aid' (44% *Typ* preference), *Typen von Persönlichkeitsstörungen* 'personality disorders' (44% *Typ* preference), *Typ von Schlaganfall* 'stroke' (40% *Typ* preference) and *Typ des Dokuments* (40% *Typ* preference). All of these terms are familiar in every-day language and the contexts are non-expert contexts, cmp. (4-12). These results can be considered as supporting the tendency we saw in the equal-preference items above: In the case of every-day terms – speakers being familiar with their meaning and essential properties – *Art* is a good choice, and in a non-expert context may even be the preferred one.

(4-12) (originally *Typ*, 44% *Typ* preference)

Menschen mit Hörgeräten können unter Umständen Störgeräusche wahrnehmen, wenn in deren Nähe schnurlose Geräte verwendet werden.

- 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 hearing aid and the distance to the source of the interference.'

The item in (4-10) is originally *Art* though showing only a moderate *Art* preference (60%). The term *Vampir* 'vampire' belongs to every-day language, speakers of German are familiar with vampires and their essential properties. However, the context is about the presentation of vampires in animated film which is an expert context, and the vampire at issue is an animation instead of a real one. This discrepancy is reflected in the data.

(4-10) (originally *Art*, 60 % *Art* preference)

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. I really like this new *Art/Typ* of vampire."

Finally, the item in (4-11)²² is originally *Art* showing, however, equal preference for either of the two taxonomic nouns (52%). Since the term *Herrscher* 'ruler' belongs to every-day language and the context is non-expert, the question arises of why we don't find a clear preference for *Art*. A possible explanation is provided when recalling that *Typ* is not only preferred with technical items but also with persons (*Typ Lafontaine*). When choosing *Art* the sentence is about classifying behavior – manner of ruling. When choosing *Typ* it is about classifying persons by prototypical rulers. But even though the ways of classification differ, the outcome will be almost the same – in the case of *Art* the president belongs to a class subsuming rulers that came to power by in a particular manner, namely coup d'état, whereas in the case of *Typ* he belongs to a class subsuming rulers matching the prototype who came to power by coup d'état.

(4-11) (originally *Art*, 52 % *Art* preference)

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

5. Conclusion and future prospects

We started out from 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 determining the tokens of a type. Essential properties of a kind are associated with the meaning of the corresponding words and are thus part of what speakers learn when they learn a language. Models or prototypes, on the other hand, are specified by expert communities. They need not be familiar to non-expert speakers.

Support for this idea was found in lexical semantics, by corpus data and by the results of an experimental study. In the dictionaries considered in section two, the taxonomic sense of *Art* was defined by sharing of essential properties. The taxonomic sense of *Typ* was paraphrased by *model* and also *prototype* – an individual though without individual features. From a diachronic point of view, *Art*

²² The term *Herrscher* is clearly not a name, that is, the sentence is a case of implicit *von* – it is about a particular *Typ/Art* of *Herrscher*.

and *Typ* notably differ in origin: *Art* is connected to descent and inheritance, whereas *Typ* is connected to coining and printing.

The corpus search in section three showed that there are basically two forms of *Art/Typ* phrases. Either *Art/Typ* is directly combined with a proper name or noun or it is combined with a super-ordinated noun in the form of a genitive or *von*-phrase. In the first form, *Art* phrases usually denote biological species (neglecting hedging cases) whereas *Typ* phrases refer to technical devices and diseases. In the second form, domains are less constrained. *Typ* still prefers technical issues and diseases but allows for other domains. *Art* occurs with every-day domains as well as abstract entities.

The experimental study confirmed the division of labor between *Art* and *Typ* phrases of the first form described above. But for phrases of the second form, the results did not straightforwardly conform to our expectations. Surprisingly many items – in the (originally) *Art* group as well as the (originally) *Typ* group – did not show preference for either of the two taxonomic nouns. This result at first sight seems to suggest that *Art* and *Typ* are equivalent in these contexts.

A closer look at individual "equal preference" items reveals, however, that classes induced by *Art* are intuitively more general and common non-expert speakers than that induced by *Typ*. Taking insights from genericity and concept formation into account it appears plausible to attribute this finding to the fact that kinds are associated with essential or "in virtue-of" properties – properties an entity has simply because it is the kind of thing it is. Speakers of a language learn such connections when they learn the meaning of word denoting the kind. From this point of view, the intuition that classification by *Art* is more general or common is due to the fact that speakers of a language are familiar with what is essential for a particular kind, simply because they are familiar with the meaning of the word.

In contrast to *Art*, classification by *Typ* was characterized as being more technical or scientific. This is straightforwardly explained by assuming that it makes use of models or prototypes which are not acquired in learning a language, but instead based on regimes arbitrarily imposed on a domain by expert communities.

Coming back to the heating example in the introduction: When I am asked what kind of heating (*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 has been 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' and what counts as essential properties of heatings. But if you ask me for the type (*Typ*) of the heating I would be lost and refer you to our heating engineer.

Languages other than German have not been taken into consideration in this paper. English *kind* vs. *type* appear close in meaning to *Art* and *Typ* but they are not equivalent (to be observed in the translations of the examples). A hypothesis to be explored in future work would be that languages in general include taxonomic expressions denoting classification based on linguistic knowledge as opposed to classification by language independent expert knowledge.

Kinds and types in semantics

The research on *Art* and *Typ* described in this is paper goes back to a talk arguing against the widely held supposition that kinds and types – more precisely: the concepts of kinds and types employed in semantic theory – are roughly the same (Umbach & Gust 2018 Paris).

The notion of kinds as a theoretical notion in semantics is rooted in the philosophical notion of natural kinds (Putnam 1975) and play a major role in the analysis of generic expressions, see Carlson (1980), Krifka et al. (1995). The notion of kinds in semantics has since been subject to further development distinguishing, e.g., (intensional) kinds from well-established kinds²³ and from encyclopedickinds.²⁴ Another variety are kinds ad-hoc generated by the use of similarity demonstratives, for example German *so* and English *like this* (Umbach & Gust 2014). Suppose the speaker points to a table uttering the sentence in (5-1). The nominal phrase "*so ein Tisch*" will then denote a set of tables similar to the one the speaker points to. Actually, this set of tables constitutes a kind, which is evidenced by the fact that (5-1b) is equivalent to (5-1a).²⁵

- (5-1) 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 demonstration (the table the speaker points to in (5-1)) are licit in determining similarity. Consider (5-2). In (a), being a diesel as well as being a Japanese car lead to the interpretation that Berta has a Japanese car and a diesel, respectively. In (b), however, being a new car does not qualify in determining similarity – the second sentence cannot be understood such that Berta has a new car.

- (5-2) a. Anna hat ein japanisches Auto. Berta hat auch so ein Auto
 (nämlich ein japanisches Auto).
 b. Anna hat ein neues Auto. Berta hat auch so ein Auto (*nämlich ein neues Auto).
 'Anna has a Japanese car / a new car. Berta has such a car, too (namely a Japanese car / a new car).'

Umbach & Stolterfoht (in prep) present a sequence of experimental studies testing these restrictions and argue that properties licit 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 demonstratives²⁶ are in fact kinds, even if ad hoc. Moreover, it is predicted that the expression including *Art* phrases are subject to the same restrictions as found for those including similarity demonstratives, which appears plausible, see (5-3).

- (5-3) Anna hat ein japanisches / ein neues Auto. Berta fährt diese Art von Autos auch.
 (nämlich japanische Autos / *nämlich neue Autos).
 'Anna has a Japanese car / a new car. Berta drives this kind of car, too (namely Japanese cars / new cars).'

To conclude, the result of the research presented in this paper is, first of all, not surprising: classification by the taxonomic noun *Art* refers to kinds whereas classification by the taxonomic noun *Typ* refers to classes specified by models or prototypes. But it was not obvious in beginning that the two ways of classification yield different results, and it was a surprise to see that classification by *Art*, is a matter of linguistics (and conceptual) knowledge while classification by *Typ* is not.

²³ In English, well-established kinds allow for singular definite generic expressions, compare *the Coke bottle* as opposed to **the green bottle*, see (Krifka 1995).

²⁴ expressed, e.g., by bare singulars in Hebrew (Rothstein 2013)

²⁵ This can also be 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 when combined with nominal and verbal expressions but not when combined with adjectives.

Topics set aside in this paper for future research include cross-linguistic comparison: Do taxonomic nouns in other languages exhibit a distinction similar to that between *Art* and *Typ*? Another topic concerns the relation between kinds and manners both covered by the German word *Art*. And finally there is the puzzling question of why only *Art* can be used for hedging: What is it that blocks hedging by *Typ*?

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