Some Perspectives on Lexical Pragmatics

Reinhard Blutner

1 Introduction

Lexical pragmatics starts from the hypothesis that the meaning expressed by a lexical unit is underdetermined by its semantics and provides a framework to study the processes involved in bridging the gap between the encoded and the communicated meaning of lexical units. The aim of this paper is to provide a concise introduction to lexical pragmatics, to explain some perspectives and problems in this research field, and to highlight some possible future developments.

The basic idea of lexical pragmatics was launched in a now classical paper (McCawley, 1978). Discussing several examples – including the much quoted example in which *kill* and *cause to die* are distinguished, McCawley argued that 'a lexical item and a syntactically complex equivalent of it may make different contributions to the interpretation of a sentence without making different contributions to its semantic structure' (McCawley, 1978: 257). Alluding to Grice's (1967) maxims of conversation, McCawley demonstrated that the difference between the linguistically encoded semantic structure and the suggested interpretation is a consequence of general principles of cooperative behaviour and as such is systematic and predictable. As a consequence, he claims, there is no need to formulate idiosyncratic restrictions that must be incorporated into the relevant lexical entries in order to restrict the system of interpretations. The suggested division of labour between semantics and pragmatics has important consequences for keeping semantics simple and for applying the semantic tool of decomposition.

In the next section, I will explain the basic phenomena that are discussed within lexical pragmatics. In Section 3, I will outline the philosophical and methodological background underlying lexical pragmatics, and the main proponents of this research field, relevance theory and optimality theory, are identified. Section 4 discusses the optimality theoretic approach to lexical pragmatics including a straightforward treatment of the idea of fossilization. Section 5 discusses some puzzles and open problems and draws some tentative conclusions.

2. Basic phenomena

Lexical pragmatics investigates the mechanisms by which linguistically-specified word meanings are modified in use. Following Wilson (2003) and Carston (2002), we can distinguish three basic phenomena: narrowing, approximation and metaphorical extension.

2.1 Narrowing

Narrowing refers to the use of a lexical item to convey a more restricted interpretation than the semantically encoded one. Examples are the use of the word *drink* to mean 'alcoholic drink' or the use of *smoke* to mean 'smoke your joint' (at least in Amsterdam, where everybody knows the request 'please smoke inside').

Another example concerns the interpretation of reciprocals (Dalrymple, Kanazawa, Kim, Mchombo, and Peters, 1998). Consider for instance the following example:

(1) a. The girls saw each other.

b. The girls are sitting alongside each other.

Sentence (1a) entails that every girl saw every other girl. This contrasts with sentence (1b) which obviously does not entail that each of the girls is sitting alongside each of the others (expressing a much weaker proposition, instead). The interpretation that is strongly preferred in these and similar cases is best described by the *strongest meaning hypothesis*: A reciprocal sentence is interpreted as expressing the logically strongest candidate truth conditions (given a lattice of propositions that structures the set of possible interpretations) which are not contradicted by known properties of the relation expressed by the reciprocal scope when restricted to the group argument. The starting point for this kind of strengthening is the minimal meaning that can be expressed by reciprocal sentences. Subsequent work has suggested extending the application of the strongest meaning hypothesis to the treatment of plurals (Winter, 2001), prepositions (Zwarts, 2003) and quantification (Blutner, Hendriks, and de Hoop, 2003).

The interpretation of adjectival modification provides another example of narrowing (Lahav, 1989). Normally, adjectives like *red, pregnant,* or *straight* are considered to be *intersective* adjectives, i.e. their meaning can be represented by one-place predicates and the combinatorial semantic operation that corresponds to adjectival modification is the intersection operation. Interestingly, Fodor & Pylyshyn (1988) conclude that these assumptions may explain the feature of systematicity in the case of adjectival modification. For example, when a person is able to understand the expressions *brown cow* and *black horse*, then she should understand the expressions *brown horse* and *black cow* as well.

Unfortunately, the view that a large range of adjectives behaves intersectively has been shown to be questionable. For example, Quine (1960) notes the contrast between *red apple* (red on the outside) and *pink grapefruit* (pink on the inside), and between the different

colours denoted by *red* in *red apple* and *red hair*. In a similar vein, Lahav (1989, 1993) argues that an adjective such as *brown* doesn't make a simple and fixed contribution to any composite expression in which it appears.

> In order for a cow to be brown, most of its body's surface should be brown, though not its udders, eyes, or internal organs. A brown crystal, on the other hand, needs to be brown both inside and outside. A book is brown if its cover, but not necessarily its inner pages, are mostly brown, while a newspaper is brown only if all its pages are brown. For a potato to be brown it needs to be brown only outside. Furthermore, in order for a cow or a bird to be brown, the brown color should be the animal's natural color, since it is regarded as being 'really' brown even if it is painted white all over. A table, on the other hand, is brown even if it is only painted brown and its 'natural' color underneath the paint is, say, yellow. But while a table or a bird are not brown if covered with brown sugar, a cookie is. In short, what is to be brown is different for different types of objects. To be sure, brown objects do have something in common: a salient part that is wholly brownish. But this hardly suffices for an object to count as brown. A significant component of the applicability condition of the predicate 'brown' varies from one linguistic context to another. (Lahav, 1993: 76)

Polysemous nouns such as *opera*, *concert*, *school*, and *government* (Nunberg, 1979) povide a third illustration of narrowing. For instance, we can identify three conceptual variants for the interpretation of *school* – the institution-, building-, and process-readings:

(2) a. The school is part of a highly successful chain of language schools. (institution-reading)

b. The school is situated in the centre of the city. (building-reading)

c. The school takes place away from the mainland. (process reading)

Bierwisch (1983) stresses that the semantic entry for these *institutional nouns* is underspecified with regard to the level of conceptually salient sense. He proposes a certain 'purpose' representing the core meaning of a given institutional noun. For instance, the purpose for 'school' is teaching and learning. It is this semantic condition which discriminates the core meanings from each other. Further, Bierwisch (1983) proposes several functions or 'templates' for specifying the particular interpretations of the noun under discussion. In the case of 'school', these functions refer to conceptual primes specifying institutions, buildings or processes related to the given purpose.[1]

2.2 Approximation

Approximation refers to the process of interpretive broadening where the interpretation of a word with a restricted core meaning is extended to a family of related interpretations. Cases in point are loose uses of numbers (e.g., *1000 students* used to mean 'about 1000 students'; cf. Krifka, 2007a), geometric terms (e.g., *square* used to mean 'squarish'; cf. Wilson, 2003), colour adjectives, where the precise colour value can deviate from the lexically addressed focal colour (e.g., *red* in *red nose*, *red bean*, and *red flag*). Recanati (2004) introduced the term 'modulation' to describe the underlying mechanism of contextual modification. Providing a precise model of this mechanism is one of the big challenges facing lexical pragmatics.

[1] For a more detailed discussion of Bierwisch (1983) and related approaches, the reader is referred to Blutner (2002).

2.3 Metaphorical extension

Metaphorical extension is a type of broadening that extends the space of possible interpretation much more radically than approximation. A good introductory example is English perception words (cf. Sweetser, 1990). Following John Locke and Ferdinand de Saussure, Sweetser (1990) claims that the feature of arbitrariness could be taken as a sufficient condition for the presence of semantic information. It is certainly an arbitrary fact of English that *see* (rather than, say, *buy* or *smell*) refers to visual perception in an utterance such as 'I *see* the tree'. Given this arbitrary association between a phonological word and its meaning, however, it is by no means arbitrary that *see* can also have an epistemic reading, as in 'I *see* what you're getting at'. Moreover, it is not a coincidence that other sensory verbs such as *smell* or *taste* are not used to express an epistemic meaning. Sweetser (1990) sketches an explanation for such facts and insists that they have to do with conceptual organization. It is our *knowledge* about the inner world that accounts for vision and knowledge being highly related, in contrast to, say, smell and knowledge or taste and knowledge, which are only weakly related for normal human beings. If this claim is correct, then the information that *see* may have an epistemic meaning but *smell* and *taste* do not, no longer needs to be stipulated semantically. Instead, this information is pragmatic in nature, having to do with the utterance of words within a conceptual setting, and can be derived by means of some general mechanism of conceptual interpretation.

Another case of broadening that cannot be classified as approximation is the phenomenon of *predicate transfer* (Nunberg, 1979; Sag, 1981; Nunberg, 1995), exemplified by the following:

(3) a. The ham sandwich is sitting at table 9. (Preferred Interpretation: The one who ordered a ham sandwich is sitting at table 9)

b. There are five ham sandwiches sitting at table 9. (Preferred Interpretation: There are five people who ordered ham sandwiches sitting at table 9)

c. Every ham sandwich at the table is a woman. (Preferred Interpretation: Everyone who ordered a ham sandwich is a woman).

Sag (1981) and Nunberg (1995) assume that the intension of the head noun (ham sandwich) has to be transferred to another property in order to get the intended (Nunbergian) interpretation (preferentially to the property of being the orderer of the ham sandwich).

Wilson (2003) discusses another variety of broadening, *category extension*. Typical examples are salient brand names (*Hoover, Kleenex*) which are used to denote a broader category ('vacuum cleaner', 'disposable tissue') including items from less salient brands. Further, certain prominent personal names lend themselves to category extension:

(4) Stefan is the new *Hilbert.*

(5) Federer is the new *Sampras*.

In (4), *Hilbert* evokes the category of gifted mathematicians, and *Sampras* in (5) evokes the category of gifted tennis players of a certain type. As Wilson (2003) stresses, these examples of category extension are not analyzable as approximations. The claim in (5) is not 'that Federer is a borderline case, close enough to being Sampras for it to be acceptable to *call* him Sampras, but merely that he belongs to a broader category of which Sampras is a salient member' (Wilson 2003: 345).

Other cases of metaphorical extension are more radical extensions of semantically specified interpretations, as illustrated by the following examples:

(6) The president has been *under fire* for his veto.

(7) My memory is *a little foggy.*

3. Theoretical prerequisites

Providing a categorization of different basic phenomena does not mean that we have to assume different computational mechanisms for explaining these phenomena. Rather, it is theoretically much more satisfying to look for a unified theory of lexical pragmatics. Presently, we find two main attempts at realizing such a unified approach. The first is based on *relevance theory* (Sperber and Wilson, 1986/1995), the second on *optimality theoretic pragmatics* (Blutner, 1998; Blutner and Zeevat, 2004; Blutner, de Hoop, and Hendriks, 2005). Both approaches agree on a number of important assumptions. For instance, both approaches take a naturalistic stance with regard to pragmatics and pursue the same main goal: developing a cognitive psychological model of lexical interpretation. This contrasts with the normative character that is generally attributed to the Gricean approach.

Further, both relevance theory and optimality theoretic pragmatics claim that the linguistic semantics encoded by a natural language expression underdetermines what is communicated by an utterance of that expression. Taking a lead from Atlas (e.g., Atlas 2005), both theories reject the doctrine of literal meaning, i.e. the idea that the *logical form* of a sentence conforms to its literal meaning, Instead, they assume *contextualism*, i.e. the claim that the mechanism of pragmatic interpretation is crucial both for determining what the speaker says and what he or she means (see Carston, 2002).

At this point, it seems appropriate to take a broader look at the variety of approaches to natural language interpretation. As Recanati has made clear in several publications (e.g.,

Recanati, 1995, 2004, 2005), most approaches to natural language interpretation can be classified along a range of attempts from radical literalism to radical contextualism. Radical literalism refers to an extreme literalism starting with a strict separation between semantics and pragmatics. It assumes that literal meaning can be determined in a purely linguistic way by looking at the semantic contributions made by the syntactic constituents of a sentence and their mode of composition. Hence, the contextual infiltration of semantics is very limited. Context-dependencies can only arise from indexical expressions, i.e. words such as 'I', 'you', and 'tomorrow' or demonstratives phrases such as 'this man' and 'that building'. No underdetermination of natural language expression is involved in these cases. Generally, the existence of underdetermination is rejected by radical literalism. A further hallmark concerns the existence of *unarticulated constituents*. This term refers to the idea of explaining the near equivalence of sentences such as 'it is raining' and 'it is raining here' by assuming an unarticulated constituent of place in the first sentence. It is a *constituent*, because there is no truth-evaluable proposition unless a place is supplied (since rain occurs at a time in a place). It is *unarticulated*, because there is no morpheme that designates that place (cf. Perry, 1993). Radical literalism doubts the existence of unarticulated constituents.

The other extreme is radical contextualism. Radical contextualism doubts the existence of a level of sentence meaning which can be expressed by minimal propositions. It assumes underdetermination instead and it assumes the existence of unarticulated constituents. Relevance theorists, optimality theoretic pragmaticists and philosophers like Searle (1979) and Travis (1989) tend to the position of radical contextualism. Authors such as Bierwisch (1983), Cappelen & Lepore (2005), Borg (2004), and Bosch (1995, 2009) are typical representatives of radical literalism.

There are two main positions between the radical poles: moderate literalism and the syncretic view (Recanati, 2006). Moderate literalism (Stanley, 2000; Taylor, 2001)[2] accepts semantic underdetermination but rejects unarticulated constituents. It contrasts with radical literalism by allowing elements of underdetermination at the level of meaning (or logical form). Consider the following two sentences in order to make the point clear:

(8) Robert is tall.

(9) John weighs 80 kg.

A moderate literalist is likely to grant that (8) is genuinely context-sensitive. The adjective 'tall' seems to include a free variable that can be specified by some norm (for a what is Robert tall? Is he tall for an adult or for a young child?). Stanley (2000) assumes that this intuitive constituent is 'articulated' by a free variable (which is controlled by operators in the sentence). Interestingly, also the interpretation of (9) is affected by contextual factors, but in a much less direct way, and the moderate literalist is likely to deny that what is said by (9) is context-sensitive. Consider first the sentence (9) in a scenario where John has had a heart attack and the doctor is asking about his weight. The second scenario is when John is about to step on an elevator with a capacity of no more than an extra 80 kg. In scenario A, the speaker evidently communicates a proposition about the weight of John's naked body. In scenario B, the speaker communicates a different proposition about the combined weight of John's naked body, his clothing, his handbag, etc. A radical contextualist has to account for the context-sensitivity of (8) and (9) in a uniform way in expressing what is said by these sentences. The moderate literalist is likely to assume a minimal proposition in

[2] *Moderate literalism* is Recanati's term (e.g., Recanati, 2006). Others (including Taylor, 2001) call it *moderate contextualism.*

case of (9) capturing what is literally expressed by the different utterances of (9). It needs *secondary pragmatic processes* (Recanati, 2004, 2005, 2006) to express the additional interpretational differences since the moderate literalist would insist that the pragmatically enriched proposition is not *directly* asserted by the speaker.[3]

A second position between the two extremes, the *syncretic view*, accepts underdetermination and unarticulated constituents but it assumes a minimal proposition for expressing the meaning of a whole sentence. Recanati (2006) uses an example from Searle (1980) to explain this position. Searle considers the verb 'cut', which is not ambiguous in his view. However, in 'Bill cut the grass' and 'Sally cut the cake', it makes quite different contributions to the truth-conditional content of the utterance. This is because the background conditions (conceptual knowledge) underlying the verb 'cut' in connection with grass and cake are different, as described by Searle:

> The sort of thing that constitutes cutting the grass is quite different from, e.g., the sort of thing that constitutes cutting a cake. One way to see this is to imagine what constitutes obeying the order to cut something. If someone tells me to cut the grass and I rush out and stab it with a knife, or if I am ordered to cut the cake and I run over it with a lawnmower, in each case I will have failed to obey the order. That is not what the speaker meant by his literal and serious utterance of the sentence.
>
> (Searle, 1980: 222-223)

[3] The position of the moderate literalist is slightly different from the position taken by researchers who avoid speaking of underdetermination and introduce instead hidden indexicals or quasi-deictic elements (e.g., Sag 1981; Bierwisch, 1983; Bartsch, 1987; Bosch, 2009).

According to the syncretic view, sentences such as 'Cut the grass' express something very abstract, which is independent of the concrete background assumptions. This abstract propositional content is derived from the underspecified meaning of 'cut' and the meanings of the other context-independent constituents of the sentence. The calculated meaning of our sample sentence abstracts from particular uses – even generalizing over such strange uses as in Searle's example.

For other examples that make a similar point, we refer to the discussion of Quine's and Lahav's examples in Section 2.1. According to the syncretic view, a sentence like 'this apple is red' expresses a proposition that abstracts from the details of what part of the apple is red and to what extent. It simply means 'some part of the apple is red'.

There is a problem with the syncretic approach. In the apple example, for instance, conceptual knowledge about how apples are normally coloured is required in order to get something genuinely truth-evaluable. The sentence 'this apple is red' does not denote an apple whose inside is red and most of whose peel is green. Normally we call such an object a green apple, which is red inside. Hence, our intuitions about the truth-conditional content of this sentence are clearly context-sensitive. This example provides a vivid illustration of the need for *truth-functional pragmatics* (to use a term favoured by Recanati, 2004; see also Carston, 2006).

All the examples discussed in Section 2 for motivating narrowing, approximation, and metaphorical extension demonstrate the view that the truth-conditional content of the corresponding sentence is context-sensitive and call for a truth-functional pragmatics. (For more discussion, see Blutner, 2006). In this vein, radical contextualism can be seen as the methodological and philosophical foundation of lexical pragmatics. Moderate literalism and

the syncretic view marginalize the idea of truth-functional pragmatics and radical literalism totally rejects this idea and the whole idea of lexical pragmatics. Radical literalism simply conflicts with the core idea of lexical pragmatics that lexical units are underdetermined by their semantics. All the other positions agree in admitting at least some elements of underdetermination.

Let us come back now to the main theoretical frameworks of implementing lexical pragmatics: relevance theory and optimality theoretic pragmatics. Besides the similarities I mentioned already, there are also important differences between the two approaches. Optimality theoretic pragmatics follows the neo-Gricean idea of assuming that two countervailing principles determine the interpretation mechanism (Atlas and Levinson, 1981; Horn, 1984; Blutner, 1998; Atlas, 2005; Horn, 2005; Huang, 2009): the Q principle and the R principle. The first principle is oriented toward the interests of the hearer and looks for optimal interpretations; the second principle is oriented to the interests of the speaker and looks for expressive optimization. In optimality theory, these principles correspond to different directions of optimization where the content of the optimization procedure is expressed by particular optimality theoretic constraints.

In contrast, relevance theory sees the communicative principle of relevance as the only effective principle. According to this principle, utterances convey a presumption of their own optimal relevance. That means that any given utterance can be presumed (i) to be at least relevant enough to warrant the addressee's processing effort and (ii) to be the most relevant one compatible with the speaker's current state of knowledge and her personal preferences and goals.

Obviously, both relevance theory and optimality theoretic pragmatics account for the resolution of the conflict between communicative effect and (processing) effort. This observation, and the fact that both approaches have a number of 'free parameters' for fitting the empirical data, makes a direct comparison relatively difficult. The notion of *blocking*, which is present in optimality theoretic pragmatics but missing in relevance theory, is presumably a substantial difference between the two approaches. The general idea is that a specialized item can block a general/regular process that would lead to the formation of an otherwise expected interpretation equivalent to it. For example, in English the specialized mass terms *pork, beef* and *wood* usually block the 'grinding' process which would otherwise give an uncountable reading for the countable nouns *pig, cow* and *tree.* This explains the following contrasts: 'I ate *pork/?pig*'; 'I like *beef/?cow*'; 'The table is made of *wood/?tree*'. It is important to note that blocking is not absolute, but may be cancelled under special contextual conditions (cf. Blutner, 1998). This suggests that the blocking phenomenon is pragmatic in nature and may be explicable on the basis of Gricean principles.

A relevance theoretic approach to lexical pragmatics has been developed in Carston (2002), Wilson (2003), and Wilson and Sperber (2002), *inter alia*. The main idea is that the linguistically encoded meaning of a word is no more than an indication of the actual interpretation or utterance meaning. Hence, the interpretation is not decoded but has to be inferred by a pragmatic mechanism. Furthermore, understanding any utterance, literal, loose or metaphorical, is a matter of seeing its intended relevance, as specified in the relevance-theoretic comprehension procedure. In other words, relevance theory 'suggests the following answers to the basic questions of lexical pragmatics: lexical-pragmatic

processes are triggered by the search for relevance, they follow a path of least effort, they operate via mutual adjustment of explicit content, context and cognitive effects, and they stop when the expectations of relevance raised by the utterance are satisfied (or abandoned).' (Wilson, 2003: 282).

4. The optimality theoretic approach to lexical pragmatics

Bidirectional optimality theory falls within the family of linguistic models that are based on the optimization of linguistic output against a system of ranked constraints (Blutner, 2000; Blutner and Zeevat, 2004; Blutner et al., 2005). This theory provides a general procedure of optimization of the relation between form and meaning, simultaneously optimizing in both directions, from meaning to form, and from form to meaning. This distinguishes bidirectional optimality theory from unidirectional optimality theoretic semantics (Hendriks and de Hoop, 2001) – optimizing from form to meaning – and from unidirectional optimality theoretic syntax (Grimshaw, 1997) – optimizing from meaning to form.
To put it in a nutshell, bidirectional optimality theory evaluates form-meaning pairs. As described in Blutner (2000), there are two ways of defining optimality in a bidirectional setting, a strong way and a weak way. The strong version is based on the standard definition of optimality, applying this to candidate pairs instead of output elements.

The weak version uses a recursive definition of super-optimality of form-meaning pairs. A form-meaning pair is super-optimal if and only if there is no other super-optimal pair with a better form that expresses the same meaning, and there is no other super-optimal pair with a better interpretation of that same form. What counts as 'better' in this definition is determined by the constraints, and usually boils down to less marked. Usually, strong

optimization gives only one optimal form-meaning pair, with the best form and meaning paired up. Weak optimization allows us to also pair up marked forms and meanings. As argued in Blutner (2000), this allows us to capture what is known as Horn's division of pragmatic labour: pairing unmarked forms with unmarked meanings, and marked forms with marked meanings. This way of associating forms and meanings is seen throughout many lexical and grammatical domains (McCawley, 1978; Horn, 1984; Levinson, 2000).

The idea of using optimality theory for formalizing lexical pragmatics was first proposed by Blutner (2000). There are now several case studies demonstrating the power of the formalism. Jäger and Blutner (2000, 2003) suggested an optimality theoretic analysis of the different readings of German 'wieder' (again). Henriëtte de Swart (2004) provided an optimality theoretic approach to the pragmatics of negation and negative indefinites. Referring to the stage level/individual level contrast, Maienborn (2004, 2005) argued against the popular view that the distinction between stage level predicates and individual level predicates rests on a fundamental cognitive division of the world that is reflected in the grammar. Instead, she proposed a pragmatic explanation of the distinction, and gives, *inter alia*, a discourse-based account of Spanish *ser*/*estar*. Other applications include the pragmatics of dimensional adjectives (Blutner and Solstad, 2000), the analysis of Dutch 'om'/'rond' (Zwarts, 2006), the pragmatics of negated antonyms (Blutner, 2004; Krifka, 2007b), the approximate interpretation of number words (Krifka, 2007a), and several examples of semantic change (Eckardt, 2002). Following Zwarts, Hogeweg, Lestrade and Malchukov (2009), I will explain the basic ideas of this approach by means of a simple example: the specification of gender in animate nouns.

4.1 The specification of gender in animate nouns

The gender opposition female – male embodies a contrast that led Roman Jakobson to formulate the concept of *markedness* first described in his work on the structure of the Russian verb (Jakobson 1984). Considering the difference between Russian *oslíca* 'she-ass' and Russian *osël* 'donkey', Jakobson notes that the feminine gender noun *oslíca* represents a marked category used only for a female animal of the species, where the corresponding masculine gender noun *osël* is used in a general sense for animals of both sexes. This latter reading we will call the 'kind reading' (referring to the animal as a 'kind' without specifying its sex). Jakobson observed further that in a specific context of contrast the female meaning may be cancelled, leaving only the male meaning: *èto oslíca?* 'Is it a she-ass?' – *nét, osël* 'no, a donkey'. Thus, depending on context, the unmarked (or neutral) form can be used either inclusively, subsuming the marked, or exclusively, in opposition to the marked.

The main approach to handling markedness in a formal way is what I will call the *default approach*. This approach starts with describing the marked term by specifying the relevant lexical features; in the case of *oslíca* it is 'female':

(10) *oslíca*: F

However, no such specification is given in case of *osël*. In this case we can specify the relevant feature only by default, i.e. by a normative statement of a general preference, also called a markedness convention (Chomsky and Halle, 1968; Kean, 1995). In the case under discussion, the default is 'male' (M). Hence, we get the following specification by default:

osël: M

The default mechanism accounts for the observation that in certain contexts the default specification can be cancelled. However, this approach has the general problem that we always get a particular specification, either by default or from the context that overwrites the default. We never get the kind (K) interpretation. What we need is a mechanism that makes sure that the unmarked term can alternate between the general and specific interpretations:

(11) a. *osël*: M b. *osël*: K c. *oslíca*: F

There is a series of other examples illustrating the asymmetric pattern of opposition; see the following examples in English where the first two exhibit male stereotypicality and the last two exhibit female stereotypicality:

(12) a. *actor*: M b. *actor*: K c. *actress*: F

(13) a. *dog*: M b. *dog*: K c. *bitch*: F

(14) a. *cow*: F b. *cow*: K c. *bull*: M

(15) a. *sheep*: F b. *sheep*: K c. *ram*: M

Further problems for the classical markedness theory are discussed, among others by Haspelmath (2006) and Zwarts et al. (2009). For example, there are these puzzling examples of symmetric alternations:

(16) a. *widow*: F b. ? : K c. *widower*: M

(17) a. *prince*: M b. ? : K c. *princess*: F

(18) a. *mare*: F b. *horse*: K c. *stallion*: M

(19) a. *nurse*: F b. *nurse*: K (e.g., *male nurse*)

In (16) the male term is marked, in (17) it is the female term. However, there is no kind reading for either of these terms. Something similar happens in (18) where a special term

(horse) is used for the kind reading.[4] Another exceptional term is *nurse* (20) which has a clear female stereotype but it allows for the kind reading in certain constructions.

As pointed out by Zwarts et al. (2009), bidirectional optimality theory provides a solution to the problems of semantic markedness in gender opposition. Consider first Jacobson's example with the terms *osël*/*oslíca*. In this case we have six possible form-meaning pairs that are in competition with each other. These six pairs are illustrated by the left column of Table 1.

Table 1. Optimality theoretic tableau demonstrating strong bidirectionality with two terms, three meanings and one constraint

		oslíca ⇔ F
☞	*osël*, M	
	osël, F	*
☞	*osël*, K	
	oslíca, M	*
☞	*oslíca*, F	
	oslíca, K	*

Source: adapted from Zwarts et. al (2009)

[4] The horse terminology is much more complex than shown in (18). For instance, there is the term 'colt' referring to a young, uncastrated male horse between the age of birth and 4 years. In contrast, the term 'filly' refers to a young female horse who has not yet had a foal between the age of birth and 4 years. Further, the term 'gelding' is used for a castrated male horse and the term 'stallion' is used for an uncastrated adult male horse over 4 years of age. The problem of markedness is related to the problem of categorization as discussed within the framework of cognitive linguistics (e.g., Taylor, 2002).

Following Zwarts et al. (2009), we only have to introduce one lexical constraint for directing the mechanism of competition: *oslíca* ⇔ F. This constraint says 'use the word *oslíca* if and only if the meaning is female'. As indicated in Table 1, only those candidates that pair a female marker with a form other than *oslíca* and those candidates that pair up the form *oslíca* with a meaning other than 'F' violate this constraint (indicated by *). Hence, on the basis of this one constraint and by using the strong version of bidirectional optimization we get exactly the three pairs that were stipulated in (12).

It is not difficult to see how the examples of symmetric alternations can be analyzed: for example (16) we need two lexical constraints *widow* ⇔ F and *widower* ⇔ M; similarly, for example (17); for example (18) we have to add an extra lexical rule for the term 'horse': *horse* ⇔ K; for the nurse domain (19), we have to consider one term only and a competition between three meanings, which require one lexical rule: *nurse* ⇔ F.

I have already mentioned that depending on context, the unmarked (or neutral) form can be used either inclusively (subsuming the marked) or exclusively (in opposition to the marked). To describe the influence of context, Zwarts et al. (2009) introduce a constraint of gender relevance (GREL) which can be in one of two states, + or –, depending on the context: GREL (+) applies if gender distinction is relevant. It penalizes the 'K' value. GREL (−) applies if gender distinction is irrelevant. It penalizes the 'M' and 'F' values. Table 2 gives an example for a context where gender is important (cf. Jakobson's example, repeated here: *èto oslíca?* 'Is it a she-ass?' – *nét, osël* 'no, a donkey').

Table 2: Selecting strongly optimal pairs in a gender-relevant context

		oslíca ⇔ F	GREL (+)
☞	*osël*, M		
	osël, F	*	
	osël, K		*
	oslíca, M	*	
☞	*oslíca*, F		
	oslíca, K	*	*

Source: adapted from Zwarts et. al (2009)

What about the motivation of the lexical constraints introduced so far? This is one of the important research questions that cannot be answered by the present kind of analyses using strong bidirectionality. Why is it the *male* reading that is associated with the 'short' (unmarked) term *osël* and the *female* reading that is associated with the other, 'longer' (marked) term? Generally, these questions concern the *evolution* of lexical constraints. In the following subsection, I will discuss some factors that determine the formation of lexical constraints in domains with gender opposition.

4.2 Fossilization

The idea of fossilization refers to the mechanism of the conventionalization of implicatures, i.e. a mechanism for sanctioning certain interpretations. The idea was first developed in Geis and Zwicky's (1971) paper on 'invited inferences'. A closely related approach is Morgan's (1978) theory of short-circuited implicatures, where a fundamentally pragmatic mechanism has become partially grammaticalized. Using this idea, Horn and Bayer (1984)

propose an elegant account of so-called neg-raising, i.e. the availability (with certain predicates) of lower clause understandings of higher clause negations. Here is an example:

(20) a. Surface form: Robert doesn't think Stefan left.

b. Interpretation: Robert thinks Stefan didn't leave

The principal difficulty for pragmatic treatments of these neg-raising interpretations is the existence of lexical exceptions to the process, i.e. we find pairs of virtual synonyms where one member allows the lower clause understanding and the other blocks it. One of Horn and Bayer's (1984) examples concerns opinion verbs. For instance, Hebrew *xogev* 'think' permits neg-raising readings while *maamin* 'believe' does not. Interestingly, the opposite pattern obtains in Malagasy. In French, *souhaiter* 'hope, wish' exhibits neg-raising, but its near-synonym *espérer* does not – although its Latin etymon *sperare* did. Horn and Bayer (1984) argue that conversational implicatures may become conventionalized ('pragmatic conventions') and this conventionalization sanctions neg-raising.

The short-circuiting of implicatures as a matter of convention has important empirical consequences for lexical pragmatics. *Inter alia*, these consequences were discussed in connection with the classical pattern of constructional iconicity (or Horn's (1984) division of pragmatic labour) which holds that unmarked forms preferentially correspond to unmarked meanings and marked forms preferentially correspond to marked meanings. McCawley (1978) listed numerous cases of constructional iconicity in the lexicon, the most famous of which was mentioned earlier in connection with *kill* (denoting direct causation) and *cause to die* (denoting indirect causation). Krifka (2007a) observed that the phenomenon is the decisive factor in determining the precise/vague interpretation of measure expressions.

In optimality theoretic pragmatics, the notion of weak bidirectionality (super-optimality) was introduced as a solution to account for the kind of recursive optimization that takes place during language change (Blutner, 1998, 2000). The concept of fossilization refers to the transformation of a *weak* bidirectional optimization into a *strong* one (Blutner, 2006, 2007a). For example, the weak system describes the phenomenon of constructional iconicity (linking unmarked forms with unmarked meanings and marked forms with marked meanings) through a recursive optimization process. This is a costly process that does not work in this way in online processing (Blutner, 2007b). Instead, the effect of super-optimization will be fossilized into a psychologically more realistic model of strong optimization.

I will illustrate the idea of fossilization with Jakobson's example of gender opposition in animate nouns. Following Zwarts et. al (2009), I will argue that lexical constraints are fossilized from a system of semantic and morphological asymmetries. In many languages, there is a general bias for the *male* interpretation. This is expressed by a constraint *F (see Table 3) which penalizes female interpretations. Considering different forms, there is a general bias for (morphologically) simple forms. *STRUC(TURE) is a well-known constraint penalizing any (morphological) structure (e.g., Grimshaw, 1997). Obviously, *STRUC prefers the term *osël* over the term *oslíca*. Table 3 shows the competition between the six possible pairs in a context where gender is important.

Table 3. Weak bidirectionality and two super-optimal solution pairs

		GREL (+)	*STRUC	*F
✌	*osël*, M			
	osël, F			*
	osël, K	*		
	oslíca, M		*	
✌	*oslíca*, F		*	*
	oslíca, K	*	*	

Source: adapted from Zwarts et. al (2009)

The solution concept of weak bidirectionality provides two optimal pairs indicated by ✌. The first solution is the pair [*osël*, M]. It does not violate any of the constraints and it is the only pair that comes out as the winner if the strong mode of bidirectionality is used. According to the definition of weak bidirectionality at the beginning of Section 4, there is another solution, the pair [*oslíca*, F], which has a marked form and a marked content. It is a solution since it differs in both components, form and content, from the first solution pair and thus cannot be blocked by it. All other pairs are blocked by one of the two solutions: [*osël*, F], [*osël*, K] and [*oslíca*, M] are blocked by the first solution, and [*oslíca*, K] is blocked by the second solution pair [*oslíca*, F] since the violation of the context constraint GREL(+) outweighs the violation of *F. This is because of the ranking of the constraints that goes from left (highest) to right (lowest) in the tableau.

It is evident that Table 3 and Table 2 show the same set of solutions, Table 3 by using the weak solution concept and Table 2 by using the strong solution concept. Hence, we can see Table 2 as a fossilized variant of Table 3; in other words, the two markedness constraints *STRUC and *F fossilize in one lexical constraint *oslíca* ⇔ F. Hence, in the

domain of gender opposition, which was studied by Zwarts et. al (2009), the process of fossilization provides the missing link between a psychologically realistic online system with lexical constraints and the more complex processing system with recursive bidirectional optimization.

5. Open problems

Although the problem of gender specification for animate nouns is possibly not at the centre of lexical pragmatics, it gives a fairly simple illustration of the observation that the borderline between semantics and pragmatics is transparent in at least one direction: tendencies predicted from pragmatics (conversational implicatures modeled by weak bidirectionality) may become *frozen* or fossilized in the semantic component of knowledge representation. The details of the fossilization process are an open problem. There are proposals (Van Rooy, 2004) that model the process as a kind of signaling game using Darwinian evolutionary mechanisms (see also Steels, 1998). Other proposals use the alternative framework of (bidirectional) iterated learning (Kirby and Hurford, 1997, 2002; Jäger, 2004). Iterated learning is oriented to the self-organizing dynamics of language as an observationally learned and culturally-transmitted communication system.

Another main problem concerns a systematic exploration of the huge range of examples in terms of a unifying theory. Both relevance theory and optimality theoretic pragmatics are possible starting points for this project. However, much more has to be done than substantiate some of the basic claims of lexical pragmatics. In addition, we need theoretical explorations that are able to *predict* the phenomena rather describe them *post facto*. An interesting area where this could be possible is the field of language change (Traugott and Dasher, 2005) where the idea of fossilization may find powerful application.

In Section 2.2 the example of adjectival modification was mentioned, where the colour value of a construction can deviate from the lexically addressed focal colour (what is the colour of a *red nose*, *red bean*, *red flag*?). There are fully compositional geometrical (vector) models that can handle this problem (Mitchell and Lapata, 2008; Blutner, 2009), models which have their origin in connectionist modelling (Plate, 2000). What is the relation between these geometrical models and the present symbolic approach? This question is important since its answer can shed new light on the mechanisms underlying blending theory (Fauconnier and Turner, 2002).

In this paper, the phenomenon of constructional *iconicity* has been an important issue. Interestingly, there are also examples of *anti-iconicity*. They are found in connection with semantic broadening. A good example can be found in Dutch, where besides the preposition *om* (= Engl. 'round'; German 'um') the French loanword word *rond* is used to refer to the ideal shape of a circle. From this original use, the form *rond* comes into competition with the original (and unmarked) form *om*. The result is a division of labour, as demonstrated in the work of Zwarts (2003, 2006). Interestingly, the linguistically marked form *rond* is semantically close to the ideal shape of a circle (unmarked meaning) whereas the unmarked form *om* is semantically close to the detour interpretation (marked interpretation). Hence, unmarked forms are associated with marked interpretations and marked forms with unmarked interpretations. How to account for this puzzling phenomenon of anti-iconicity? Is there a theoretical solution that accounts for iconicity and anti-iconicity in terms of a mechanism of cultural evolution – a mechanism that simulates the process of conventionalization?

Obviously, lexical pragmatics is an emerging field of research, both empirically and theoretically. At the moment most researchers are concerned with empirical work, mainly concentrating on listing the puzzles and giving a fairly precise description of them. I think there are several reasons why we need more theoretical work that endeavours to explain the phenomena rather than being satisfied to describe them. The theoretical work should also establish connections to neuronal underpinning and to the diachronic dimension of language use.

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