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Stereotyping, prototyping, and figurative use: Towards a proper semantic analysis

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1. Introduction. In this paper, I would like to discuss the notions of stereotype and prototype from a purely semantic point of view. Amazingly, many of those writing about prototyping and prototypical effects tend to ignore stereotyping, and vice-versa.¹ In general, though, one finds that the literature on stereotyping is predominantly found in the area of social psychology, whereas prototyping plays an important role in the domain of cognitive psychology. This is at least my strong impression after searching the relevant literature: stereotyping is an interactional matter, and it has found its way into sociolinguistics, whereas prototyping is mainly a cognitive-psychological affair which has been extended into psycholinguistics.² So, there seems to be some division of labor: stereotyping

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¹E.g. Fodor & Lepore (1997) in “There is a Standard Objection to the idea that concepts might be prototypes (or exemplars, or stereotypes)”, and Jackendoff (1983), when talking about Rosch’s prototypes, uses the term ‘stereotype’, even though the title of the relevant section is called ‘Default Values and Prototype Images’. In Jackendoff’s 1990-book *Semantic Structures* again his preference rules are associated with the term ‘stereotype’.

²Cf. Bar-Tal (1989), Macrae et al. (1997) on the sociology side, Tversky (1977), Osherson & Smith (1981), Tsohatzidis (1990) on the psychology side. Of course, there is an evident overlap between sociological and psychological research, e.g. Hamilton (1981). And there has been a lot of attention from the philosophical side: Kripke (1972), Putnam (1975;1979); more recently Bartsch (1987a;1987b) and Leezenberg (1995), among many others.

implies some social setting, prototyping seems to involve the individual way of handling conceptual categories. In spite of the popularity of the two notions, precise definitions are not given, or if they are given, they suit the purposes of social or functional psychologists, not of linguists. In fact, the role of linguistics may even be reduced to virtually zero if one assumes that conceptual categories have nothing linguistic about them besides the conviction that stereotypes are socially determined prejudices of a certain kind. I do not believe that this sort of reduction would be helpful, because I think that modern semantics may contribute to a better understanding of the two notions to the profit of those who are interested in them from the point of view of social or cognitive psychology.

2. Lexical and encyclopedic knowledge. The distinction between what traditionally has been called lexical knowledge and encyclopedic knowledge is rather unclear. Even though most people can tell the difference between buying a dictionary and an encyclopedia and so seem to master a principled distinction between knowledge of a language and knowledge of the world, the matter is not so simple from the point of view of the makers. In most European dictionaries, we hardly find any mention of names of capitals, kings and queens, political heroes, painters, writers, etc., just as we do not find pictures of thrushes and robins. There are some exceptions, like the French *Larousse* and the Dutch *Verschueren*, which seem to feel at home in the American tradition of mixing linguistic and domain information. But the existence of this tradition shows how difficult it is to mark a genuine difference between the two kinds of knowledge. E.g. why exclude proper names if these are well-accepted linguistic entities? For nouns, adjectives and verbs the problem can be formulated in terms of the word definition: how much information do we associate with words like *thrush* or *doctor* or *magazine* and where exactly is the borderline between linguistic and non-linguistic information? Comparing encyclopedias and dictionaries is quite revealing in this sense.

The development of databases and the media such as the Internet has made it even more difficult to formulate exactly what the real difference is. On the Internet I would like to see a definition of the word *thrush*, but I want to have it connected with a picture of the bird and a description of some of its main properties. But there is no way to tell where the transition from linguistic information to encyclopedic information takes place in this case. One could even argue that there is no principled distinction, but it is as difficult to do this as it is to take the opposite position. In what follows, I will try to find my way through this difficult question of talking about different kinds of knowledge while denying a principled distinction between them. In lexical semantics this is how we have to live: we find ourselves at the interface of knowledge of the domains about which we speak and the linguistics means we have for doing so.

From Verkuyl (1978) on, I have been arguing that a lexical entry should have only the inclusion relation to provide the algebraic structure governing lexical knowledge. It took some time for me to realize that this point of view is essentially a Montagovian one. According to Montague a proper name like *Reichenbach* is to be analyzed as denoting the (finite) collection of all the sets to which

the bearer of that name belonged (physicist, logician, fugitive, developer of tense logic, logical positivist, etc). The basic format used for this is (1a), which is equivalent to (1b).

- (1) a. $\{X : \text{Reichenbach} \in X\}$
 b. $\{X : \text{for all } x[\text{Reichenbach}(x) \Rightarrow X(x)]\}$

The formula (1b) may also be used for characterizing noun denotations if one restricts the relation between two lexical nouns to the formula given in (2).

- (2) $\{X : \text{for all } x[\text{Horse}(x) \Rightarrow X(x)]\}$

In other words, the subset relation may be taken as crucial for the organization of lexical knowledge. This reduces the amount of lexical information about horses considerably, because the format in (2) requires that for all X in (2) all members of the category of *horse* share the property X . This parsimonious attitude will pay off, as I shall show below.

One may push this point further by assuming that the subset-restriction on the architecture of the lexicon L is a principled one, in the sense that it distinguishes lexical knowledge from non-lexical knowledge because the latter is organized in terms of less restricted mathematical structure, such as partial ordering, mereological structure, etc.³

Let us consider in some detail what this means. The best way to illustrate its implications and to get a feel for what is at issue is to present the tree given in figure 1 below. If someone learns that a thrush is a songbird and already knows that songbirds are birds, the knowledge structure necessary to relate thrushes to birds will have the form of a total order warranting inheritance. Now if we get from *thrush* to *songbird* and we want to have available information about other songbirds, we are immediately in a typically encyclopedic situation: we enumerate the names of other subsets of the set of songbirds, such as nightingales, parakeets, and others. And we may miss some of them simply because we forgot about them or because we never learned them. We are in a situation in which we learn or try to remember all states of the US or all the countries in Europe, or all the numbers of the départements in France.

This is not an trivial point: we have to separate our linguistic knowledge enabling us to use language from the knowledge we have about specific linguistic knowledge domains. Recall the need to distinguish German prepositions taking the accusative from those that take the dative, which we had to learn by heart. This form of knowledge is essentially encyclopedic: it is not different from learning the names of the capitals of European countries. What gives it a linguistic flavor is that the things we learn are the proper names of linguistic entities rather than of capitals. The enumeration of names as members or subsets of a certain category is crucially an encyclopedic matter: it is domain knowledge. As was stated earlier, I am aware that the plea for doing away with a principled distinction between linguistic and encyclopedic knowledge is orthogonal to the attempt to show that there is such a distinction, but yet I would like to follow

³The full impact of this point became clear to me in a conversation with Louis des Tombe.

this line of thought because it seems to pay off in terms of the current discussions about the nature of the algebraic structures that we need to characterize the models of interpretation.

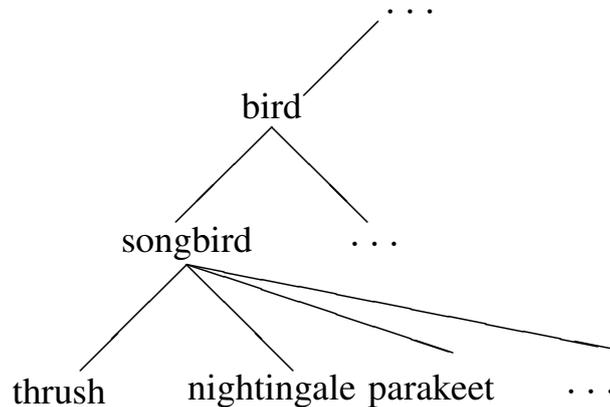


Figure 1: *Lexical knowledge*

With respect to the songbird example, one may say that there are two sorts of top-down information: (a) the one-level-down knowledge that the category of songbirds contains thrushes, nightingales, parakeets, blackbirds, etc.; and (b) the knowledge that a thrush is a songbird with a specific property distinguishing it from other songbirds.

The information (a) is what we typically find in encyclopedias and not in dictionaries: one could say that the top-down direction is not linguistic in the sense that it structures our knowledge of songbirds. This knowledge partitions the set of songbirds into the proper subsets of songbirds shown in figure 1. Suppose that we learn for the first time that a robin is also a songbird. In that case, a new subset will be added to those that are already there. In this knowledge structure, a robin can in no linguistic way be related to a parakeet. That is, neither in the lexical entry for *robin* nor in the lexical entry for *parakeet* is this structural information available. We need to appeal to our (encyclopedic) knowledge of the domain of birds to establish the relation between the subsets of the set of songbirds. It is important to see that the words *thrush*, *nightingale*, *parakeet*, and *robin* are unrelated from the point of view of lexical semantics: we know lexically that a *thrush* is a songbird and a bird, and we know lexically that a *nightingale* is a songbird and a bird, but there is no connection between these two pieces of information. It is only when we get at the (mother) superset of songbirds that we may remember that the set of songbirds contains n subsets, among which thrushes, nightingales, parakeets, and robins are found. But this is basically knowledge about the world: we distinguish sets and see connections between them by partitioning them, some of them having names that we have available in our (mental) lexicon.

Summarizing, it seems clear that the search direction in a knowledge base may be said to determine whether we may speak of lexical knowledge as distin-

that the knowledge that carburetors are parts of a motor is always top-down from the perspective of a carburetor belonging to the set of devices (apparatus), whereas the relation between *device* and *carburetor* may be talked about in two ways: bottom-up is the proper way of saying that a carburetor is a device, whereas the top-down way characterizes the carburetor as a subset of the set of devices, as set apart from the sets called *wheel*, *seat*, *engine*, etc., these all being devices of some sort.

The present considerations about the distinction between lexical knowledge and world knowledge in terms of structures based on inclusion and structures having different non-Boolean architectural properties will be related to the distinction I will make between stereotyping and prototyping. It will be argued below that stereotyping is a strategy to get into the “lexical mode”—it is basically a bottom-up phenomenon— whereas prototyping is a way to operate at the level of knowledge of the world: it is basically a phenomenon involving a top-down perspective: comparing robins to thrushes and observing that a robin is a prototypical bird presupposes structuring the set of birds. In this way, we can also explain why important areas of metaphoric usage of language contains clues to signal prototypicality.

3. Lexical semantics and generalized quantification. In this section, I will first discuss the basic model for generalized quantification as it emerged in the eighties.⁴ The next step is to connect this model with traditionally well-known lexical notions such as synonymy, hyponymy, antonymy, etc. and to show how these can be captured. The basic format of GQT for the analysis of sentences like (4) is given in figure 3.

- (4) a. Some men are ill. $A \cap B \neq \emptyset$ c. All men are ill. $A \cap B = A$
 b. Three men are ill. $A \cap B = 3$ d. No men are ill. $A \cap B = \emptyset$

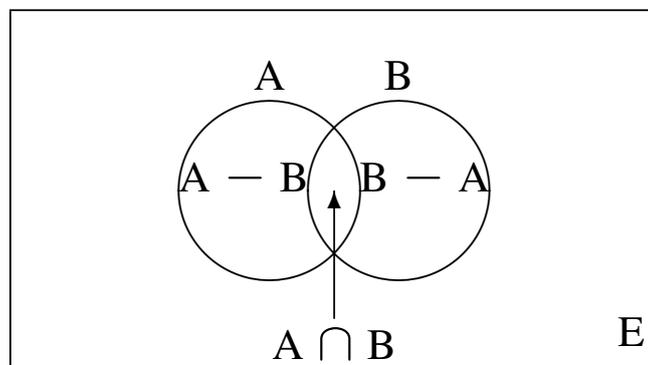


Figure 3: *Intersection model of generalized quantification*

⁴General works on GQT are Van Benthem (1986), Gamut (1991), Partee et al. (1990), Keenan & Westerstahl (1997), among others.

Determiners like *some, three, all, no, many, few, at least 30 but not more than 50*, etc. provide information about the intersection $A \cap B$, where A is the set of men, B the set of those who are ill, and E the set of individuals constituting the domain of interpretation. In the remainder of this article I will write $A \cap B$ as AB . There is no claim that the semantics of the sentences can be described exhaustively just in terms of the corresponding sets in this particular model, but the claim is that in each situation to which these sentences are applied these sets can be construed. In this way we can say that (4a) is true in a model if and only if the intersection AB contains at least one man, that (4b) is true just in case AB contains three men, that (4c) is true just in case $A - B$ is empty and AB contains all men and that (4d) is true if and only if AB is empty.

Now, for the sentences in (4) figure 3 expresses a relation between a noun and a complex predicate *are ill*. In sentences like *Three men ate a sandwich prepared by their mother*, this predicate may be quite complex, but by applying modern techniques like lambda-abstraction it can always be taken as a one-place predicate.⁵ Suppose now that B is a set denoted by a simple predicate recognizable as a lexical item in a lexicon. In that case, we are doing lexical semantics as a form of structural semantics. It is possible to use figure 3 to characterize basic lexical semantic notions, and to show that inherent to them essentially the same form of quantification is present that we met in sentences like (4).

In order to make a strict difference between language and denotation, I will continue to use A, B, C , etc. for sets and I will use α, β, γ as their corresponding predicates in the language. For example, in (4) $\alpha = \textit{man}$, $\beta = \textit{ill}$, whereas $A =$ the set $I(\textit{man})$ and $B =$ the set $I(\textit{ill})$.⁶ So, we have now four traditionally well-known notions in a modern dress in figure 4.

Basic notion:	$A - B$	AB	$B - A$
1. α synonymous with β	\emptyset	$\neq \emptyset$	\emptyset
2. α hyponym of β	\emptyset	$\neq \emptyset$	$\neq \emptyset$
3. α hyperonym of β	$\neq \emptyset$	$\neq \emptyset$	\emptyset
4.	$\neq \emptyset$	$\neq \emptyset$	$\neq \emptyset$
5. α antonym of β	$\neq \emptyset$	\emptyset	$\neq \emptyset$

Figure 4: *Some basic lexical semantic relations*

In fact, given the emptiness or non-emptiness of the intersection AB , we deal with eight logical possibilities. Three of them disappear from our view for obvious reasons. Of the remaining five we find synonymy in 1, hyponymy in 2, and hyperonymy in 3. Note that they are all forms of inclusion. That is, in 1 all x in A form a subset of B and vice-versa, in 2 and 3 we find one-way inclusions. We find antonymy in 5. Relation 4 did not receive an official name, although most relations between two words (of the same category, that is) in a dictionary fall under this heading. In general it defines situations in which none of the three

⁵The complex predicate is something like: $\lambda x.x$ ate a sandwich prepared by the mother of x .

⁶Standardly, I is the function mapping constants from a language to semantic objects in the domain of interpretation. In this case, we are dealing with the predicate constants *man* en *ill*.

sets involved is empty. I will call it triple non-emptiness (TNE). In my view, TNE should be given a more prominent role to play than may be discerned in the tradition of lexicography and lexicology. What makes 4 interesting in respect to generalized quantification is that it is short for a number of different sorts of quantification: not only ‘not all’, but also ‘some’, ‘most’, ‘many’, etc.

It is not my intention to use the four terms in figure 4 as they function in lexical semantics. Crucial for 1,2 and 3 is the inclusion relation, which is the relation on which I will focus as relevant for the connection between structural and lexical semantics. As to 4, the emptiness of AB is essential at this stage, not the structure in which A is the antonym of B . One would not like to say that *raven* and *white* are antonyms, just as some would not like to say that *raven* is a hyponym of *black*. But these restrictions on the use of terms are not essential for the present analysis. In section 7, it will be shown that for the relation between prototyping and figurative use, antonymy turns out to be a relevant notion, if taken as applying to a situation in which A relates to B within an immediate superset $C = A \cup B$. Modulo this qualification, it can be maintained that in the five basic semantic relations under analysis, quantification plays an essential role as shown by paraphrasing: 1, 2 and 3 are based on ‘all’, 4 on ‘not all’ and 5 on ‘not’. This should be a firm indication that lexical semantics is closely related to structural semantics in which quantification plays so essential a role. What is important here is that lexical semantic relations are governed by inclusion, or in the case of 4 by the impossibility of any form of inclusion or even overlap.

4. Models and lexical knowledge. Our lexical knowledge of the relation between α and β is based on our experience with many domains E . If sentence (4a) *Some men are ill* is said to be true with respect to a model M it applies to just one domain in which the relation between A and B can be verified. That is, one has to look for the set of men A in the domain of discourse E , for the set B of all ill individuals and (4a) is true if and only if we find some men in AB . The same applies to (4c) *All men are ill*: all of the men in the domain E should be located in the set B of ill individuals. But note that (4c) can also be used to characterize men as entities which have the persistent property of illness. This persistency involves a series of models each having a domain E . That is, in this case (4c) should be said to be true with respect to a set $\mathcal{M} = \{M_1, \dots, M_n\}$ in which for every M_i in \mathcal{M} , there is an interpretation I_i making (4c) true.⁷ In certain militant feminist circles of the seventies (4c), and the near synonymous *Men are ill* were used as expressing a deep-rooted biological truth. If taken seriously such a usage can only be understood as the claim that in whatever model men would occur they always would form a subset of the set of ill individuals.

Logicians do not really like to see (4c) as a statement giving information about someone’s lexical knowledge, but in my view linguists are bound to view expressions like (4c) in their general use as an indication that in the lexical knowledge of those who consider (4c) true as a general statement about men, the

⁷A model is taken here as a pair consisting of a domain of discourse E and an interpretation function I assigning semantic values to expressions of the language.

two predicates ‘men’ and ‘ill’ are connected on the basis of hyponymy. That is, in a mental lexicon the knowledge about the relation between α and β makes accessible a collection \mathcal{E} of domains $\{E_1, \dots, E_n\}$ in each of which α and β had or is supposed to have possibly different extensions. A sentence like (5)

(5) All ravens are black.

can now be seen as our lexical knowledge that in whatever E_i we encounter with *raven* = α and *black* = β , the set $A - B$ will be empty and the intersection AB non-empty.

In general, it seems that all sorts of discussions in the domain of the philosophy of science apply at the individual level of knowledge organization. That is, we may relate lexical knowledge to theory formation as discussed in the philosophy of science. The only proper answer to stereotyping is to confront people using them with extensions, i.e. with TNE-counterexamples in a specific model. The unwillingness to accept counterevidence at the individual level is the counterpart of the well-known reluctance to give up a theory in view of a counterexample. There is a tendency to save the theory rather than giving it up.

Compare the sentences (5) *All ravens are black* and (4c) *All men are ill*. Both fit into scientific theories, biology and feminist biology respectively. The difference between the acceptance of (5) and (4c) as axiomatic or generally accepted statements within the theories mentioned is determined by social considerations. Individual theories about the universe are influenced by the existence of bodies of knowledge having sufficient authority to impose themselves on the proper use of words featured in them, as Kripke and Putnam have made clear. All of us accept the biological axiomatic statement *Ravens are black*. Our refusal to accept (4c) as a true general statement is to be seen as the refusal to connect the predicates ‘men’ and ‘ill’ at the level of lexical semantics in terms of persistent inclusion.

Decisions of this kind have far-reaching consequences in our linguistic system. People accepting (5) as a statement asserting the hyponymy relation between *raven* and *black*, are predicted to refuse to accept sentences like (6).

- (6) a. Some ravens on this campus are black.
b. Of the ravens that are black, these must be saved.

My knowledge of the different domains in the collection \mathcal{E} tells me that there is or should be no special semantic relation between *man* and *ill* and hence I consider (4c) as a contingent sentence, i.e. as a sentence whose associated \mathcal{E} contains at least instances of E 's with the TNE-configuration. Sentence (6a) sounds odd. You normally wouldn't believe it. If you do, you take the TNE as the governing semantic relation for the lexical items *black* and *raven*. This is to say that in any E the sentence will behave contingently.

Likewise, Dutch people who live by statements like (4c) will have to accept that they can no longer use sentences like (7), which contain the restrictive clause *die ziek zijn* (that are ill).

- (7) (a.) Van de mannen die ziek zijn, vind ik deze wel meevallen.
'Of the men that are ill, I do not find these so bad.'

- (b.) De mannen die ziek zijn, moet je anders behandelen.
 ‘You must treat the men that are ill differently (from those that aren’t).’

Undoubtedly there are other structural restrictions on the use of the predicates involved, but (6) and (7) suffice to demonstrate the point at issue: the systematic use of a stereotype has many linguistic implications, which may be hidden to the user itself.

Discourses often contain statements in which one shifts from talking about the model at hand to talking about experiences with other models. That is, they do not apply to this particular M_i but to all possible and relevant members of the collection \mathcal{M} , as experienced by the speaker so far. In short, they give information about core assumptions in the speaker’s theory about the world and the way to do this is to connect predicates to each other at the lexical level. More generally, the semantic relations 1, 2, and 3 all assume a collection \mathcal{M} in which for all its E ’s the inclusion relation is assumed to hold. Given a TNE-configuration for a pair of predicates, it is banned from inclusion as the underlying semantic pattern. Now it is time for stereotyping.

5. Stereotyping. Consider the following list of stereotypical relations:

Word	Description	Word	Description
Italian man	romantic	Fleming	anti-Walloon
Italian man	mafioso	politician	unreliable
Russian woman	mafioso	Dutch	stingy
man	weak	American manager	aggressive
mother	strong	American manager	short-lived
	housewife	male	rational

In all these cases one may say that α and β are TNE-related: there is no specific semantic relation between α and β because models are available in which extensionally all three relevant sets are non-empty.

Stereotyping comes in at the very moment at which $A - B$ is declared or considered or taken to be empty with the explicit or implicit claim that this holds for all members of \mathcal{M} .⁸ The result is clearly set inclusion: A is now considered a subset in every \mathcal{E} and the speaker is directed by the structure of his lexical knowledge. The very fact that TNE changes into hyponymy or sometimes even synonymy makes it a lexical matter. Suppose that we think in terms of change, in that by some experience a speaker changes $A - B$ from non-empty into empty. Think of a holiday trip by some young girl to Italy including a love affair there, leading to such a change. It will affect, in principle, the whole system of her lexical knowledge by the very fact that it is organized as a network of related concepts. All predicates related to the predicate ‘Italian man’ and its superset ‘romantic’ will be, in principle, open to undergo the consequence of the new-born hyponymy. In other words, if *romantic* implies *courteous*, Italian men will

⁸Note that this formulation also covers the situation in which \mathcal{M} contains just one member, i.e. the situation in which just one model is assumed. I will continue to speak in terms of a series of models each having a possibly different domain.

be considered courteous on the basis of the earlier stereotype. In terms of \mathcal{M} , stereotyping can be seen as a refusal or an impossibility to inspect all M s in $\{M_1, \dots, M_n\}$ individually or as a reduction to just those domains in which inclusion has been the case contingently. So what we see here is that stereotyping is basically a form of universal quantification at two different levels: (i) a particular model is not sufficiently or fully verified at the contingent level in order to find counterexamples to the statement that A is included in B ; (ii) the inclusion relation is assumed to generalize to all other models.

From the point of view of generalized quantification, the cognitive mechanism involved in the inspection of different models can be explained quite well. At the heart of the basic format of quantification of figure 3, in relational terms $D_E(A, B)$, we find a tripartite structure in which D_E is taken as the operator, A as the restrictor and B as the nuclear scope (cf. Bach et al. 1995, in particular Pardee 1995.) That is, in sentences like (4c) *All men are ill* the set A of men may be all men in E , but it is also possible to have restrictions on A such that the application of the operator is restricted to a particular subset of the set of men in E . One way to restrict A is to allow A to be the set of all men in the model intersecting A with a context set C in the sense of Westerståhl (1984) so that the quantification applies to the intersection AC , the set of all men relevant to or identified by the present discourse.⁹

At this point, the notion of preference rules or default reasoning comes up quite naturally, because restrictions on A so as to obtain universal quantification may have the alternative developed in non-monotonic logics. Given a collection \mathcal{M} one might say that in most M s of $\{M_1, \dots, M_n\}$ the inclusion is given, or even that in all M s we have non-monotonic ‘most’-quantification, non-monotonicity blocking inferences made possible on the basis of universal quantification. The well-known example, of course, is that on the basis of the sentence *Birds fly* and the fact that Tweety is a penguin one may not validly infer that Tweety can fly.

But default reasoning as a way to account for stereotyping should be rejected on two grounds: (a) by taking inclusion as the leading quantificational force of stereotyping we hold the one who uses a stereotype responsible for this force; (b) the logical properties of stereotyping point in the other direction: universal quantification. To see this let us reconsider the sentences of (4) from the point of view of their monotonicity behavior. Let $[[_{NP} \text{Det } N] \text{ [VP]]}$ in sentences like (4) be interpreted as expressing the relation $D_E(A, B)$. For example, the Det *all* is taken as the relation D_E holding between A and B such that A is a subset of B . Now a determiner in the relation $D_E(A, B)$ is right-monotone increasing when (8a) holds and a determiner in the relation $D_E(A, B)$ is right-monotone decreasing when (8b) holds.

⁹There are all sorts of ways of restricting quantification, e.g. accommodation as part of presupposition projection, as described in e.g. Geurts & Van der Sandt (1998). Maybe these are relevant for the present analysis too, but I will not go into the nature of these restrictions because I can continue my analysis on the basis of the certainty that there are ways to “get” at the proper restriction, given a suitable context.

- (8) a. MON \uparrow : if $D_E(A, B)$ and $B \subseteq B'$, then $D_E(A, B')$
 b. MON \downarrow : if $D_E(A, B)$ and $B' \subseteq B$, then $D_E(A, B')$

We find the patterns in (9) and (10).

- (9) a. Some men are very ill. \Rightarrow Some men are ill. MON \uparrow
 b. Three men are very ill. $\not\Rightarrow$ Three men are ill.
 c. All men are very ill. \Rightarrow All men are ill. MON \uparrow
 d. No men are very ill. $\not\Rightarrow$ No men are ill.
 (10) a. Some men are ill. $\not\Rightarrow$ Some men are very ill.
 b. Three men are ill. $\not\Rightarrow$ Three men are very ill.
 c. All men are ill. $\not\Rightarrow$ All men are very ill.
 d. No men are ill. \Rightarrow No men are very ill. MON \downarrow

Note that (precisely) *three* is neither MON \uparrow nor MON \downarrow : it is interpreted as a non-monotone quantifier.

Let us also say that a determiner Det in the relation $D_E(A, B)$ is left-monotone increasing or persistent if (11a) holds and a determiner in the relation $D_E(A, B)$ is left-monotone decreasing or anti-persistent if (11b) holds.

- (11) a. \uparrow MON : if $D_E(A, B)$ and $A \subseteq A'$, then $D_E(A', B)$
 b. \downarrow MON : if $D_E(A, B)$ and $A' \subseteq A$, then $D_E(A', B)$

We find the patterns in (12) and (13).

- (12) a. Some men are ill. \Rightarrow Some persons are ill. \uparrow MON
 b. Three men are ill. $\not\Rightarrow$ Three persons are ill.
 c. All men are ill. $\not\Rightarrow$ All persons are ill.
 d. No men are ill. $\not\Rightarrow$ No persons are ill.
 (13) a. Some men are ill. $\not\Rightarrow$ Some firemen are ill.
 b. Three men are ill. $\not\Rightarrow$ Three firemen are ill.
 c. All men are ill. \Rightarrow All firemen are ill. \downarrow MON
 d. No men are ill. \Rightarrow No firemen are ill. \downarrow MON

Again we observe that (precisely) *three* is neither MON \uparrow nor MON \downarrow : it is interpreted as a non-monotone quantifier.

Let us put these pieces of information together, adding the fourth logical possibility:

- (14) a. \uparrow MON \uparrow some, at least n, infinitely many
 b. \downarrow MON \uparrow all
 c. \uparrow MON \downarrow not all
 d. \downarrow MON \downarrow no, at most n, a finite number of

We see that *all* is \downarrow MON \uparrow and this is exactly what we are after: stereotypes show the same type of behavior as sentences with universal quantification, as can be seen in the following examples, assuming that parliamentarians are a subset of politicians and unreliable people are a subset of the people breaking promises.

- (15) a. Politicians are unreliable. \Rightarrow_{ST}
 MPs are unreliable. \Downarrow MON
 a.' All politicians are unreliable. \Rightarrow
 All MPs are unreliable. \Downarrow MON
 b. Politicians are unreliable. \Rightarrow_{ST}
 Politicians break promises. MON \Uparrow
 b.' All politicians are unreliable. \Rightarrow
 All politicians break promises. MON \Uparrow

Another example that will do is (16), on the assumption that if you are stingy you are not a big spender.

- (16) a. Dutch are stingy. \Rightarrow_{ST} People from Utrecht are stingy. \Downarrow MON
 b. Dutch are stingy. \Rightarrow_{ST} Dutch aren't big spenders. MON \Uparrow

Here again there are no real differences in entailment behavior. These cases demonstrate quite clearly that stereotyping may be considered a case of universal quantification. I have added the subscript *ST* to indicate that the entailment is justified on the basis of genuine stereotyping. This notion comes up quite naturally in the context of (16) because it should follow that this sentence is not always used to express a stereotype. The well-known *Birds fly* is not *sui generis* a stereotypical statement. Only when it is used to express a genuine lexical relation between the words *bird* and *fly*, does it express a stereotype. But note that *All birds fly* can also be used without the explicit commitment of a universally valid statement. That is, one should not say that *All Dutch are stingy* is not stereotyping as opposed to *Dutch are stingy*. Both can be used stereotypically, as should follow from the fact that universal quantification can be restricted in the way described earlier. It should be added though that we may expect some differences between the primed sentences in (15) and the non-primed ones. After all, the former express the full force of the universal quantifier, whereas in the latter universal quantification is left implicit. Whatever can be said about this rather subtle meaning difference, one may establish that the non-primed cases in (15) and (16) express full commitment to the truth of the antecedent: someone who believes stereotypically that politicians are unreliable is committed to the view that members of parliament are unreliable, because MPs are politicians.

There is another interesting condition on generalized quantification that is pertinent for the present analysis. It is the property of conservativity, which has two versions, a weaker one and a stronger one. It says:

- (17) a. $D_E(A, B) \Leftrightarrow D_E(A, AB)$
 b. $D_E(A, B) \Leftrightarrow D_A(A, AB)$

Constraint (17a) expresses the idea that basically only that part of *B* matters which is involved in the predication. As to (17b), “its full force is to declare everything outside *A* irrelevant” (Van Benthem 1986:8). It is widely assumed that Conservativity is a universal constraint on any determiner. In both versions this constraint works out remarkably close to our intuition of stereotyping.

Those who consider Jews as cheats or Arabs as 100% unreliable are subject to the wish to equate the notions involved: for them in the most extreme form Jew = cheat and Arab = 100% unreliable. This is what falls out naturally in the cases under consideration. I do not say that Conservativity necessarily imposes synonymy, but it is certainly compatible with it.

The generalization over different models easily involves quantification over different times. That is, the subscript i of E_i may pertain to a time index or to an index where time is a natural ingredient. Stereotypical behavior assumes time structure: one needs a series of different models (or in one model, a series of similar events) in order to obtain universal quantification. So, what we should predict to find back in the analysis of stereotyping is basically the well-known distinction between so-called D-quantification and A-quantification originating in Lewis (1975) and extensively discussed in Bach et al. (1995). That is, the distinction between quantification over entities (all x have the property ‘ A ’) and quantification over situations (on all occasions o , x has the property ‘ A ’). This prediction is borne out:

- (18) a. Politicians are always unreliable.
 b. Italian men are always romantic.
 c. Whenever I see them, Flemings are anti-Walloon.

Note in passing that on the basis of the table at the beginning of this section, it would follow that Flemings are anti-anti-Flemings. This seems a reasonable consequence of (18c), when based on stereotypical truth.

From these considerations, it follows that a stereotype is basically a linguistic notion. That is, if we meet an expression of the form “That is a stereotype”, we should have to take the referent of *that* as a linguistic entity: a sentence, a statement, a proposition, a description, a representation. In short, one cannot very well say *?The stereotype taxied up to the runway*, whereas one can say *The prototype taxied up to the runway*.

6. Prototyping. Even though linguists have written about prototyping, a clear linguistic definition of what a prototype is has not yet been given. The notion of prototype discussed in Lakoff (1987) is psychological and not linguistic. Likewise, Kamp & Partee (1995) react to and follow Osherson & Smith (1981) in the definition of a concept as a quadruple, Osherson and Smith did not discuss a linguistic notion but rather a psychological category. They locate it in a quadruple $\langle A, d, p, c \rangle$ which is said to be in the extension of a concept, where A is a domain of objects, d is a binary distance function assigning to each pair of individuals in A a numerical value expressing how much they differ from each other, p a particular object in A and c a characteristic function partitioning A . The two papers do not disagree about the quadruple itself, rather about the way c ought to be defined, that is either in terms of fuzzy set theory (O&S) or in terms of supervaluation (K&P). In both cases, the leading idea is that the prototype p is an entity in A and that it qualifies itself as the best exemplar of A on the basis of comparison. It follows that linguists, in fact, are in the rear when it comes to gnawing at the prey.

As said above, the prototype of a car may indeed be parked in front of my house but not next to a stereotype. This car is a prototype in the sense of a first trial of a specific type or subtype (a model), but in what is called prototype theory this preoccupation with membership of a category has remained predominant. It is a robin which is, at the level of individual or category, a prototype within some category. So, it really seems that the notion of prototype applies to something in a domain which has a specific role to play with respect to other members of the domain, either as an individual or as a category. What remains for the lexically oriented linguist is to account for the way in which we talk about prototypes and also to account for the linguistic clues by which we signal that we are involved in the act of prototyping. *He's a real nowhere man*: is that a way to talk about a prototype? Are there specific linguistic means for identifying prototypes? Does an insight into these means contribute to a better understanding of the notion of a prototype? These sorts of questions arise and my hope is to provide an answer to them.

To begin with, we observe that there is a crucial difference between stereotyping and prototyping. Prototyping is built on the semantic relation of inclusion: a prototype competes with other subsets, even we focus on an individual x which is a prototype of something. The competitive nature of prototyping in terms of generalized quantification is captured by figure 5 below, in which the circles of figure 3 are replaced by squares.

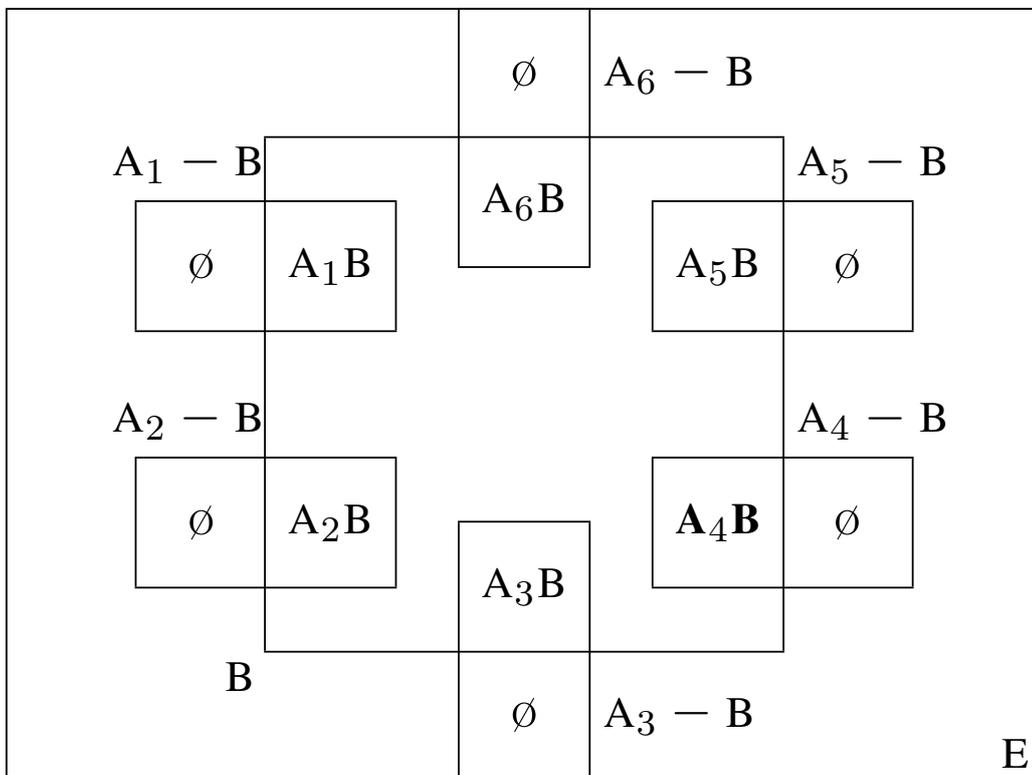


Figure 5: *Prototyping: a set of intersections*

If we say that a robin is a prototypical bird, we have to assume a superset B partitioned into a collection of subsets, of which the set of robins is given a specific role. A typical case of prototyping can be illustrated by figure 1: a nightingale may become the prototypical bird for songbirds winning out in the competition over thrushes, parakeets and robins. Note that all the subsets need to be treated along the lines of figure 3. More in general, given a number of sets A_1, A_2, \dots, A_n prototyping is based on at least two intersections, $A_i B$ and $A_j B$. Suppose B contains six subsets. In that case, figure 5 represents the intersections $A_1 B =$ the set of thrushes, $A_2 B =$ the set of parakeets, $A_3 B =$ the set of robins, $A_4 B =$ the set of nightingales, etc., with $A_1 - B, A_2 - B, A_3 - B,$ etc. all empty. The bold-faced intersection $\mathbf{A_4 B}$ figures as the prototype or as containing the prototype(s) of B , given a particular domain E or a series of E s. The latter follows from the fact that persistent inclusion is involved, i.e. inclusion in all models: prototyping is based on 1, 2, and 3 in figure 4.

In the section on stereotyping I pointed out that stereotypes show the behavior of universal quantification. I shall now compare stereotyping and prototyping by considering the transitivity of inclusion relations of the format (19).

$$(19) \quad \begin{array}{l} A \subseteq B \\ B \subseteq C \\ \hline A \subseteq C \end{array}$$

The following patterns show that this transitivity can be found in stereotyping but not in prototyping.

$$(20) \quad \begin{array}{ll} \text{a. Italian male} \Rightarrow_{\text{ST}} \text{Romantic} & \text{b. Italian male} \Rightarrow_{\text{ST}} \text{Romantic} \\ \text{Romantic} \Rightarrow_{\text{ST}} \text{Courteous} & \text{Romantic} \Rightarrow \text{Courteous} \\ \hline \text{Italian male} \Rightarrow_{\text{ST}} \text{Courteous} & \text{Italian male} \Rightarrow_{\text{ST}} \text{Courteous} \end{array}$$

$$(21) \quad \begin{array}{ll} \text{a. Nightingale} \Rightarrow_{\text{PR}} \text{Songbird} & \text{b. Nightingale} \Rightarrow_{\text{PR}} \text{Songbird} \\ \text{Songbird} \Rightarrow_{\text{PR}} \text{Bird} & \text{Songbird} \Rightarrow \text{Bird} \\ \hline \text{Nightingale} \not\Rightarrow_{\text{PR}} \text{Bird} & \text{Nightingale} \not\Rightarrow_{\text{PR}} \text{Bird} \end{array}$$

In (20), the entailments are justified on the basis of the universal quantification involved in the stereotyping. I have distinguished between a stereotyped second premise on the left-hand side and a genuine universal quantification on the right-hand side, but this makes no difference. The data in (20) are expected on the basis of what I said about stereotyping earlier. Note that one can simply establish the truth of the conclusion here. In (20a), the first premise is taken as axiomatic by a speaker S . If S also adopts the stereotype of the second premise, S is committed to the truth of the conclusion. As to (20b), if S takes the first premise as axiomatically true, when confronted with a generally accepted universal statement (say, it is in the dictionary), S is again committed to the truth of the conclusion.

As to prototyping, (21) gives an awkward result. Suppose that the first premise of (21a) is accepted as well as the second, both on the basis of prototyping. Then on normal inferencing it should follow that nightingales are the

prototypes of the bird-category. But (21a) shows that *bird* in fact has two prototypical categories, both songbirds and nightingales are prototypical. This gives the entailment an invalid flavor. But there is another problem with (21a), which also is inherent to (21b), where the second premise expresses a genuine universally true statement. The problem is that from the fact that nightingales are prototypical songbirds, it does not follow that they are prototypical birds. Even if it is true that nightingales are the prototypical songbirds, robins may remain the prototypical birds. This is peculiar because they happen to be songbirds.

This shows again that prototyping is essentially different from stereotyping, as it should on the basis of the analysis presented in this paper. A direct consequence of the present analysis of the two notions at issue is that it is predicted that prototyping may build on stereotyping. In other words, the emptiness of the $A_i - B$ -sets may be due to stereotyping. Take $\beta = \textit{real criminal}$ with $\alpha = \textit{Italian}$ and $\gamma = \textit{Russian}$ and $\delta = \textit{Chinese}$. Then genuine and, in this case quite extraordinary, stereotyping would be to empty $A - B$, $C - B$ and $D - B$ so as to obtain inclusion and then on top of this prototyping starts as soon as one subset is selected as representing B , in some sense of representing to be discussed below. This is not far-fetched, as one can perceive in real political discussions say in Israel, concerning the problem of Peace for Land, where we see some mixed form with $B =$ the set of those people (or their leaders) you really cannot trust and $\alpha = \textit{Arab}$, $\gamma = \textit{Americans}$, $\delta = \textit{English}$, among other predicates denoting nationalities or cultures. A speaker might be prepared to assume TNE-relations for some of the groups involved (but not necessarily when it comes to political behavior) but is certainly not prepared to do so for the interpretation of α , the reason being fundamental mistrust. So either α ends up denoting the only genuine subset and in this way becomes the prototype or there are other subsets as well and α becomes the prototype among these subsets. Thus, in Dutch, sentences expressing stereotypical prototyping like (22) can be expected.

- (22) a. Arabieren zijn bij uitstek onbetrouwbaar.
 Arabs are an outstanding example of unreliability.
 b. Ik ken geen volk dat zo onbetrouwbaar is als de Arabieren.
 I don't know any people who are so pre-eminently unreliable.

Note that apart from their content, these sentences are interesting because they show how the stereotyping may hide behind the prototyping. The prototyping part may be characterized as a wild nonsensical statement, but it should be seen that this can be done only on the basis of stereotypical quantification.

Another example showing the interaction between stereotyping and prototyping is (23).

- (23) Een studente is hèt voorbeeld van een zelfstandige vrouw.
 A female student is THE example of an independent woman.

Here we see that the set F of female students must first be stereotyped into a subset relation with the set I of independent women (I happen to know models in which female students are heavily dependent on their relatives or on their partner) and after this stereotyping F has to compete with other subsets of I such as

female business managers or female doctors, which as far as I can see are not always not created on the basis of some stereotyping (I happen to know dependent female doctors, but I admit it's quite hard to find dependent female business managers), so in this case we are again in the mixed form of prototyping. It is important to observe that there are two ways of denying (23): (a) on the ground that I prefer the business manager as prototypical; and (b) on the ground that I happen to know those dependent female students mentioned earlier.

In preparation for the next section one more example:

- (24) a. Een Fries staat in Nederland model voor stijfkoppigheid.
b. A Frisian represents stubbornness in Holland

Here again we need stereotyping—all Frisians are stubborn—in addition to which we must look to the other provinces of Holland in order to see whether there are even more severe cases of stubbornness; and on the basis of these considerations (24) states that the Frisian form is the prototype of stubbornness.

7. Figurative use of language and prototyping. My present fascination with the topic of stereotyping dates back from my discussion in Verkuyl (1993) of the twelfth impression of Van Dale, the leading Dutch dictionary, which contains many clear traces of anti-Semitism.¹⁰ I argued that the so-called mirror argument leading to definitions such as (25) is extremely dubious. The mirror argument says that dictionaries should give the lexical definitions as they are used in society. This should make (25a) and even similar definitions with labels like “⟨offensive⟩” or “⟨improper⟩” a fair representation of certain aspects of the use of the word *jew*.¹¹

- (25) jood (fig.) bedrieger
jew (fig.) cheat

In particular, the notion of figurative use is really malignant in this context and I argued that if indeed the TNE-relation between *Jew* and *cheat* should be given a place in a dictionary, the label ⟨stereotypical⟩ would be more appropriate as a warning.

In my view, figurative use should be captured on the basis of configuration 5 in figure 4: $AB = \emptyset$. Figure 6 exemplifies the basic idea with respect to sentence (26):

- (26) Hans is een ezel
Hans is an (utter) ass

¹⁰This section is based on ideas developed in that article and in the discussion it provoked: Van Calcar (1994), Geeraerts & Smessaert (1995;1997), and Verkuyl (1994b;1997a;1997b). As a matter of fact, Van Dale is not the only European dictionary having this sort of entries; cf. Verkuyl (1994a) for some discussion.

¹¹The mirror argument is false on many grounds, one of them being the simple fact that labels like “⟨offensive⟩” belong to a non-offended majority including the lexicographer. This leads to the awkward situation that the label warns against the use of the word *Jew* for characterizing cheats.

The figurative force of this sentence can only be operative on the basis of the assumption that Hans is not a donkey. So we start out with an $AB = \emptyset$, which is not an uncommon assumption in the study of the figurative use of language.

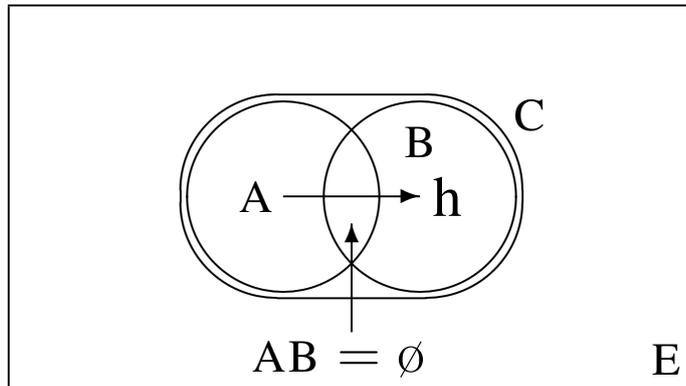


Figure 6: *Figurative pattern*

What happens is that in Dutch, given a superset C , say the set of genuinely dumb individuals, the name α (= *ezel*) is transferred to Hans who is a member of B , a set having no name in the present context in which (26) is interpreted. By this transfer we identify Hans as belonging to the set C . This is due to a special relation between A and C . This special relation is basically prototyping: (26) identifies the set of donkeys (asses) as the prototypical subset of C . One condition should be added: this identification takes place on the basis of the success of the metaphor. So, I do not claim that every metaphor is an instance of prototyping. My claim is that prototyping is closely related to the cognitive mechanism of using figurative language. Glucksberg & Keysar (1993) came to similar conclusions, but I disagree with their urge (1993:411) to think of the set C as receiving the name of A . In natural language we can often do without a lexical name using circumscriptions or implicit reference to supersets. I will show that shortly.

Let me study in some depth some of the implications of taking figure 6 as a point of departure by considering the sentences in (27).

- (27)
- a. Ruud is een Fries
Ruud is a Frisian/from Frisia
 - b. Lubbers is een Fries
Lubbers is a Frisian
 - c. Ruud is een echte Fries
Ruud is a real Frisian
 - d. Ruud is het prototype van een Fries
Ruud is a prototypical Frisian
 - e. Lubbers is een echte Fries
Lubbers is a real Frisian

Sentence (27a) simply states that Ruud belongs to the set of Frisians. Of course, the sentence may be used to explain something in Ruud's behavior in terms of a property stereotypically assigned to Frisians, namely that they are stubborn. But it is not necessary in the case of (27a). In (27b), however, the first interpretation of (27a) cannot be true because our ex-prime minister Ruud Lubbers is not from Frisia and being a Catholic rather than a Calvinist different stereotypes are to be applied to him as a political figure. But suppose we really mean to say (27b). In that case we end up with figurative use. With respect to a certain situation in which Lubbers is perceived as being stubborn, (27b) attributes figuratively to him the property of stubbornness on the basis of Frisians being prototypically stubborn in our Dutch culture.¹² That is, we use the predicate 'be Frisian' figuratively to characterize Lubbers in terms of a property attributed to Frisians and relevant given a superset C to which the Frisians as well as Lubbers belong.

In fact, figure 6 applies fully to (27b) with A = Frisian, C = stubborn Dutch and h = Lubbers, B remaining unlabeled. What the first speaker of (27b) obtains is the equation $A \cup \{h\} = C$, because B is simply the unstructured complement of A in C . The problem is that the lexicon does not contain a name for $A \cup \{h\}$. So, here we get a look at the birth of an extension of meaning. Applied to (26), a successful reception of this sentence the first time that *ezel* has been used figuratively will inevitably lead to its repetition with regards to other people and so we can easily see the pressure to extend the meaning of *ezel* so as to cover human beings. Here we see the origin of polysemy and maintain that prototyping is an essential part of it. Glucksberg and Keysar's *Mary's marriage became a jail* also fits in this picture if we take Mary's marriage as h in figure 6 with A as the set of institutions called *jail* having involuntary and confining properties they speak about. The set C is what brings the institution h and A into $A \cup \{h\}$ and in this way expansion takes place (1993:414).

Returning to Ruud who is a Frisian and considering (27c), we see that this sentence does NOT give the name of the prototypical subset of the set C : the complex noun *echte Fries* 'real Frisian' does not denote C of figure 6.¹³ In fact, we see that C =Frisians and that the use of *echte* (real) purports to put Ruud into the prototypical subset A of the Frisians, however, without identifying A by a linguistic label: A has no name, it is circumscribed. Or rather, it is assumed by the speaker that the hearer knows what a prototypical Frisian is. Note that (27e) is simply false. The predicate *is een echte Fries* cannot be used figuratively to indicate that Lubbers has the property of stubbornness. So, here we see that speakers clearly signal their wish to speak about x in terms of x 's belonging to an as yet unidentified prototypical subset. Note that in the cases discussed here

¹²I do not commit myself to this prototypicality, but the expression *Friese stijfkop* (Frisian bull-head) is idiomatic.

¹³Cf. *Hij is een typische Patijn* (He is a typical Patijn): this can only mean that he belongs to the family Patijn and that he is at the center of the characterizing properties of this family (say, public service). In *Hij is een Patijn* (Hij is een Patijn) one has available the figurative use 'He behaves like a Patijn' in the same way as one may say in (27b) that Lubbers is a Frisian knowing that that is not true.

we see a clear difference between naming a prototype directly and implying or circumscribing it. A lot of linguistic work has to be done to identify the different ways in which speakers single out their special attention for some of the predicates that they use to speak about the domain of interpretation at hand.

8. Conclusion I think that there are sufficient linguistic arguments to distinguish meaningfully between stereotyping and prototyping. Given this distinction in terms of bottom-up vs. top-down perspective on information stored in a knowledge base (in our case, our mental lexicon), it has been argued that figurative use turns out to be a way to identify prototypical subsets. As soon as the figurative force of a sentence disappears, the process of extension of meaning leading to polysemy begins.

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