Iconicity in Language and Literature 7

Naturalness and Iconicity in Language

Edited by Klaas Willems and Ludovic De Cuypere

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Iconicity in Language and Literature

A multidisciplinary book series which aims to provide evidence for the pervasive presence of iconicity as a cognitive process in all forms of verbal communication. Iconicity, i.e. form miming meaning and/or form miming form, is an inherently interdisciplinary phenomenon, involving linguistic and textual aspects and linking them to visual and acoustic features. The focus of the series is on the discovery of iconicity in all circumstances in which language is created, ranging from language acquisition, the development of Pidgins and Creoles, processes of language change, to translation and the more literary uses of language.

Volume 7

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Introduction

Naturalness and iconicity in language

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Preliminary remarks

It has become a virtual cliché in introductory outlines of linguistic naturalness and iconicity to state that both notions pertain to what is probably the oldest and one of the most intriguing problems in the history of Western language philosophy, viz. the nature of the linguistic sign. It is a matter of fact, however, that after almost 2400 years – roughly the time that separates us from Plato's *Cratylus* – the issue continues to engender discussion. Although it had seemed as if the matter had been settled at the dawn of modern linguistics, with Ferdinand de Saussure making a strong case for a concept of the arbitrary sign, the issue was never entirely settled (cf. Joseph 2000). Two notable early dissenters from Saussure's view were Émile Benveniste, who argued that in the experience of the native speaker the relation between form and meaning is necessary rather than coincidental (cf. Benveniste 1939), and Roman Jakobson, who argued against what he called the Saussurean "dogma" of linguistic arbitrariness in his pioneering article "Quest for the essence of language" (Jakobson (1971 [1965]). While Benveniste's argument was easily refuted – the notion of arbitrariness never signifies absence of necessity to Saussure, only absence of motivation (cf. Gardiner 1944) –, Jakobson's article was more successful as it paved the way for the study of linguistic iconicity in the modern sense of the word. It was not until the late 1970s, however, that Jakobson's analysis of iconicity in language really began to enjoy the attention it deserved, particularly in the research of linguists working in the functional-typological paradigm, such as John Haiman, Talmy Givón, Joan Bybee, Paul Hopper and Sandra Thompson, among others.

In addition to the linguistic research inspired by Jakobson's analysis of linguistic iconicity, two other related theories emanated during the 1970s and 80s, which probed the interface between language and its physical substrate: Natural Phonology, originated by David Stampe, and Natural Morphology, originally

developed by Willi Mayerthaler. Both theories are generally referred to under the heading of Natural Linguistics or Naturalness Theory. (Incidentally, the term "Natural Syntax" was coined by Haiman (1985b) to denote syntactic iconicity, but the term did not catch on in the linguistic community.)

The fundamental tenet of Naturalness Theory is that distinctions in language may be mapped onto naturalness scales founded in extralinguistic reality, that is, the physical or cognitive foundations of language. Although sometimes taken as synonyms, iconicity is in fact only one purported feature of naturalness. For instance, in Natural Phonology, naturalness is not defined in terms of iconicity, but rather in terms of economy. In Natural Morphology, on the other hand, iconicity is considered an important aspect of naturalness, but other morphological features are additionally invoked as naturalness parameters. Due to the inherent connection between iconicity and naturalness, this volume brings together papers on both notions.

In recent years, aspects of the iconicity and naturalness hypotheses have gained acceptance by linguists working outside the functional-cognitivist paradigm. Noteworthy in this regard is Newmeyer's (1992) article which makes the provocative claim that principles of iconicity are fully compatible with a generative approach to language (cf. also Bresnan and Aissen 2002, Aissen 2003). The naturalness hypothesis has furthermore inspired linguists working in other paradigms such as Optimality Theory. Yet, despite the fact that iconicity and naturalness have become standard terminology in contemporary linguistic theory, unresolved issues remain, in particular because not everyone agrees that the empirical data adduced in recent years suffice to draw unequivocal conclusions about the nature of language. Paul Bouissac (2005), for one, believes that linguistic iconicity might be merely in the eye of the beholder and that the iconic patterning of language operates as a literary trope at best. Martin Haspelmath (2008a, b) claims furthermore that the iconicity hypothesis may be discarded if the notion of frequency is taken into account. Additional problems will be pointed out in the discussion below.

As it is our understanding that many issues involved in the iconicity and naturalness debates are epistemological and metatheoretical rather than merely empirical, the present volume is not intended as a collection of new empirical research corroborating the naturalness and iconicity hypothesis, but purports rather to present state-of-the-art discussions about some moot points in the naturalness and iconicity debates. The volume brings together papers which display a keen historical and metatheoretical awareness about the issues at hand. The authors were specifically charged with presenting a critical analysis of the notions of iconicity and naturalness and their respective applications in linguistic theory. As will be explained below, one crucial problem with empirical research to assess the iconicity hypothesis is the interpretation of the data. Some authors (e.g., Sonesson in this

volume) argue for a distinction between similarity and iconicity. In their view, similarity only qualifies as iconicity when the similarity involved is not coincidental but truly motivational, i.e. when the attested similarity accounts for the particular form of the sign or construction. It is, for instance, not because the English plural form *boys* is longer than the singular *boy* (a sign-object similarity which is readily attested), that iconicity accounts for this formal difference (cf. Haspelmath 2008a,b).

In this introduction we first offer a brief discussion of the concepts of iconicity and naturalness and we identify some topics for discussion (sections 2 and 3). In section 4 we give a summary of the contributing papers. Section 5 draws some concluding remarks.

Iconicity

The term iconicity is derived from *icon*, one of three basic kinds of signs in Charles Sanders Peirce's theory of semiosis, the other two being *index* and *symbol*. This particular trichotomy of signs is based on the relation between the representamen, viz. the "sign vehicle", and the object referred to. Basically, icons refer to their object based on similarity, indexes based on an existing or a contiguity relationship and symbols on conventionality. Additionally, three types of iconic signs (also called hypo-icons) are distinguished by Peirce. *Images* represent their referent by means of simple qualities. The similarity between an architect's model of a building and the actual building is an example of this type of iconicity. *Diagrams* represent their object based on relational similarities. A chart illustrating the growth of a population, for instance, illustrates the number of people. Finally, *metaphors* represent their object by referring to a parallelism between the object of the sign and another object. The metaphor *foot of the mountain*, for instance, is grounded in the similarity between foot as the lowest body part and the lower part of the mountain.

The first to recognise the vast potentiality of Peirce's semiotic theory for linguistics was Roman Jakobson. The above-mentioned article "Quest for the for the essence of language" (1971 [1965]) was the first to apply Peirce's theory of signs to tackle the problem about the nature of the linguistic sign. By doing so, Jakobson not only introduced Peirce's semiotics into linguistics, he also extended the traditional scope of research into the non-arbitrary relation between expressions and their meanings from a phonological to a morphosyntactic level. Typical examples of non-arbitrary language which had been suggested before were either onomatopoeic words (e.g. *click*, *buzz*, *meow*, etc.), which are now generally considered to be of peripheral importance in languages (Haiman 1992) or instances of sound symbolism, whereby parts of the sound of a word or expression are associative of the state of affairs or object referred to. For instance, the repetition of nasal sounds in "and

murmuring of innumerable bees" (a line taken from Lord Tennyson's *The Princess*) vividly renders the humming sounds produced by the bees. In the past decades, however, the newly awakened linguistic interest in iconicity has considerably deepened our insights into iconicity on the phonological level, witness some recent publications on so-called ideophones. Ideophones are highly expressive linguistic elements created to simulate, especially in spoken language, a sensory perception, emotion or event. One of the universally attested features of ideophones is that they have a tendency for iconicity and sound symbolism, yet in a much broader sense than what was traditionally understood under these terms. In particular, ideophones are not restricted to the realm of auditory perception. For some discussion we refer to the edited volume by Voeltz and Kilian-Hatz (2001), which surveys a host of examples taken from different, in particular African and Australian, languages.

By applying Peirce's trichotomy of iconicity, in particular diagrammatic iconicity, Jakobson added instances of iconicity in morphology and syntax to the traditional repertoire of phonological iconicity, several of which have become textbook examples. One of Jakobson's seminal examples of morphological iconicity is the gradual morphological increase in the degrees of comparison (e.g. *high-higher-highest*) which is said to bear an iconic reflection of the "gradation gamut" of what is referred to. One of his key examples of syntactic iconicity is Caesar's famous quote *veni, vidi, vici* of which the word order, or better still the clausal order, may be seen as an iconic depiction of the chronological order of events.

According to Jakobson, iconicity, and in particular diagrammatic iconicity, is particularly suited to explain Greenberg's (1976 [1966]) language universals (Jakobson's examples are the preference to express conditions before conclusions and SVO word order, cf. also below). Since the 1980s, linguists working in the functional-typological paradigm have elaborated on this view. One of the basic tenets of functional-typological linguistics holds that language is adapted so as to mirror thought, in a similar way as living organisms are adapted to their environment (cf. Givón 1995b: 47). Iconicity is thus conceived as the main structuring principle of language in general. Moreover, because of their alleged similarity with conceptual (i.e. prelinguistic) thought, iconic language structures are thought to be "easier to store, retrieve and communicate" (Givón 1985: 189, Croft 2003: 116).

It is not until the 1980s that the true importance of Jakobson's ideas was widely appreciated. From then onwards, one sees a vast upsurge in linguistic research inspired by the iconicity hypothesis, particularly in the fields of morphology and syntax. The latter need not be surprising since morphosyntactic structure offers various possibilities for iconicity. Three basic principles of morphosyntactic iconicity have been suggested in the literature: the iconic principle of cohesion, the principle of adjacency and the principle of sequential order.

The principle of cohesion (also referred to as "the proximity principle") says that the formal distance between linguistic signs in a sentence or text is motivated (i.e. determined) by the conceptual distance denoted in the state of affairs. Two concepts are considered as conceptually close when they share semantic properties, when one affects the other, or when both are perceived as inseparable (Haiman 1983: 783); the reverse case, conceptual distance between concepts being formally reflected by a notable distance on the linear axis, in spoken as well as written language, is called alienation (Haiman 1992). Many have entertained the principle of cohesion as a hypothesis to explain several morphosyntactic phenomena. For instance, the formal difference between *I taught Greek to Harry* and *I taught Harry Greek* (the so-termed dative alternation) has been related to the conceptual distance between the action denoted by the verb and the recipient (cf. Lakoff and Johnson 1980: 130, Rohdenburg 2003: 266). Accordingly, the teaching would have more effect on Harry in the Double Object Construction than in the construction with a prepositional object. This difference in effect is thought to motivate the creation of two different constructions. Obviously, the problem with this kind of explanations is that it is extremely difficult to verify their reliability on a sound empirical basis, so that they seem doomed to remain conjectures at best.

The basic idea underlying the principle of adjacency is that syntactic structures consist of a main element, i.e. a head (also called "operandum"), and one or more modifying elements, called modifiers (or "operators"). According to the principle of adjacency a modifier is put as close as possible to its head, or, in cases where there is more than one modifier, the order of modifiers tends to reflect their relevance to the head, with the most relevant modifier being put most adjacent to the head. Consider, for instance, the order of the adjectives in the noun phrase *nice little wooden dolls* (cf. Van Langendonck 1995: 85). Arguably, the feature 'wooden' is more relevant to the dolls than 'little' as 'wooden' is an inherent feature of the object, whereas 'little' is only a feature arising out of comparison with other similar objects. The adjective *nice* denotes a personal appraisal and might therefore be regarded as less relevant than the feature 'little'. The order of relevance is thus mirrored by the formal order of the adjectives.

Finally, the principle of sequential order states that "the order of clauses in coherent discourse will tend to correspond to the temporal order of the occurrence of the depicted events" (Givón 1990: 971). Not only is this principle said to hold in cases such as *veni, vidi, vici* or *he opened the door, came in, sat and ate* (Givón 1995b: 54) in which the order of events is directly reflected by linguistic structure, but also in the three basic constituent orders SVO, SOV and VSO in the languages of the world. The general tendency to place the subject before the object, which seems to be the unmarked constituent order in more than 90% of the world's languages, is thought to be motivated by the fact that "our perception of natural progression in the case

of an action event is from the agent to the patient and for an act of giving from giver to receiver" (Siewierska 2005: 646) (cf. also Jakobson 1971 [1965]: 351, Lyons 1977: 511, Eco 2000: 390, Sebeok and Danesi 2000: 63, Taylor 2002: 64).

Before discussing some moot points in the iconicity debate, we now present a brief overview of the seminal readings in linguistic iconicity research. Mandatory for any student of linguistic iconicity is the work of John Haiman (1980, 1983, 1985b). Important papers by a variety of authors may be found in the edited volumes by Haiman (1985a), Landsberg (1995), Simone (1995), Hiraga and Radwańska-Williams (1994), Willems (2004), Gallmann, Lehmann and Lühr (2007), and the special issue on iconicity of *Faits de Langues*, 1993(1). A thought-provoking discussion on iconicity as an explanatory concept, in particular its relation to the notion of frequency, may be found in a recent issue of *Cognitive Linguistics*, 2008, Vol. 19(1), with contributing authors Croft (2008), Haiman (2008) and Haspelmath (2008a,b). We come back to this discussion later on in this introduction. The book series 'Iconicity in Language and Literature' (John Benjamins) brings together papers that generally take a broader scope, not only including linguistic iconicity but also iconicity in literature and, in recent years, (multi)medial art. So far, seven volumes (including the present volume) have appeared in this series: Nänny and Fischer (1999), Fischer and Nänny (2001), Müller and Fischer (2003), Maeder, Fischer and Herlofsky (2005), Tabakowska, Ljungberg and Fischer (2007), and De Cuypere (2008). Of particular importance is also Givón's work on functional-typological syntax, as his views on language are mainly governed by the concept of iconicity (cf. Givón 1979, 1984, 1990, 1995a,b 2002, Givón and Malle 2002). An illuminating discussion of iconicity in the linguistic thought of W. von Humboldt can be found in Trabant (1986). Finally, readers interested in linguistic iconicity in relation to poetic language are referred to Anderson (1998) and Fónagy (2001).

To round off this introductory section on iconicity and before moving over to the notion of naturalness, we point out certain thorny issues in the iconicity debate. First a more general problem related to the notion of iconicity and iconic signs in general, a problem which is also pertinent to the study of iconicity in language.

During the 1960s and 70s, one of the main points of discussion in (visual) semiotics was the often termed iconist vs. iconoclast debate, a debate which actually put the very existence of iconicity at stake. The debate is recounted in great detail by Sonesson in many of his papers and also in this volume, so suffice it here to summarise the crux of the problem. We know that iconic signs are defined by Peirce as signs which refer to an object on the basis of similarity. However, according to Peirce, all signs (iconic signs included) are also determined by a habit, which relates a representamen to an object by means of an interpretant. This implies that Peirce's definition of an iconic sign is somewhat paradoxical: if all signs are determined by a habit, then conventionality is ubiquitously present in all kinds of sem-

iosis. Yet, at the same time, iconic signs bear a great deal of resemblance to their object. This begs the question: does similarity play any role in the functioning of the iconic sign or are iconic signs as conventional as any other (symbolic) sign?

In pictorial semiotics, the branch of semiotics dealing with pictures and visual signs alike, two opposing views emerged during the 1960s and 70s as a result of this problem. One strand of thought, traditionally referred to as the *iconist* view, is to insist that iconicity plays a substantial role in semiosis and that there are indeed iconic signs. Another strand, the *iconoclast* view, regards iconicity as merely coincidental and makes the strong claim that there are no iconic signs, since allegedly iconic signs are as conventional as any other sign. One notices how the same lines of reasoning might be applied to alleged instances of linguistic iconicity. Consider, for instance, the phenomenon of onomatopoeia. The similarity between onomatopoeic words and the objects to which they refer is most often immediately obvious, at least for onomatopoeic words in one's native language. The latter remark is not unimportant, as the meaning of onomatopoeic words is not as readily accessible as might seem at first sight. That Japanese *nya-nya* refers to the sound made by a cat is unclear to non-native speakers of Japanese, unless of course one is informed of the meaning of *nya-nya* in the first place – which would, however, involve a semiotic process of a non-iconic kind. We can conclude, therefore, that the same problem as in pictorial semiotics applies to linguistic iconicity: is the attested similarity functional and foundational or is it derived by comparative reasoning and thus merely of secondary importance or even coincidental? To answer this question it proves worthwhile to take another look at how the discussion unfolded in pictorial semiotics by focussing on Sonesson's solution to overcome the apparent stalemate position.

Sonesson suggests making a distinction between two kinds of iconicity: primary and secondary iconicity. Primary iconicity is said to be involved when "the perception of an iconic ground obtaining between two signs is one of the reasons for positing the existence of a sign function joining two things together as expression and content" (Sonesson 1997: 4). Primary iconicity is observed when the recognition of similarity establishes a sign function. In the case of secondary iconicity, the sign function is already known before the iconic ground is discovered: "the knowledge about the existence of a sign function between two things functioning as expression and content is one of the reasons for the perception of an iconic ground between the same things" (ibid.). Secondary iconicity offers a possible solution for the problem of linguistic iconicity: it acknowledges the fact that the meaning of a linguistic sign or construction is fundamentally arbitrary in the Saussurean sense of the word, while recognising that iconicity might be involved on a secondary level, as a means of adding extra meaning on a textual level (cf. Willems 2005a, Willems 2005b, De Cuypere 2008). As it stands, however, this solution is open to discussion.

With the iconicity debate in pictorial semiotics in mind, it comes as no surprise that the notion of iconicity has also been a controversial topic in debates on Sign Language. In the latter half of the twentieth century, Sign Language research was faced with a seeming paradox between, on the one hand, the claim that Sign Languages are natural languages with a fully developed lexicon and syntax and thus on a par with spoken languages, and, on the other hand, the straightforward observation that iconicity is a characteristic of Sign Language (Liddell 2002, Herlofsky 2005). In an effort to substantiate the first claim, the existence of iconicity in Sign Language was often denied or minimalized. Liddell (2002) lists four different ways in which this double agenda was dealt with. The first way is to deny that iconicity exists in Sign Language (e.g. Frishberg 1975). The second is to accept its existence but only as a modality effect (e.g. DeMatteo 1977). The third way is also to claim that iconicity does indeed exist but to downplay its importance (e.g. Klima and Bellugi 1979). The fourth way is to recognize iconicity as a crucial characteristic of Sign Language, suggesting that Saussure's arbitrariness view is overstated (e.g. Taub 2001). Today, it is generally accepted that Sign Languages are natural languages. That iconicity is a key feature of Sign Language is equally acknowledged, even though its particular role remains a topic of lively debate.

A second problem related to linguistic iconicity concerns the sign relationship to which iconicity is said to apply. As several authors have argued, among them Seiler (1990) and Nöth (in this volume), there is an inconsistency with regard to the relation characterised as being iconic. Iconicity is sometimes used in reference to the relation between the sign and the object referred to, at other times to the relation between the form, i.e. expression, of the sign and the object referred to and at still other times it qualifies the relation between form and meaning. This terminological obfuscation may actually be traced back to Jakobson's *Quest* article, in which Jakobson suggests to reconcile Saussure's distinction between *signifiant* and *signifié* (and, thirdly, the object referred to) with Peirce's sign concept consisting of representamen, interpretant and object by means of the Stoic sign concept which essentially distinguishes between a *signans* and a *signatum*. Although Jakobson's sign concept is unambiguous in other writings (e.g. Jakobson 1962, 1962 [1939]), where the *signans* is defined as the form of the sign and the *signatum* as its meaning ("signified", *signifié*) (cf. Jakobson 1962: 631, 1985 [1974]: 99, 1985 [1975]: 206-215), it is unclear in the *Quest* article whether *signatum* solely refers to the meaning of a sign or to its content more generally, including the (concept of the) referent. On the one hand, the term *signatum* is used in relation to the referent: "The *icon* acts briefly by a factual similarity between its *signans* and *signatum*, for instance, between the picture of an animal and the animal pictured; the former stands for the latter 'merely because it resembles it'" (Jakobson 1971 [1965]: 347). On the other hand, the iconicity of *high-higher-highest* (Jakobson 1971 [1965]:

347) does not make sense when iconicity is strictly interpreted in terms of reference, because in the case of, e.g., *small-smaller-smallest* the referent gets smaller as the word gets longer. Iconicity is therefore related to conceptual complexity and markedness: the longer forms *highest* and *smallest* are also more marked or conceptually more complex than the shorter forms *higher* and *smaller*.

A third problem that has been raised with regard to iconicity concerns the relationship between iconicity and economy. According to Haspelmath (2008a,b), phenomena that are explained under the heading of iconicity of quantity, iconicity of complexity and iconicity of cohesion are actually better accounted for by the principle of economy. Iconicity of complexity has, for instance, been invoked to explain the grammatical asymmetry observed in non-causative vs. causative constructions, as in Turkish *düş(-mek)* 'fall' vs. causative *düş-ür(-mek)* 'make fall, drop' (Haspelmath 2008a: 2). The shorter, more-cohesive form tends to be the most frequent form. And since more frequent forms are more predictable they also tend to be shortened due to reasons of economy. Hence, iconicity is not necessary to explain the formal asymmetry. The same reasoning is said to apply to other grammatical asymmetries such as degrees of comparison (e.g., Eng. *long, longer, longest*), and the expression of alienable vs. inalienable possession, where inalienable possession tends to be more cohesively expressed (e.g., Maltese *id* 'hand', *id-i* 'my hand', vs. *siġġu* 'chair', *is-siġġu tiegħ-i* [the-chair of-me] 'my chair' (**siġġ (u)-i*).

The relation between iconicity and economy was actually also the main topic of concern in Haiman (1983), where it is argued that although iconicity and economy are generally competing motivations, they may also be in harmony, which illustrates the complex relation between both concepts. Haiman (2008) remains confident that the principles of quantity, complexity and cohesion are important explanatory principles as he is not convinced by Haspelmath's frequency hypothesis, which he regards as reductionistic, but which Haspelmath (2008b: 65fn) denies. Haiman (2008: 36) points out that frequency is in itself not a cognitive explanation and therefore itself in need of explanation. And so it appears that the debate on the relation between economy and iconicity is far from being settled.

In the next section, we turn our attention to the concept of naturalness. We start off with a basic outline of the naturalness hypothesis including a short survey of the seminal readings. Some remaining points of discussion are again highlighted in addition.

Naturalness

The first theoretical model in modern linguistics with an elaborated concept of naturalness was advanced by David Stampe in the late 1960s under the heading of

Natural Phonology (cf. e.g. Stampe 1969, 1972). In Stampe's theory, natural sound patterns and processes are sound patterns grounded in speech production and perception. The basic idea is that natural speech sounds or combinations thereof are more easily produced and perceived than unnatural ones. The concept of naturalness is thus suggested as an explanatory hypothesis for synchronic sound patterns (universally attested language sounds, phonetic contrasts, phonotactic structures and sound alternations) as well as diachronic sound changes. Textbook examples of alleged natural sound changes are: the devoicing of final obstruents, the palatalization of consonants preceding high front vowels and the nasalization of vowels. A collection of contemporary studies in Natural Phonology is found in Hurch and Rhodes (1996).

In the 1980s a second linguistic theory was developed based on the naturalness hypothesis: Natural Morphology; seminal works here include Mayerthaler (1977, 1981), Herbert (1986), Dressler et al. (1987b), Seifert (1988) and Wurzel (1989). Recent publications such as Fenk-Oczlon and Winkler's edited volume (2005) and the special issue of *Folia Linguistica* on Natural Morphology edited by W. Dressler (2006) illustrate that the theory of Natural Morphology remains popular, despite the fact that it remains controversial, and justly so, among language theorists. Natural Morphology starts from the observation that morphological distinctions in language bear asymmetrical oppositions: not all morphological structures are acquired at the same time during language acquisition or lost simultaneously in aphasia, not all are affected similarly by language change, and not all are equally transparent (Mayerthaler 1981: 2). According to the theory of Natural Morphology, these phenomena can be explained on the basis of different degrees in naturalness. A number of parameters for determining morphological naturalness are found in the literature; for a concise overview see Dressler (1995: 22). The basic parameters are the principle of 'one form-one meaning' (subdivided in the parameters transparency and uniformity) and constructional iconicity. According to the parameter 'one form-one meaning', a paradigm is considered highly natural when each suffix is linked with one particular meaning and when each meaning is predictable from its form. Consider, in this regard, the paradigm in Table (1):

Table 1. A constructed example of a natural paradigm (McMahon 1994: 99)

	sg.	**pl.**
Nominative	*dag*	*dags*
Accusative	*daga*	*dagas*
Genitive	*dage*	*dages*
Dative	*dagu*	*dagus*

This artificial paradigm, constructed by McMahon (1994: 99) for instructive purposes, is said to be transparent as well as uniform. Transparent because each suffix complies with the 'one form-one meaning' principle and uniform because the *-s*, which is in itself only a part of the plural suffixes, indicates that a particular suffix corresponds to a plural form. One would be hard-pressed to find a language that conforms to this criterion. The parameter of constructional iconicity, however, is based on the assertion that it is natural for a morphological structure to reflect semantic complexity by formal complexity. For instance, the singular-plural opposition *house-houses* is considered as maximally iconic because of the addition of the suffix. In contrast, Lat. *deus-dei* is regarded as contraiconic, because the formal marking of the plural shows a decrease. Similarly, *goose-geese* is regarded as minimally iconic, the ablaut only signalling that there is a difference, and *sheep-sheep* as non-iconic (cf. Wurzel 1989: 19), since no formal difference marks the semantic difference.

In addition to these formal parameters of naturalness, Mayerthaler (1980, 1981) suggested a set of semantic parameters based on the notion of the so-called *prototypical speaker*. The prototypical speaker refers to a commonsense understanding of how the speaker experiences his or her lifeworld. The prototypical speaker is said to be human, male (at least in male dominated societies), he inhabits a 3+1 dimensional space-time, has his eyes in front, allowing to observe things in front rather than behind, walks upright and is probably right-handed. As such, the concept of the prototypical speaker bears close resemblance to what Lakoff and Johnson (1980: 176) call "Direct Immediate Understanding", viz. the cognitive attitude towards things we know from our direct physical involvement with our environment. Closer scrutiny (e.g. Glynn 2007 and in this volume) reveals, however, that one should be careful not to take common sense conjectures about the nature of language too light-heartedly.

For example, in John Taylor's (1999) discussion of the structuralist notion of neutralisation in the lexicon, e.g. gender neutralisation between *he* and *she* or *man* and *woman* in English, or as when *day* is used, not in opposition to *night*, but to cover an entire 24 hour period as in *Paul spent a few days in Paris* (cf. Coseriu 2000 [1990]), Taylor (1999: 30) writes:

> The use in English of *he* as a gender-neutral pronoun (as feminist critics never tire of reminding us!), arguably does represent a conceptual bias, which view 'male' as the default value for human beings (females simply do not count); it is therefore not just a 'structural' fact about the language system. Concerning the day and night example, this plausibly represents an instance of metonymy; the 24 hour period is designated by its (for most people) most salient component. (Hoteliers calculate the duration of a guest's stay in terms of so many nights.)

Although Taylor's arguments might seem reasonable at first glance, they are actually highly problematic, because they are based on a common sense reasoning that may be adequate for some languages, i.e. those in which the kind of neutralisation referred to applies, but not for all languages that fall within the same cultural domain. For example, in English and French, the words *man* and *homme* are often used with a meaning that in other languages is conveyed by a word that is different from either one of the pair 'man' and 'woman', e.g. *Mensch* in German and *mens* in Dutch (both roughly the equivalent of 'human being' in English). German and Dutch also have the opposition between *Mann/Frau* and *man/vrouw* respectively, but apart from very few occurrences, the noun for the male member of this lexical opposition is not used as a neutral term. Obviously, claiming that in German and Dutch females would "count" more than in English and French would miss the point. Likewise, Taylor's assumption that the 24 hour period is designated by *day* and not by *night* because for most people the presence of sunlight is the "most salient component" of a 24 hour period, is not always confirmed by linguistic data. Again, the assumption is based on an alleged "naturalness" in the coding of experience through language that appears to be at odds with certain facts about the language-specific meanings of words in different languages. For example, in older stages of the German language, 24 hour periods were referred to by using the word *Nächte* 'nights' in stead of *Tage* 'days', in particular in the context of deadlines (for more extensive discussion see Willems 2005b: 421-426).

Being governed by similar common sense intuitions about the experiential underpinnings of language structure, some basic assumptions of Naturalness Theory may be examined on the same basis as Cognitive Linguistics. Critics of Naturalness Theory have taken issue with two particular aspects of the naturalness hypothesis. The first argument raised is that Naturalness Theory fails to provide a technically adequate definition of the term "natural(ness)", that is, a definition which elevates the term from its informal uses as 'more simple', 'more common', 'normal' and 'optimal' to a definition based on operational criteria. Well-known in this regard is Lass's (1980: 43) fierce criticism of the naturalness hypothesis: "the common is in some sense 'optimal'; and since the theory says that 'optimization' is to be defined in terms of increasing 'simplicity', then 'common' = 'natural' = 'optimal' = 'simple' […] what it expresses is the blinding tautology that nature tends towards the natural." In order to get beyond an intuitive and potentially circular understanding of natural(ness), criteria drawn from several fields of research have been proposed to define naturalness, in particular from language change, language loss in aphasia, and child language. To what extent such criteria are relevant in defining naturalness in language remains to be determined. As a case in point, take the criteria derived from child language. Whereas Harnisch (2005) finds ample evidence of children's preference for transparent and iconic structures in child

language, Juliette Blevins points out in this volume that there are problems associated with setting criteria for phonological naturalness based on language acquisition. For instance, certain sound features of child language may mistakenly be labelled as "natural" when they are in fact produced due to an immature state of the articulators. Another problem is that some common sound substitutions in child language prove rarely if ever attested as sound change in adult phonology. A third factor undermining the value of language acquisition features as naturalness parameters is the fact that different children come up with different solutions to bypass similar phonological intricacies. Hence, it is far from evident to find adequate parameters of naturalness on the basis of language acquisition.

The second argument, which has been raised against the Natural Morphology hypothesis, questions the explanatory value of the naturalness hypothesis. Obviously this problem partly stems from the difficulty of defining natural(ness). As Andersen points out in this volume, it is inherently circular to explain linguistic change from less to more natural as a preference for what is labelled as more natural. According to Lass (1980), Naturalness Theories cannot explain anything for they are non-deterministic and hence unable to make predictions. Lass's view on explanation is informed by the idea that only deductive-nomological explanations, viz. explanations based on general laws similar to those advanced in the natural sciences, are valid. In this view, however, exceptions to a generally formulated process of language change should be nonexistent, which is obviously not the case.

Whilst proponents of Natural Morphology concur that detailed predictions of language change might not be possible – if only because of the complexities involved in the process –, "well-founded predictions" (Wurzel 1989: 200) are nonetheless thought to be possible. Natural Morphology is accordingly conceived as a "preference theory" (Dressler, Mayerthaler, Panagl and Wurzel 1987a: 9). The theory does not pretend to predict changes, it merely purports to predict which changes are most likely, based on universal and language specific preferences. We leave it as a topic of further discussion whether this suffices as a valid factor in explaining language change.

An overview of the contributions in this volume

The contributions in the present volume are roughly divided into two parts. The first four papers deal with iconicity and naturalness from a theoretical point of view. The last five papers probe the iconicity and naturalness hypothesis based on sophisticated empirical research.

The first paper, *Philosophical Naturalism and Linguistic Epistemology*, by Lia Formigari, discusses the notion of naturalness from a historical and metatheoretical

point of view. The main purpose of the article is to point out which aspects of the concept of naturalness in pre-modern theories are still attested in contemporary linguistic theorizing. Starting from a broad definition of naturalness as "a notion of philosophy (or rather philosophies) as contiguous to scientific theories and/or to views and beliefs incorporated in social practices and behaviors", Formigari distinguishes three types of linguistic naturalism in Western philosophical tradition: 'Cratylean' naturalism, which finds its modern counterpart in the iconicity debate, 'Epicurean' naturalism, which deals with the birth of language, conceiving the latter as a mixture of instincts and social forces, and 'Adamic' naturalism, which regards the origin of speech as the result of divine inspiration, suggesting a gap between animal communication and human language, a view which is still, *mutatis mutandis*, shared by contemporary researchers stressing phylogenetic factors over ontogenetic development. Formigari then goes on to distinguish between two different interpretations of the apriori, viz. the apriori in Kant's sense, referring to knowledge absolutely independent of all experience, and in the sense of a starting point of a research program. Both notions of the apriori are found in competing linguistic theories, such as Chomsky's "internal naturalism" vs. Quine's "external naturalism".

In his article *Prolegomena to a Theory of Iconicity. Considerations on Language, Gesture, and Pictures*, Göran Sonesson builds on his work in pictorial semiotics to explain his view on iconicity in general and on linguistic iconicity in particular. Drawing on Saussure's theory of signs and Husserl's phenomenology, Sonesson arrives at a distinction between no less than six potentially iconic relations: between the picture thing (e.g., a painting hanging on the wall) and the picture object (what is seen into the painting), between the picture object and the picture subject (the object in the world which is taken to be depicted), between the picture thing and the picture subject; and between those three and the referent (the object in the world irrespective whether or not it really exists). Additionally, Sonesson suggests an analogy between Lessing's classical comparison between visual art, which Lessing sees as an iconic rendering of space, and literature, which Lessing takes as an iconic rendering of time, and the idea of "dual coding" in cognitive psychology. Sonesson's paper concludes with a reflection on the difference between partitioning the world in language and in gesture, arguing that the crucial difference between both modes of communication is that gesture is able to depict the whole in its simultaneity, which language is unable to do.

Offering an unconventional and thought-provoking analysis of Peirce's theory of semiosis, Winfried Nöth in his paper *Semiotic Foundations of Natural Linguistics and Diagrammatic Iconicity* argues that linguistic iconicity is a matter of degree. In their most basic sense, iconic diagrams refer to schemata. In this view, all constructions in language, including syntactic constructions, complex words, and texts, inherently evince diagrammatic iconicity. In addition to the iconicity of any

well-formed linguistic construction, an extra degree of iconicity may be added, according to Nöth. For Nöth, the sentence *she married and had a baby* is not only syntactically iconic (because grammatically correct), its constituent order also corresponds to the order of events referred to, thus displaying an extra level of iconicity. We point out here that Nöth's distinction is actually not unlike Sonesson's distinction between similarity and iconicity. The crucial difference that separates Nöth's view on iconicity from Sonesson's is that the latter is more restrictive of what counts as iconic. To Sonesson, similarity qualifies as iconicity when the similarity is functional, i.e. when the attested similarity motivates the interpretation of the sign or construction; Nöth, on the other hand, accepts that similarity may itself be characterised as iconicity.

Another rather controversial claim by Nöth is that Peirce's trichotomy of signs is not particularly suited as a foundation of the theory of naturalness in language. In contrast to popular belief, the trichotomy does not square with a distinction between natural and conventional. Although it is correct, according to Nöth, to associate the icon and index with naturalness and the symbol with conventionality, the symbol is in some respects also 'natural'. Nöth points out that the key feature of the symbol is not "social convention" but habit, and defined as such, symbols may be found in nature as well as in culture. Thus, in Nöth's view, animal communication is as much symbolic as human language. Linguistic symbols are more specifically iconic rhematic legisigns. Any grammatical diagram is an icon of the speaker's mental diagram. Linguistic signs are rhemes since they are neither true nor false. They are legisigns, or types, which function through instances of theory application or replicas.

The fourth paper is by Henning Andersen and offers, as its title *Naturalness and Markedness* suggests, a thorough comparison of Naturalness Theory, as developed in particular by Janez Orešnik (2001, 2004), and Markedness Theory. At first sight, both theories appear to have a great deal in common. For instance, they share the same aim of subsuming language relations under a single value paradigm. Andersen points out, however, that there are also major differences separating both theories. One particular difference is that Naturalness Theory conceives linguistic relations and differences as scales, from less natural to more natural, whereas Markedness Theory purports to define distinctions as inclusive relations, unmarked vs. marked, with the unmarked entity including the marked one. For instance, the unmarked expression *lion* includes the marked expression *lioness*; *lion* makes no reference to sex and can thus also be used to refer to female lions (for a discussion of the difference between a feature and a mark see Newfield and Waugh 1991). Distinctions are thus defined as asymmetrical oppositions in Markedness Theory, which makes the theory best suited to explain synchronic variation and diachronic change, according to Andersen.

Juliette Blevins's paper on *Natural and Unnatural Sound Patterns* opens a series of more empirially oriented papers. Three kinds of sound patterns are discussed: patterns in contrastive sound inventories (contrasts), patterns in the static distribution of sounds (phonotactics), and patterns defined by the variable realization of sounds in different contexts (alternations). All three are examined from a synchronic and diachronic point of view. After a short historical survey of the study of phonological patterns in the work of notable figures such as Pānini, Sībawayh and King Sejong, Blevins moves on to offer a meta-analysis of scholarship on natural and unnatural sound patterns. A large inventory of natural and unnatural sound patterns is provided. Natural sound patterns are defined as "sound patterns grounded in articulatory and perceptual properties of speech", unnatural ones are "those with no plausible single phonetic source, origin or explanation". Based on her analysis, Blevins concludes that naturalness may account for frequent sound patterns. She maintains, however, that naturalness is irrelevant to the understanding of the phonological grammar of particular languages, a view which is arguably in accordance with recent work on phonology.

The following paper, *The Iconic Function of Full Inversion in English*, is by José Carlos Prado-Alonso. Full inversion constructions are "constructions in which the subject follows the entire verb phrase in a declarative clause", as in *On the near corner was Herb's gas station*. A corpus analysis of this construction was carried out for English fictional and non-fictional texts. It appears from Prado-Alonso's research that inversion actually serves two different discourse purposes. In non-fictional texts inversion is created as a means to structure the text. In fictional texts, on the other hand, inversion may be seen as an iconic reflection of how a scene is observed. For instance, in the example given above, the visual perception is first oriented towards the general location, *the near corner*, and then the focus of attention is guided towards the subject, *Herb's gas station*.

What is particularly interesting about Prado-Alonso's paper is that iconicity is studied *in vivo*. The paper is a palpable illustration of Nöth's concept of a higher level of iconicity and Sonesson's concept of secondary iconicity. Importantly, it is not the full-inversion construction as such which is said to be iconic, but a particular use of it in actual discourse.

Daniella Marzo in her paper *What is Iconic about Polysemy? A Contribution to Research on Diagrammatic Transparency* deals with iconicity in the lexicon, in particular with the relation between iconicity and polysemy. Marzo takes issue with Linda Waugh's view that polysemy is a constraint on iconicity and argues instead that polysemy actually contributes to the iconicity in the lexicon. In her view, polysemy evinces diagrammatic iconicity (and up to a certain level also metaphoric iconicity). Building on recent scholarship on lexical motivation (e.g. Koch 2001), Marzo argues that polysemic words are diagrammatically motivated via lexical

units (units consisting of one form combined with one single meaning). For instance, the lexical units *mouse* 'small rodent' and *mouse* 'computer device' are said to have the same form and to share a "cognitively relevant relation" (similar shape) and should therefore be analysed as an instance of diagrammatic iconicity.

In addition, Marzo also carried out a questionnaire study to examine the transparency of polysemic words. Previous research (Dressler 1985, Koch and Marzo 2007) has suggested scales of transparency. Koch and Marzo's (2007) study, for instance, has a five pointed scale ranging from total transparency (e.g., Fr. *bois* 'forest' vs. *bois* 'wood (the substance)') to non-transparency (e.g., Fr. *vite* 'quickly' vs. *rapide* 'quick'). Marzo's questionnaire study reveals that not all instances of polysemy are transparent. For instance, German *Weg* ('stretch of road' and 'concrete path on which we walk') was found to be non-transparent to most informants, whereas *Auge* ('globule of fat' and 'eye') appeared fully transparent. This suggests, according to Marzo, that transparency not only depends on form, but also on meaning. In particular, it seems that metaphoric similarity (cf. *Auge*) enhances transparency, whereas contiguity (cf. *Weg*) may limit it.

Iconic Structures in Sign Languages by Eline Demey, Mieke Van Herreweghe and Myriam Vermeerbergen deals with two questions. First, does iconicity play a part in the linguistic structure of Sign Languages and are Sign Language users aware of it? Second, what is the status of the sublexical elements in Sign Languages, and more specifically, should they be considered as phonemes or as morphemes? That iconicity is a central characteristic of Sign Language is generally accepted, according to Demey et al. There are, however, two opposing views on the role of iconicity in Sign Language. One strand of thought maintains that iconicity is present in Sign Language but not as a structuring principle, the other strand adamantly holds that iconicity is the central organizing principle of Sign Language. Both views are thoroughly discussed in the paper. Demey and her colleagues propose yet a third view in which iconicity is featured as a "superstructure", a view which is, again, not unlike Sonesson's concept of secondary iconicity and which the authors relate to W. von Humboldt's philosophy of language. According to Demey et al. every language element (spoken or signed) has a potential iconic value, which can be activated by the language user. From a diachronic point of view, iconicity may indeed play a large role in newly formed signs. However, when a sign enters a system of existing signs, it enters into opposition with other signs which is a first step towards its conventionalization. As a sign spreads throughout the community, it may even more lose its iconicity (cf. Haiman's 1985 concept of erosion). Yet, the sign may keep its iconic qualities and thus its iconic potentiality may be activated by the signer on specific occasions. For instance, in Flemish Sign Language (VGT) the sign for EARTH'S CRUST is formed by a so-termed c-hand (the hand takes the shape of the letter C). Demey et al. point out that even though the

sign may have become arbitrary in its common use in geography class, the width of the opening between the thumb and index may still be deployed to create an iconic rendering of the varying thickness of the earth's crust, illustrating the difference between iconicity as a potentiality and actual iconic motivation.

The final paper in this volume, *Arbitrary Structure, Cognitive Grammar, and the partes orationis. A Study in Polish Paradigms* by Dylan Glynn, investigates a key tenet of Cognitive Linguistics, viz. the assertion that parts-of-speech are grounded in perceptual experience. Cognitive Linguistics assumes that basic, i.e. universal and pre-linguistic, concepts (also called "conceptual archetypes", Langacker 1999: 41) of 'thing' and 'process' underlie the parts-of-speech noun and verb. This purported isomorphic relation between parts-of-speech and basic concepts may be regarded as a special instance of iconicity, according to Glynn, as the relation involves a motivated similarity between meaning and reference rather than between form and reference. Taking the Polish vocabulary of precipitation (e.g. rain, snow, etc.) as his data of analysis, Glynn looks at the class-lexeme productivity of a range of relational classes, such as adverbs and adjectives. If iconicity would be a motivating factor, then it should be possible to offer perceptually based explanations for the irregularities found. The results of Glynn's analysis show, however, that iconicity can not explain the constraints found for class-lexeme productivity. Glynn concludes that other (usage-based) factors need to be taken into account.

Concluding remarks

How *natural* is natural language? How *iconic* are linguistic symbols? These two questions are fundamental to any theory of language because they are at the heart of the search for the essence of the linguistic sign (including constructions). As already pointed out in the preliminary remarks, both questions can be traced back to the very origins of Western language science, and both are notoriously elusive. One may expect, therefore, that naturalness and iconicity will continue to attract the attention of linguists, philosophers, semioticians and literary scholars alike. An intriguing aspect of the time-honoured and still ongoing debate on the nature of language is that language is generally, and rightly, regarded as one of the defining properties of man, thus underscoring the creativity of the human mind, so aptly phrased by W. von Humboldt saying that language "ist das bildende Organ des Gedanken" (Humboldt 1998 [1830-1835]: VII, 53). However, notwithstanding a product of the mind ("Geist" in Humboldt's words), language is at the same time as natural as anything could be that distinguishes humans from all other living beings. This leaves us with the puzzling conclusion that in language the mental and the natural are in no way in conflict with one another, but rather merge to produce

a result *sui generis* that is obvious and unfathomable at the same time. As the contributions in the present volume testify, this conclusion is not so much an end to the debate as a starting point of theoretically as well as empirically informed research practice. The contributions illustrate that things are not to be taken at face value, that apparently self-evident statements can turn out to be mistaken or only partially true, and that much of the debate is still poorly understood, urging linguists, no matter whether they have a structuralist, cognitive, functionalist or generativist background, to focus on different facets of naturalness and iconicity in language – and leaving to future researchers the task of offering a synthesis of the research findings to which the present volume hopes to contribute.

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Philosophical naturalism and linguistic epistemology

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The first part of the article provides a general working definition of linguistic naturalism and briefly describes the forms it took in pre-modern theories of language, pointing out those aspects that are still present in the modern-day debate (Section 1). It then shows that two different notions of the *a priori* are at the root of two competing forms of modern linguistic naturalism (Section 2). These are discussed in the next paragraphs, in which Chomsky's internalist naturalism is contrasted with Quine's externalist naturalism (Section 3), and with more recent research programs that can be subsumed under the rubric of 'developmental' naturalism. These focus on the formation of the *a priori* structures of subjectivity, and on the interaction of those structures and social practices from a phylogenetic (Section 4) and ontogenetic perspective (Section 5). A last paragraph (Section 6) draws a few conclusions.

1. Models of naturalism

The definition of naturalism I will adopt in the present essay is the broadest among current ones: it corresponds to a notion of philosophy (or rather philosophies) as contiguous to scientific theories and/or to views and beliefs incorporated in social practices and behaviors. Contiguity does not mean reduction. Rather, it indicates the fact that philosophy, while endowed with its own methods, does not operate on unique, domain-specific, 'philosophical objects': on the contrary, it finds them already defined in various ways by science or common sense. Its first methodological problem is reducing pre-existing materials to a coherent and theoretically analyzable epistemological object. Language philosophy is no exception.

A reference to common sense is due when the study of language is concerned. In this case, the naturalist approach applies to materials offered by one or more among sciences such as biology, psychology, neurosciences, acoustics, artificial intelligence, etc., but also to descriptions of linguistic and conversational practices

and to the implicit linguistic knowledge of the speakers, their *Sprachsinn,* or (as we prefer to say nowadays) *epilinguistic* knowledge, which is a fundamental part of their 'knowing a language.'

It is perhaps worth recalling that naturalism, in the broad sense outlined above was an undisputed method of Western tradition from Aristotle to Kant, to the point that natural philosophy was identified for centuries with the science of nature. The same holds for language philosophy, which developed as a reflection on the meaning of names, i.e., as an eminently epistemological reflection on linguistic categorization as a mode of accessing reality, of organizing and controlling experience. For centuries, the structure of grammar and the structure of the mind were treated as domains that were epistemologically contiguous, when not actually overlapping. A few examples: it would be difficult to say where the theory of grammar ends and the theory of the mind begins in Medieval semantic theories. It would be difficult to conceive Locke's semiotics independently of the new physics' critique of the substantial forms. Condillac's theory, a true monument to linguistic naturalism, is interwoven with the findings of the *sciences d'observation*, medical sciences and the nascent anthropology. Indeed a repertory of such examples would cover the whole history of language theories.

The break between philosophy and naturalism came about in the post-Kantian period, when natural philosophy affirmed its diversity from the natural sciences. A similar thing happened in the same period in language philosophy, with the adoption of a dual method in linguistic research, transcendental and empirical, aimed at clarifying respectively the ideal and the historical genesis of languages. Alongside 'natural history,' an 'a priori history' was born, as Fichte called it in his essay *Von der Sprachfähigkeit und dem Ursprung der Sprache*, published in 1795. The historical perspective had to be supported by a philosophical one. The first described factual linguistic occurrences, the second proved them to be necessary. In other words, language forms had to be justified in terms of transcendental forms. Only through this precondition a true science of language was possible, a science of the unconditioned form of language. As any human competence, speech too was seen as a spontaneous germination born out of non-empirical conditions. Humboldt's notion of *Sprachform,* which precedes all contingent linguistic manifestations and constitutes their ideal essence, is a hint of this universal germinating power.

This idealistic transformation of language philosophy did not have the power to put an effective stop to research programs based instead on a theoretical contiguity with other sciences, as proved by the development of psychologism from Herbart to Wundt. However, it did succeed in making them marginal to academic philosophy and, with rare exceptions, in making them lose contact with contemporary research in historical linguistics. The reduction of linguistics to aesthetics proclaimed by Benedetto Croce in the early twentieth century was a clear sign of

the break between philosophy and the language sciences and of the consequent exclusion of any form of naturalism from linguistic philosophy. It was followed, with much more effective and lasting consequences, by Heidegger's negation of the legitimacy of any scientific study of language.

I have told part of this story elsewhere (Formigari 1988, 1994). I summarize it here only to note that the naturalist turn taken in the 1960s by philosophers such as W.V.O. Quine, psychologists and biologists such as Donald Campbell and Konrad Lorenz, was in a way a return of philosophy to its ancient epistemological and cognitive vocation. The rapid development of new technologies for the study of the mind, in the following decades, made the notion of naturalized epistemology (to use Quine's expression) much more current that could have been expected. We shall see further on what forms this notion of epistemology has taken when it has been applied to linguistics, and what research programs it has produced.

The broad definition of linguistic naturalism from which we began – a second-degree reflection on language sciences and the linguistic commonsense of speakers – allows us to identify a number of models of naturalism that developed as metareflections at various stages of linguistic knowledge. The fact that this knowledge was sometimes closely tied to the founding myths of Western culture and could easily be classified as pre-scientific, did not prevent them from turning over the centuries into central *topoi* of our philosophical tradition, based on shared beliefs, and from being a source of criteria that can be applied to present debates too. A survey of those models can serve in the first place as a deterrent against oversimplification, as a warning not to reduce naturalism to one of the poles of the nature-nurture antinomy. Every epiphany of naturalism is a complex of theses that defines itself unitarily in opposition to something that varies from time to time but is not necessarily *anti*-naturalism.[1]

I shall distinguish three types of linguistic naturalism in Western philosophical tradition.

a. 'Cratylean' naturalism. According to this model, some sort of iconic congruity exists between the name and the thing it designates. In its classical expression, found in Plato's *Cratylus*, naturalism is the dialectical opposite of conventionalism. Plato expresses it in terms so radical as to sound paradoxical, but this serves him to reduce the notion *ad absurdum* and elaborate, through the confutation of the two opposite positions, his own theory of names as legitimate tools for categorizing and communicating. The thesis of the similarity between names and things continued in Western culture, merging itself with the myth of Adam the name-giver. It exerted

1. A broader treatment of this subject is found in Formigari (2004: 16–18, 39–43, *passim*).

its influence up to the threshold of modernity, not only in mystical literature, but also in scientific disciplines like philology, where it worked as an ultimate goal in the study of etymology and the search for the original mother tongue, and an ideal model in the construction of artificial languages. In natural sciences such as astrology and medicine, we find explanations of the *virtus verborum* – the efficacy of invocations, charms, or the therapeutic power of sounds that induce somatization – as effects of powers that voice and sound share with other measurable phenomena in the universe, of attraction and repulsion forces similar to those of a magnet or the power of antidotes. Behind the myths and paradoxes in which this model is sometimes expressed, lies the urge to identify a motivation in names that would explain their representational power and their semiotic efficacy.

In modern philosophy, this form of naturalism has found its opposite in the theory of the *arbitraire du signe*, while recent debates on phonic iconism reformulate the theme of sound-meaning continuity. The discussion has gone much beyond the traditional theme of onomatopoeia, focusing on the correspondence between the perception of sounds and other modes of perception, cognition and expression (perception of colors and forms, gestuality, intentions and emotions, etc.). This 'physiognomics of the voice' seems destined to play an important role in embodiment and motor theories of language elaborated in cognitive semantics.

b. 'Epicurean' naturalism. Its source is Epicurus' letter to Herodotus documented by Diogenes Laertius. The long passage in which Epicurus describes the birth of speech from the joint action of individual drives and social needs shows a wise dosage of endogenous, subjective, private factors and public, communicative functions. The two kinds of factors condition and integrate one another and together form the 'human nature'. A pre-existing collection of instincts is undisputed, but their apriority does not make them impermeable to experience: human nature, Epicurus explains, derives many and various teachings from things, and things themselves exercise powerful constraints on the human mind.

The special interest of this passage lies in the notion of a reciprocal influence of instinct and learning. An often unspoken source in secular culture, Epicurus' theory of the origin of language became the prototype of all theories that sought to explain the origin of speech as a spontaneous process in the collective history of humankind, independent of supernatural intervention or divine revelation. An enduring and important current of 'Epicurean linguistics' in language theories, from the Renaissance to early nineteenth century has been reconstructed by Gensini (1999).

Among the forms of classic naturalism, this is the closest precedent to present approaches we shall discuss below under the rubric of 'developmental naturalism'. These approaches are all based on a notion of human nature in which external

factors merge with endogenous factors, activating or even modifying them in significant ways. In pre- and protomodern linguistics this form of naturalism is opposed to 'Adamic naturalism'.

c. 'Adamic' naturalism. The theological thesis of divine inspiration or revelation of speech can also be viewed as a peculiar form of naturalism. It attributes to Adam the first and fundamental act of representation of the human mind, the categorization of things through names. It is a gift that can be revoked (Babel), returned (Pentecost), in any case it establishes once and for all the diversity of the human mind in relation to that of *muta animalia*. It establishes once and for all *human nature* in its unique and irreproducible identity.

In its theologically explicit form this model has no longer enjoyed scientific respectability for centuries. It was already obsolete when Herder presented his *Abhandlung über den Ursprung der Sprache* (1772) as a confutation of the theological theses of Johann Peter Süssmilch, who serves indeed only as a straw man to Herder's naturalism. But a fundamental trace of that model remained even in Herder's essay, though its *incipit* may suggest differently ("Already as an animal man has a language…"). In fact, the main thesis of the *Abhandlung* affirms the absolute heterogeneity of the human and animal mind and the discontinuity between animal forms of expression and the symbolical forms in which human language and culture are enacted. It is perhaps not too far-fetched to perceive a secularized version of that ancient model in modern theories that emphasize the impact of phylogenetic factors in contrast with ontogenetic ones, establishing an insurmountable gap between the animal mind and the human one.

2. Naturalism and the problem of the a priori

It is almost a cliché to date the renaissance of philosophical naturalism to Quine's famous essay (1969a), in which he proposed a model of naturalized epistemology after the antipsychologist wave in anglophone philosophy. I will refer later again to this essay, which influenced the debate in analytic philosophy for more than three decades (see French et al. 1994) and, according to many, marked the beginning of its crisis, depriving it of its two fundamental premises: antipsychologism and the faith in the *a priori* foundation of epistemological principles. Quine's critique of all analytic criteria of truth and meaning was tantamount to a rejection of the notion that there may be statements whose truth-value can be ascertained solely on the basis of the meaning of their components. This undermined at the root the very definition of philosophy as the analysis of language, i.e., the aspect that made analytic philosophy a linguistic philosophy *par excellence*. It is significant that after Quine the philosophical

debate focused mainly on the problem of justification of knowledge and beliefs, that is, on the skeptic inferences that might be drawn from the thesis that epistemology depends solely on contingent information about the world.

Philip Kitcher (1992), in an article on the revival of naturalism, lists two minimum conditions for a naturalistic approach: (i) the reintroduction of psychology into epistemology, and ii) the rejection of the *a priori*.

Condition i) seems to have been largely accepted in the epistemology of language of the last few decades, though with some important reservations. At the two opposite extremes of the theoretical spectrum, we may position 'psychologized linguistics' and 'pure linguistics' (Antony 2003: 48). The first approach can be plausibly made to coincide with the Chomskyan school: since ordinary language users possess an internal system of rules or principles, the core of a naturalistic study of language should consist in the attempt to render explicit our knowledge of such a system (see Barber 2003: 3). The other extreme is well-exemplified by Jerrold Katz's position as voiced in various essays of the 1980s and 1990s: the sole pertinent task of linguistics as such is the description of languages as formal systems, it is not the (psychological) study of the partial knowledge that locutors have. Between these two extremes are many intermediate positions that, while not reducing linguistics to a branch of psychology, acknowledge the importance of its psychological aspect, accepting at the very least the notion that performance (or *parole* or whatever we wish to call the empirical manifestations of language) depends on mental processes and behaviors that can be the object of empirical study.

Condition (ii) requires a little more attention. To begin with, it is possible to identify two notions of apriority, one of which is certainly incompatible with a naturalistic perspective, while the second remains a legitimate and useful, indeed indispensable, tool of naturalism.

ii(a) In Kant's acceptation, we understand by *a priori* knowledge, not knowledge independent of this or that experience, but knowledge absolutely independent of all experience.

ii(b) According to a different acceptation, we may qualify as *a priori* the starting point of a research program, argument, or inferential procedure. It is a condition that is in turn conditioned: an *empirical apriority.* This expression may sound as an oxymoron to someone used to an intrinsically non-naturalistic philosophical style, but is widely attested in philosophical literature, at least up to Kant. In Johann Heinrich Lambert's *Neues Organon* (1764) – a text which can be considered as a repertory of the philosophical tools of its time – it is said that *a priori* and *a posteriori* are expressions that refer to the order in which our knowledge is arranged, they are relative not absolute, they may be characterized by degrees: a notion may be *more or less a priori* than another one, and function at times as *prius* and at times as *posterius* in the chain of knowledge (*Neues Organon*, Vol. I: §§ 634-638). Critics of

Kant (among which Herder) took up this conditional notion of apriority: *a priori* elements, in the intellectual behavior of humans, must never be conceived formally, for every *prius* presupposes a *posterius,* and one must determine case by case what precedes and what follows in thought or argumentation.

The publication of Peter Strawson's *The Bounds of Sense,* in 1966, was followed by a discussion on the legitimacy of a notion of *a priori* compatible with empiricism (see Schaper and Vossenkuhl 1984) and on the alternative between the study of conditions that make possible *every* configuration of every possible experience – cf. ii(a) above –, and the study of the conceptual schemes that make possible *a specific* configuration of experience – cf. ii(b) above. But already in 1941, the Kantian notion of *a priori* had been discussed by Konrad Lorenz, future Nobel prize laureate for ethology, who introduced into the debate an evolutionary perspective. A biologist, writes Lorenz (1941), cannot ignore the question of the allegedly transcendental nature of our cognitive apparatus, of its supposed independence from experience. If, like the rest of the organic world, it is a result of an adaptation to the external world, as argued by evolutionary epistemology, it must be necessarily considered as something *a posteriori* in regards to our evolutionary history. Indeed, the *a priori* laws of our mind could have possibly been quite different if the history of their formation had been different. The error of transcendental idealism is to suppose that because the structures of the mind precede any individual experience, which they no doubt do, they must therefore be independent of the evolutionary processes that affect all other organic structures. Cognitive powers adapt to the external world in the same way that the hoof of the horse adapts to the ground, and the fin of the fish to the water. In these cases, "no one is so crazy as to think that it is the form of the organ that 'prescribes' the properties of the object" (Lorenz 1941: 99). Thanks to this reformulation of *apriority* as a result of adaptation, the boundaries of the *a priori* are not given once and for all (Lorenz 1941: 95-96). Every condition can be inserted in a chain of conditions in the role of *posterius.*

The notion of apriority as a transcendental, unconditioned condition, capable of prescribing the form of our empirical knowledge and thus ensure its validity, seems incompatible with a naturalistic perspective of an evolutionary type, which, as such, must be capable, at least in principle, of retracing the chain of conditions. On the contrary, the notion of apriority as conditioned condition is not only compatible with a naturalistic perspective, but is in fact one of its tools, as Lorenz points out. Let us call these two notions (i) the nativist notion and (ii) the developmental notion of the *a priori.* In so doing, I will leave aside the question of the extent to which Kant's own position differs from classical nativism (which it of course does, pre-Kantian nativism being a theory of innate *ideas,* therefore concerning the *contents* of the mind not the *forms* of understanding). According to the nativist notion, mental and linguistic structures are refractory to

empirical-intentional factors, both on the phylo- and ontogenetic level. According to the developmental, or epigenetic, notion instead, mental and linguistic structures are the evolutionary or co-evolutionary results of phylogenesis. As such, they have a significant impact on the ontogenetic processes, and are open to the influence of empirical-intentional factors. To the nativist and the epigenetic notion of apriority correspond two forms of naturalism, whose difference is best revealed in their relation with evolutionary epistemology. I will examine them in the rest of the article, dedicating Section 3 to nativist naturalism and Sections 4 and 5 to developmental naturalism.

In relation to the question of apriority, another premise is necessary. Kitcher (1992: 70) notes that "Quine's critique of analyticity automatically constituted an attack on the *a priori*". This is certainly true in the case of Quine, just as the reverse is true in the case of Chomsky's naturalism, where the analytic notion of meaning is closely connected to the thesis of the apriority of universal grammar. But the two things, analyticity and apriority, are not necessarily connected (or *automatically* connected, to use Kitcher's expression), as if their joint presence (Chomsky), or absence (Quine) were a constitutive aspect of all theories. For example, it is difficult to deny the analytical power of grammar, i.e., to deny that the formal semantic structures of a language are the bearers of information about the intentional objects, or referents, they apply to. A grammar form (the tense, mode, or aspect of a verb, gender, number, etc.) certainly does 'say something' about the objects or events concerned, independently of the actual act of referring. But this does not *necessarily* mean that those structures are an *a priori* in an absolute sense.

Indeed, the case of grammar confronts us once again with the problem of the *a priori*. Once again, it comes in two different acceptations: i) a strong, 'transcendental' acceptation and ii) a weak, 'empirical' one. The first acceptation implies a rigorously analytical and internalist semantics, as Chomsky's indeed is, in which there is no room for the intentional sphere, including reference. The second is perfectly compatible with an externalist semantics that, while focusing on intentional relations, does not deny the analytic power of grammar. In fact, it can even take the origin of grammar from the domain of intentional experience as an object of study.

3. Naturalizing the a priori: Chomsky's way

Quine's naturalism led to systematic study of the speakers' performances and stimulated research in externalist semantics. Chomsky seems to take yet another step in the naturalization of linguistics, focusing on the study of the mental structures underlying those performances, i.e., the set of principles and rules that generate and syntactically organize representations. His naturalism resulted in a rigorously

internalist semantics, which excluded any consideration of language-world connections. As I will try to show in the following, in both aspects – the apriority of mental structures and internalist semantics – Chomsky's naturalism contrasts not only with Quine's, but also with recent naturalistic theories issuing from so-called second generation cognitivism.

Chomsky's naturalism is so explicit (see for example Chomsky 2000: 75-105) that there is no need to demonstrate it. It consists of a set of scientific procedures leading to strong explanatory theories that can be integrated into core natural sciences. The system of knowledge represented in the mind of a speaker is the epiphenomenon of physical mechanisms whose discovery is entrusted to brain sciences (see for example Chomsky 1988: 5-8). Naturalistic linguistics is not concerned with any intentional phenomena reflecting particular human conditions, attitudes, and perspectives, or common sense notions such as *speaking a language*. All that we can sensibly say in this regard cannot be integrated into the natural sciences. Even elementary notions such as *nameable thing* cannot be used in a scientific discussion of language: "What we take as objects, how we refer to them, and the array of properties with which we invest them, depend on their place in a matrix of human actions, interests, and intent in respects that lie far outside the potential range of naturalistic inquiry" (Chomsky 1992: 207-208). The only objects that are open to scientific investigation are the human language faculty and the (I-)languages that are its manifestations. These are the only objects that "qualify as natural objects" (Chomsky 1995: 14).

Naturalization therefore concerns only the framework of language, i.e., universal grammar and the internal grammar that it generates in individual minds. The same theoretical model may be used also for a possible naturalization of the mind. In this case, it would be necessary to postulate a 'science-forming faculty' performing, as the basis for cognitive *a priori*, the same function that the language faculty has in the acquisition and use of language (Chomsky 1992: 208). In both cases all that pertains to the conceptual-intentional system is relegated to the epistemologically irreducible sphere of common sense.

The first victims of this approach are the idea of language as social practice, and referential semantics ("the obscure idea that certain terms have a relation to things [...] fixed in a common public language...", Chomsky 1992: 222). Like all intentional phenomena, any reference of a linguistic expression or mental representation to extramental entities belongs to common sense and falls into the domain of objects that cannot be naturalized. Internalism is the only approach to semantics that can do without conceptual-intentional factors and therefore the only approach compatible with this type of naturalism. In Chomsky's example, once we conceive Peter's brain as part of a larger system of interactions, we are immediately faced by questions that lie outside the scope of naturalistic approach. "The analogy would no

longer be to the configuration C produced in Peter's brain when he thinks of cats, but to some physical configuration C' involving C along with something else, perhaps something about cats" (ibid.). An internalist semantics necessarily involves the retrieval of an analytic notion of meaning, the only one which may be subject to scientific treatment in Chomsky's perspective. This holds on a grammatical level, as we have seen, as well as on a lexical one: a child's lexical learning largely consists in applying "labels for concepts that are already part of his or her conceptual apparatus" (Chomsky 1988: 28). The acquisition of a vocabulary is guided by a rich and invariant system of concepts, which is prior to all experience (Chomsky 1988: 33). To be self-sustaining, an analytical theory of meaning must exclude any reference to common sense objects. Like Quine, Chomsky resorts to the criterion of synonymy, reformulating in terms of meaning the Kantian criterion of analyticity as the inclusion of the predicate into the subject. Consider his analysis of words such as 'persuade' (1988: 30ff.) as examples of terms whose meaning is pre-determined by ideas such as action, agents, goal, intent, and others, independently of their empirical application. It is beyond question, he concludes (1988: 32), "that acquisition of vocabulary is guided by a rich and invariant conceptual system, which is prior to any experience". Analyticity becomes thus an internally determined property of linguistic expressions. Unlike Quine, however, and like Kant, he sees the criterion of synonymy as cogent. As part of the I-language, internalist semantics "seems much like other parts of the biological world" and as such qualifies as an object of naturalistic inquiry (Chomsky 1992: 218-219).

Jackendoff's attempt to broaden the semantic scope of the naturalizing program, hypothesizing the existence of three distinct and interconnected computational systems – phonological, syntactical and conceptual – is well known (Jackendoff 1996). But in fact it only pushes the border of what can be naturalized: the computational and formal aspects of semantics on the one hand and the actions, interests, and beliefs that motivate the use of language on the other hand remain, respectively, inside and outside that border.

Chomsky opposes his *methodological naturalism* to *methodological dualism*, "the doctrine that in the quest for theoretical understanding, language and mind are to be studied in some manner other than the ways we investigate natural objects" (1995: 28). However, he reintroduces dualism on a different level, i.e., between the two distinct, though interfaced, systems: the computational system and the conceptual-intentional one. This represents a problem for language sciences, in which competence and performance, language and speech, formal features and semantic features (*a priori* and *a posteriori*) would consequently be treated as two epistemologically unconnected domains. There are passages in Chomsky's writings that leave little doubt that this is indeed the case. In a particularly dramatic one, Chomsky states that the naturalist approach pursues its own paths, and produces a

picture of the world parallel and separate from our ordinary ways of talking and thinking, the latter being "far too rich in character for us to hope to be able to discern explanatory principles in any depth, if these even exist" (Chomsky 1995: 10).

Chomsky's naturalization program stops, downwards, at the border of the conceptual-intentional domain. But it also stops, *de facto* if not in principle, upwards – that is, in the chain of conditions – at the border, albeit contingent, of the description of the cerebral structures that underpin universal grammar. The states, representations, principles and conditions that we assume, says Chomsky, describe the properties of the brain independently of the cerebral mechanisms that produce them, which are at present unknown. What justifies an approach, and the hypotheses that guide it, is its capacity of yielding adequate descriptions, significant explanations and productive research programs (Chomsky 1998: xiv-xv). This kind of justification, one cannot help noting, is in fact the one that supports any kind of epistemological approach, even one without the *a priori* postulates of the Chomskyan one. In other words, one does not need to be a rationalist in linguistics to be satisfied with such pragmatic justifications and trust in future scientific research for the integration of one's descriptions into a naturalized model of linguistics, i.e., an integration of 'psycholinguistics' into 'neurolinguistics'. In terms of our initial definition of naturalism, we could perhaps say that Chomsky's theory is a dimidiate naturalism, a partial theory that cleaves language in two and leaves one part outside of its boundaries.

Since we started from the notion of naturalized epistemology, we must necessarily return at least briefly to Quine. Without entering into the details of the Chomsky-Quine debate (the reader can refer to Gochet 1978: 69-78, for a very balanced and still useful account), we may note that the distance between their two notions of naturalism is clearly evidenced by the opposition between Chomsky's internalist conclusions and Quine's choice of a semantics fully focused on the indeterminacy of meaning and on the strategies adopted to overcome this indeterminacy. Linguistic practice occurs entirely within the empirical sphere ("one has no choice but to be an empiricist so far as one's theory of linguistic meaning is concerned", Quine 1969a: 81). No analytical notion can describe its procedures ("The sort of meaning that is basic to translation, and to the learning of one's language, is necessarily empirical meaning and nothing more", ibid.). Epistemology is a chapter of psychology and hence of natural science, and the kind of psychology used by the new scientific epistemology is an empirical psychology (1969a: 82-83), where 'empirical' may be read as 'behaviorist'.

"It is one of the ironies of the history of behaviorism," John Searle noted (1972: § 3) "that behaviorists should have failed to see that the notion of a human action must be a 'mentalistic' and 'introspective' notion since it essentially involves the notion of human intentions". Thus both Quine's and Chomsky's naturalism seem

to clarify only one half of a larger picture: an intentionality without mind and a mind without intentionality. Quine sheds light on the half containing communicative and cognitive practices and strategies. Chomsky shows the half depicting the preconditions of practices which however elude all scientific description. Joining the two halves, however, is not enough to obtain a picture of accomplished naturalism. Any suture of the two parts is bound to be unsuccessful. The premises are too different (a rejection *vs*. reintroduction of *a priori* principles and the criterion of analyticity), and so is their method: on the one side we find an empirical psychology, modeled, what is more, on the example of behaviorism, dominant at the time; on the other side we have a transcendental psychology focusing on the innate structures of subjectivity. Their outcome is also different on main points of language theory, such as semantics (externalism vs. internalism). Finally, the style of their naturalizing programs is different. In Quine, a maximum of descriptive value in regards to speech practices is combined with a minimum of explanatory power concerning their underlying mechanisms. In Chomsky, the explicative power of the theoretical model has its trade-off in the explicit renunciation of any description of speech.

After the 1960-70 period, in which the two authors developed their theories and engendered their schools of thought, we have never had, in my view, an equally explicit and 'monumental' manifestation of naturalism in linguistics. Rather we could speak of a galaxy of research programs in genetic psychology, which I shall deal with below. Their problem seems not so much reuniting the two halves of the picture as much as imagining a new one, or, to persevere in my metaphor, to construct a *panopticon* that would allow us to observe the entire extension of that natural artifact that language is.

To treat the Chomsky-Quine opposition as a case of the traditional opposition between rationalism and empiricism is rather natural, indeed inevitable. But this alternative is often banalized into an opposition between innate principles vs. the mind as blank slate. The image of the *tabula rasa*, even in the classical debate, was never more than a convenient formula: the theory of knowledge in classic empiricism is founded on a psychology of faculties, and faculties are constitutive organic predispositions of the mind; their operations follow innate mental mechanisms (association, generalization, analogy, composition and decomposition of data, abstraction). In the rhetoric of empiricism, few notions recur as often, even in the titles of the founding texts, as the notion of 'human nature'. Without digging too far back into the past, it will suffice to refer to Quine's "Natural Kinds" (1969b) to find an acknowledgment of the existence of innate functions (such as the primitive sense of similarity, a part of our animal birthright which makes categorization an elementary mechanism of thought and language), and, at the same time, the acknowledgment of their compatibility with empiricism (Quine 1969b: 123). Even

more explicitly, and as a response to Chomsky, Quine declared that innate biases and dispositions are the cornerstone of behaviorism (Quine 1969c: 96). The problem for empiricism, instead, is that of justifying these functions without postulating them as unconditioned *a priori*. To do this, Quine appealed to a behaviorist notion of learning as a response to a reward. In present day naturalism, as we shall see, more complex approaches have been adopted, along with a more complex notion of learning. Thus, the dispute between rationalism and empiricism, today as yesterday, is not a question of affirming or denying the existence of *a priori* structures of the mind, but in affirming or denying that those structures are permeable to experience in the process of both phylo- and ontogenetic history.

4. Naturalizing the a priori: Darwin's way

Biologists are reluctant to dramatize the relation between experience and its conditions, unlike the majority of philosophers, at least after Kant. This may depend on the fact that all biologists, since Darwin, have operated in the context of evolutionary epistemology and subscribe to the notion that every epistemic status is dependent on the processes that generate and sustain it. This 'genetic' or developmental inclination, rightly emphasized by Kitcher (1992: 75), is fundamental to the definition of the various competing forms of linguistic naturalism. The absence or the presence of this trait distinguishes two irreducible models of the mind: the mind as a repertory of necessary constraints, unaffected by phylo- and/or ontogenetic history, or the mind as a psychogenetic process.

It is the latter approach that I wish to discuss now. More precisely, I wish to show how the biological notions of evolution and adaptation interfere with the definition of the two opposite models of naturalism that we have begun to outline: the nativist one, discussed in Section 3, and the developmental one, that we shall deal with in the present paragraph and the next.

Philip Lieberman's statement (2000: 3) that "nothing in biology of language makes sense except in the light of evolution" is a good starting point for a definition of developmental naturalism, also because Lieberman has been the most persevering scientist in the search for a model of cognitive naturalism compatible with evolutionary biology, working on it for more than thirty years. His thesis, as it is known, is that the uniqueness of the human language has its roots on the one hand in non-linguistic intelligence (perceptual, sensomotorial, emotional systems and long-term and short-term memory) and on the other hand in the general evolution of the animal world. Let us focus now on the latter aspect. Along with the notion of adaptation of classic evolutionary theory, Lieberman and other followers of developmental naturalism develop a notion of plasticity of the animal brain.

The capability of re-organizing cortical circuits in response to stimuli – experimentally attested, in the case of language, by the fact that children, or even adults, who suffer severe damage to the cortical areas normally responsible for language, retain the capability of respectively learning and using it – is explained by Lieberman in terms of the role of learning in the formation of the neural circuits involved in motor and cognitive activities, including the acquisition of the phonetic, lexical, and syntactic systems of natural languages. If the neuroanatomical substrate of the functional language system is part of the human genotype, "the particular neural circuits that code words, regulate syntax, control speech production, and perceive speech sounds are shaped in the course of development in particular linguistic environments" (Lieberman 2000: 6).

Introducing an epigenetic principle in the description of the language faculty, as many authors have done in the last decades (see Elman et al. 1996, MacWhinney, ed. 1999, Tomasello 2003) has two disrupting consequences for nativist theories: it contradicts at once the apriority of syntax and its independence of the conceptual-intentional sphere. For what is learning, after all (at any level, from phylogenetic adaptation to ontogenetic implementation) if not a macroscopic intentional interaction?

This becomes even more evident in the notion of coevolution, introduced by Terrence Deacon and others. The idea of reciprocal adaptation between competences and their host, the human brain, holds for language as well as for other technologies: "Stone and symbolic tools, which were initially acquired with the aid of flexible ape-learning abilities, ultimately turned the tables on their users and forced them to adapt to a new niche opened by these technologies" (Deacon 1998: 345). Deacon postulates, on the basis of neuroanatomical considerations, that symbolic reference was a primary cognitive adaptation, made possible by the predisposition to analysis of higher-order associative relationships, and that syntax was a factor intrinsic to, rather than separate from, the referential function. Thus in the natural history of the human mind, the intentional function par excellence, reference, prepared by a protolinguistic use of specific indexical referential signals, acquires the role of prime mover that nativist naturalism reserves to universal grammar. Reciprocity between structural competences and evolution is intrinsic to any instrumental theory of language. Even in the case of speech, "tool use is a two-way sign of intelligence", it *requires* and *confers* intelligence (Dennett 1995: 377-378).

The exclusion of conceptual-intentional factors from the epistemological domain of naturalism is incompatible with the Darwinian model. This is confirmed by the results of the efforts of Chomsky's followers to reconcile the two (for a quick overview see Liebermann 2000: 127-129). Pinker and Bloom (1990: § 3), for instance, infer from the *function* of speech both the universal traits of grammar in human languages and their adaptational origins, and this function is primarily a

conceptual-intentional one. Grammars must map propositional structures onto a serial channel, keeping ambiguity to a minimum and increasing the speed of the encoding and decoding of information relating to the objects and events of the world and the internal states of members of a group of cooperating individuals. Protolanguage, a notion proposed and defended throughout the years by Derek Bickerton (Bickerton 1990, 2000), implies from the start the existence of elementary forms of reference as well as other communicative strategies.

The debate on the application of the biological notion of evolution to cognitive theories has been going on for more than two decades and has given new theoretical respectability to the problem of language origin, which seemed relegated to the dusty archives of speculative anthropology (rightly so, according to Sylvain Auroux [2007] who has recently charged the language origin debate with biological determinism). Chomsky has always been rather agnostic about the negotiations with Darwin so zealously pursued by his followers. And also on the base of a recent article (Hauser et al. 2002), it seems that his position has not changed very much. The borders of the *a priori* are located at the abstract computational system (the *faculty of language – narrow sense*: FLN), while the sensory-motor and conceptual-intentional system that belong to the *faculty of language – broad sense* (FLB) are gladly consigned to the domain of that which cannot be naturalized. If we think of Lorenz's critique of transcendental idealism and apply it to the Chomskyan distinction between FLN and FLB, we can very well ask ourselves: is it reasonable to think that the latter is subject to an evolutionary history from which the former is exempt and that precisely this exemption allows the former to 'prescribe' the properties of the latter?

While not using the term coevolution, Konrad Lorenz had very clearly explained in what acceptation a transcendental element could be admitted into evolutionary cognitive psychology. If the *a priori* organization of all possible experience, i.e. the human mind with all its categories and forms, is not conceived as something immutable, independent of natural processes, but, on the contrary, as something tied to them by a close relation of interdependence, the border between what can be experienced and what is transcendental will be in turn conditioned, in any living species, by that interrelation. Something like Kant's *a priori* forms undoubtedly exists: some dispositions to think according to patterns that precede individual experience. The duty of the naturalist is to find an explanation for them in the evolutionary history of our species. As Lorenz notes, "something that has developed through an evolutionary adaptation to the laws of the external world, has necessarily developed in some sense of the word *a posteriori*, although in different ways from abstraction or deduction from previous experience" (Lorenz 1941: 95-96). What we have here is a unitary vision of natural and artificial processes of accumulation and elaboration of information, a vision that allows one to

connect biological evolution to the cultural evolution of our species. The latter "has produced both the contents of 'our world 3' in Popper's words, and those 'exosomatic' extensions of our body and our brain: the tools of science and technology, from Galileo's telescope to the computer, considered as an authentic 'artificial mind'" (Somenzi 1977: 11). These words were written in a period when the debate on naturalism was focused on questions of general epistemology. Only in much more recent years has language been included among these 'exosomatic' extensions. But for this to occur, it was necessary to reintroduce in the research program of naturalism the study of learning processes and an interest in the ontogenesis of human intelligence and language.

5. Naturalizing the a priori: Piaget's way

In the previous paragraph, I have tried to outline, using a few significant examples, a particular version of developmental naturalism, which could be called 'evolutionary constructivism'. It is an approach based on the idea that the *a priori* of the human mind are the result of a general process of anthropogenesis based on mutual conditioning between mental structures and the history of the species. In the present paragraph, through again a limited number of examples, I will try to describe a trend that is complementary to evolutionary constructivism, which I shall call 'developmental constructivism': the notion that the cognitive and behavioral structures of the subject are constructed in the process of ontogenetic interaction, on the basis of predispositions that are not oriented from the start towards specific competences.

In a public debate between Chomsky and Piaget, held in 1975 (Piattelli-Palmarini 1980), Piaget was accused of empiricism. In reality, throughout his life, Piaget had always refuted empiricism in the name of an interactive notion of the relation between the epistemic subject and the world: a constructivist view of experience according to which each empirical datum is assimilated into a cognitive architecture made of schemes, concepts, images and mental elaboration procedures. On the other hand, Piaget had always distanced himself from rationalism, at least those versions that imply a nativist option, i.e., forms of preformism or apriorism that explain knowledge on the basis of internal structures impermeable to experience, and view the subject as a set of purely endogenous mental competences. To this idea of a structure without genesis, Piaget opposed a different model of the mind, in which mental dispositions develop ontogenetically through a gradual interaction of the organism with the environment. Thus, the label of *genetic* empiricism may be appropriate to his position, at least insofar as he seeks to explain mental functions on the basis of their process of construction. Certainly, in

qualifying it as 'genetic' we differentiate his position from the nativist rationalism donned by Chomsky as his philosophical mantle and, at the same time, we distinguish it from other forms of empiricism, such as behaviorism or classical pre-evolutionary empiricism, whose limit had been a conception of human nature as a set of competences already full-blown at birth, waiting only to be trained through imitation. Indeed, it is a small step from this form of classical empiricism to the rationalist notion that human nature consists of *a priori*, automatically activated, competences. In other words, classical empiricism lacked, like rationalism, a developmental or evolutionary perspective. Thanks to this perspective Piaget may conceive of infant psychology as part of a general embryogenesis that continues well beyond the moment of birth and includes the entire growing process, both physical and mental, up to the relative stability of adulthood. Though experimental results made possible by new technologies have disconfirmed many of Piaget's notions of the infant mind, his general view remains valid (cf. Tomasello 1999). One cannot set a starting point for intelligence, intelligence is "a point of arrival, and its origins merge into those of sensorimotor adaptation in general and, through the latter, into the origins of biological adaptation itself" (Piaget 1967: 13).

The fabric of mind seems today a place where the genesis of the language faculty can be redesigned in the context of naturalist linguistics. The study of the assimilation and adaptation processes in the infant mind, the production of action schemes, the emergence and interiorization of coordinated operations and actions, concrete and formal, seems often more promising than the study of phylogenetic processes, with its inevitable baggage of speculative hypotheses. Recent research suggests a sort of functional innatism that overcomes the old antinomy between *prius* and *posterius* in the reciprocal interaction of knowledge and action. Only from a merely practical perspective can there be an *a priori* at which the chain of conditioning must stop, but not in principle. Thus many authors retrace the symbolical dimensions of language to the interaction of exogenous and endogenous factors. A key tenet of this approach "is that the pattern of connections underlying knowledge and/or skill representations is dynamic or plastic, continually adjusting to new contingencies in the internal and external milieu" (Dick et al. 2005: 238).

In this dialectic of endogenous and exogenous factors, the respective role of *prius* and *posterius* are continuously exchanged. There is no doubt, for example, that one can detect, in the infants' acquisition of vocabulary, phenomena whose statistical regularity clearly marks them to be language learning universals. Small children will tend to refer a new word to an object of which they do not know the name, rather than one whose name they already know, and to the entire object to which their attention is drawn, rather than to a part or a quality of the object. These are some of the unconscious rules through which children solve 'Quine's

problem' (Tomasello 2003: 84-86), i.e., the problem of referential indeterminacy. At this point, one can opt between two different interpretations of the fact. One can decide that children operate on the basis of *a priori* constraints that lead them to assume certain kinds of necessary connections between language and the world. Or – in the case of those positions that I group under the label of developmental constructivism – one can in turn explain these manifest tendencies in vocabulary learning as contingent effects of the fact that the attention of children focuses prevalently on whole concrete objects, which they perceive as salient in the routine cultural activities they participate in. The latter interpretation sees lexical competence as a consequence of complex processes involving many other factors, such as joint attention and intention-reading, the capability of segmenting the speech stream in identifiable units, inferential capabilities, and so on.

The alternative is equally clear-cut when it comes to grammatical competence. This can be represented as a repertory of semantically empty rules, or, on the contrary, as the mastery of a structured inventory of meaningful linguistic constructions (Tomasello 2003: 99). It is not surprising that grammaticalization and lexicalization give rise to similar problems. In both cases what remains to be explained is the formation of rules that *only at a later stage* serve as *a priori* constraints on the linguistic behavior of the subject. For a naturalistic and developmental description, grammaticalization can be explained solely on the basis of reiterated pattern-findings and the application of a categorization skill in symbolical interaction. The full-blown inventory of constructs that constitute the mental grammar of an adult individual is formed in the course of an apprenticeship based on operations such as intention-reading and pragmatic inferencing.

6. Conclusions

I have sought to reconstruct two different forms of naturalism currently operating in 'psycholinguistic' research, viz. a generative naturalism ('Chomsky's way', discussed in Section 3) and a developmental naturalism, which claims two different eponymous heroes, Darwin and Piaget, respectively, and two different methodological approaches. The first approach ('Darwin's way', Section 4) studies the formation of subjective structures in phylogenesis from the perspective of evolution. The latter ('Piaget's way', Section 5) studies it in ontogenesis from the perspective of developmental constructivism.

Whether the mind is investigated from a phylogenetic or ontogenetic perspective, the theoretical outcome of developmental naturalism is the same: syntactic competences, like all cognitive structures, are conditions that are in turn conditioned, permeable to experience, indeed constructed by the interaction with the

intentional sphere. Generative naturalism describes the formation of mental structures as a unidirectional process (from condition to conditioned, from the language faculty to the I-language, from 'principles' to 'parameters'). In the conception of developmental naturalism, instead, the accumulation of information coming from the interaction with the world and with other subjects in the world retroacts on the very structures that have made those acquisition procedures possible. This relationship between mental structures and history, this reciprocity of formative powers pertinent, respectively, to biogenetic factors and to acquisition of information, rests on an analogy between the process of adaptation and the process of learning.

A collateral, but not secondary, effect for the language sciences is the radically different approaches to meaning associated respectively to nativist and developmental naturalism. In the first case, we have an analytic theory of meaning, guaranteed by the *a priori* nature of universal grammar and by the system of concepts that predates any experience. In the second case too, the analytic power of grammar is beyond question. Denying it would be tantamount to saying that speakers cannot derive semantic information from grammatical forms. But there is a different view of how analytical meanings of grammatical forms integrate with information coming from the intentional sphere. It is on this point that most research in cognitive grammars focuses.

The alternative is thus between a strong explanatory model, based on a transcendental notion of the *a priori* impermeable as such to the vicissitudes of anthropogenesis, whose power of description is however limited to the analytical mechanisms of meaning, and a model with an inferior explanatory power compensated by a greater capacity for description. The latter model, based as it is on a developmental notion of *a priori*, must include in its research program all that pertains to the intentional sphere as the site where the *a priori* is formed and modified, including the common sense notion of speaking a language.

It is almost banal to interpret this alternative as a new episode in the controversy between explicatory and interpretative sciences that has plagued the relations between philosophy and the sciences for the last 150 years, turning terms like 'naturalism' and 'psychologism' into insults. The alternative between *Natur-* and *Geisteswissenschaften* – which emerged at the end of the nineteenth century, when the model for nomothetical sciences was classical mechanics and the model for idiographic sciences was philosophical *Historismus* with its notion of the peculiarity and uniqueness of each historical object – was a philosophical trap in which language theory, too, fell sometimes squarely into. Even Chomsky alludes to a peculiar "theoretical understanding, a particular mode of comprehension" (Chomsky 2000: 77) that must go where naturalistic psychology cannot venture. This seems to be the price one has to pay for the uncontroversial character of a procedure

integrated into core natural sciences (76-77), which assigns to other forms of understanding (non-naturalistic, non-scientific) the entire domain of language-world connections. Thus, methodological naturalism, which in Chomsky's intentions had to be an antidote against methodological dualism, results in a mere re-organization of dualism, at the end of which the language faculty is safely tucked into the uncontroversial domain of natural sciences while all the rest is abandoned to hermeneutical practices.

From the standpoint of research in the language sciences, the choice between the different kinds of naturalism is a methodological one: which of the two theoretical options is best suited to which research programs. Now, compared to the monolithic theory of language proposed by generative naturalism, the variegated and problematic theoretical framework offered by neo-constructivist positions affords a few advantages from the perspective of the epistemology of linguistics: the fact of not isolating language from other cognitive and behavioral competences serves to better describe and explain non-formal aspects of languages, their very variety, their deviation from natural grammars, the communicative strategies they enact, the historical-empirical determinants of meaning. All things that are expelled from the theoretical scope of the generative model as factors that cloud observation and must be cleared away before one can identify the ultimate condition of language, universal grammar. (*Translated from the Italian by Gabriele Poole*)

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Prolegomena to a general theory of iconicity

Considerations on language, gesture, and pictures

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Too often the word "iconicity" is used simply as a scientifically sounding term for similarity. In order to develop a real theory of iconicity, it is not enough, but perhaps a good start, to return to Peirce. In this paper, I use the reconstruction of the notion of iconicity inspired by my work in pictorial semiotics to throw some light on iconicity in language and in gesture. I suggest that there are several possible iconic relationships within the sign, and that these relations may involve properties, proper parts, or perspectives. In particular, I criticize the idea of iconicity being a question of degrees. The article looks at parallels between Lessing's classic distinction between the resources of language and pictures and contemporary studies of "dual coding" in thinking. It also considers the segmentation of movement in different languages and gesture systems, in particular in relation to Satellite-framed and Verb-framed languages.

1. Introduction[1]

There is not much point using the scholarly term "iconicity" simply as a synonym for similarity. Nor is it of much use employing oneself to find out "what Peirce really thought" about iconicity, though it cannot hurt starting from there. Students of language and gesture have often been guilty of the first sin. Philosophers, when they take an interest in iconicity, tend to be austere Peirceans waiting for their ultimate illumination from the *Collected Papers*. Instead, I suggest we start from wherever we can – from Peirce, from Saussure, from McNeill, or wherever –, and

1. The extension of my theory of iconicity to aspects of language and gesture was particularly stimulated by my participation in the SGB project at the Faculty of Humanities at Lund University ("Langage, gesture, and pictures, from the point of view of semiotic development"), as well as in the still ongoing European Union project SEDSU ("Stages in the evolution and development of sign use"). I wish to thank Jordan Zlatev, member of these projects, as well as the reviewers of this volume for their useful comments.

then we go on according to the Peircean principle that, within the scientific enterprise, made up of a community or scholars, you can always reach a further interpretant, but never the final one.

2. Iconicity as a phenomenon, and semiosis

In the semiotical parlance derived from Peirce, an icon is a sign in which the "thing" serving as expression is, in one or other respect, similar to, or shares properties with, another "thing", which serves as its content. We can dispense with Peirce's peculiar terminology for the moment. However, if we are to believe in Peirce, there are two further requirements: Not only should the relation connecting the two "things" exist independently of the sign relation, just as is the case with the index, but, in addition, the properties of the two "things" should inhere in them independently.

In spite of it being plagued by the equivocation inherent in the very term of iconicity, the study of visual semiosis seems to be apt to throw some light on the general issues of iconicity. Let us start with what icons are *not*. It might be fairly obvious that icons in this sense have nothing to do with the most common religious and art historical sense, referring to a pictorial representation of persons or events derived from the sacred history of Christianity. Indeed, icons in the religious sense are very bad instances of icons in the semiotic sense, for they are, as Uspenskij (1976) has shown, subject to several conventions determining the kind of perspective which may be employed, and the kind of things and persons which may be represented in different parts of the picture. It should also be evident that "cultural icons", in the sense of objects being characteristic of, or central to, some society or subculture, do not have to be iconic in the semiotic sense, and most icons in the semiotic sense are not cultural icons. There is certainly much more tendency to confuse iconic signs with icons in the sense given to this term in the jargon of computer programming, or in cognitive psychology (e.g. Kolers 1977), where it is used to refer to all things visible, or everything the elements of which are graphically disposed. Contrary to the icons of computer programs and those of cognitive psychology, iconic signs may occur in any sense modality, e.g. in audition, notably in verbal language – not only onomatopoetic words, but also in the form of such regularities and symmetries which Jakobson (1965a and 1965b) terms "the poetry of grammar" – and music (cf. Osmond-Smith 1972), and not all visual signs are iconic in the semiotic sense; indeed many icons found in computer programs are actually aniconic visual signs. As for the "iconic codes", parallel to the "verbal codes", of cognitive psychology, they do not even have to be made up of signs.

Even though Peirce is certainly not clear about this notion, I will here propose a definition of the concept of sign. Taking a clue from Piaget, I will claim that expression and content must be differentiated from the point of view of the subject (irrespective of the corresponding object being objectively separated or not). Following Husserl, I will say that the expression is something that is directly perceived but not in focus, whereas the content is indirectly perceived while at the same time being the focus of the relation (cf. Husserl 1939). This constitutes a double asymmetry between expression and content (cf. Sonesson 2001a, 2001b, 2006).

Certain passages in Peirce's work may be understood in this sense. Pure icons, he states (CP 1.157), only appear in thinking, if ever. Indeed, it is only for a floating instant, "when we lose the consciousness that it is not the thing, the distinction of the real and the copy", that a painting may appear to be a pure icon (CP 3.362, cf. Sonesson 1989: III.1). A pure icon is thus not a sign, in the sense defined above. Peirce specifically refers to the case in which the sign loses its sign character, when it is not experienced as a sign but is confused with reality itself (which could actually happen when looking at a picture through a key-hole with a single eye), when, as Piaget would have said, there is no differentiation between expression and content, nor any asymmetry involving focus and directness between them.

Indeed, it would seem that, at least sometimes, the pure icon is taken to be something even less substantial: an impression of reality, which does not necessarily correspond to anything in the real world, for "it affords no assurance that there is any such thing in nature" (CP 4.447). Thus, it seems to be very close to the "phaneron", the unit of Peircean phenomenology (itself close to the Husserlean "phenomenon" or, in one possible interpretation, the "noema"), which is anything appearing to the mind, irrespective of its reality status. In this sense, the Peircean icon is somewhat similar to that of cognitive psychology, for it involves "sensible objects" (CP 4.447), not signs in any precise sense: however, it still comprises all sense modalities.

Many semioticians, in particular those who deny the existence of iconic signs, apparently believe pictures to be typical instances of this category. There are several reasons to think that this was not Peirce's view. In most cases, when reference is made to icons in semiotics, what is actually meant is what Peirce termed *hypoicons*, that is, signs which involve iconicity but also, to a great extent, indexical and/or "symbolic" (that is, conventional, or perhaps more generally, rule-like) properties. There are supposed to be three kinds of hypoicons: images, in which case the similarity between expression and content is one of "simple qualities"; diagrams, where the similarity is one of "analogous relations in their parts"; and metaphors, in which the relations of similarity are brought to an even further degree of mediation. Diagrams in the sense of ordinary language are also diagrams in the Peircean sense, e.g. the population curve that rises on the sheet of paper to the

extent that the population augments. The Peircean concept is however much broader, as is the notion of metaphor, which would, for instance, also include the thermometer. Moreover, no matter how we choose to understand the simplicity of "simple qualities", and how ever much that goes against Peirce's self-understanding, the Peircean category of images cannot include ordinary pictures (which would in fact be metaphors of metaphors, in the Peircean sense of this term): if anything, a Peircean image might be a colour sample used when picking out the paint to employ in repainting the kitchen wall.

Contrary to the way in which icons have been conceived in the later semiotic tradition, diagrams, rather than pictures, are at the core of Peircean iconicity: at least, they are of most interest to Peirce himself. Indeed, mathematical formulae and deductive schemas, which are based on conventional signs, are those most often discussed in his work.

There is still another sense in which pictures are far from being central instances of icons. As was noted above, the fact that an object serving as the expression of an icon, and another object serving as its content, possess, in some respects, the same properties, should not be understood as a result of one of them having an influence on the other. In the case of an icon (contrary to the case of an index), "it simply happens that its qualities resemble those of that object, and excite analogous sensations in the mind for which it is a likeness" (CP 2.299). Since both Franklin and Rumford are Americans, Peirce claims, one of them may serve as a sign of the other; but the fact that Franklin is an American is quite unrelated to Rumford's being one. But there is at least one sense in which this is not true, not only of a photograph (which Peirce often pronounces to be an index), but also in the case of a painting or: in each case, the "thing" serving as the expression is expressly constructed in order to resemble the "thing" serving as the content, although a direct physical connection only exists in the first instance. Leonardo painted the canvas known as Mona Lisa in order to create a resemblance to the wife of Francesco del Giocondo, and, although the resemblance is of a much more abstract kind, the same is true of Picasso painting Gertrude Stein or Kahnweiler. And it is as true of a synthetic computer picture showing a lamp as of a photograph with the same subject.

Peirce's claim that the properties of expression and content pertain to them independently seems more relevant to identity signs (like Franklin representing Rumford) than to pictures. In another sense, on the other hand, pictures are far more iconic than, for instance, objects representing themselves: they can do with far less indexicality and convention. From this point of view, and contrary to what has been suggested by Morris (1946: 98ff.), and often is repeated in theatre semiotics, an object is not its own best icon, if icon is understood, as in the abovementioned context, to mean iconic sign.

When used to stand for themselves, objects are clearly iconical: they are signs consisting of an expression, which stands for a content because of properties which each of them possess intrinsically. And yet, without having access to a set of conventions and/or an array of stock situations, we have no possibility of knowing, neither that something is a sign, nor what it as sign of: of itself as an individual object, of a particular category (among several possible ones) of which it is a member, or of one or other of its properties. A car, which is not a sign on the street, becomes one at a car exhibition, as does Man Ray's iron in the museum. We have to know the show-case convention to understand that the tin can in the shop-window stands for many other objects of the same category; we need to be familiar with the art exhibition convention to realise that each object merely signifies itself; and we are able to understand that the tailor's swatch is a sign of its pattern and colour, but not of its shape, only if we have learnt the convention associated with the swatch (cf. Sonesson 1989: II.2.2., 1994a).

Convention is thus needed, not only to establish the sign character, but also the very iconicity of these icons. Since iconicity can be perceived only once the sign function, and a particular variety of it, is known to obtain, the resulting icons may be termed *secondary* (Sonesson 1994b). This also applies to "droodles", a kind of limiting-case of a picture exemplified by Carraci's key, in which a triangle above a horizontal line is discovered to represent a mason behind a stone wall, once we are told so (cf. Figure 1); as well as the manual signs of the North American Indians, which, according to Mallery (1881: 94f.), seem reasonable when we are informed about their meaning. As for iconicity in language and in music, it most of the time seems to be secondary. Not only is the similarity of *cock-a-doodle-doo* and the sound made by a cock only perceptible to the person familiar with the meaning of the term; this also applies to the grammatical category of the singular being shorter than the plural, the adjective being placed close to the noun of which it is a property, the polite forms signifying more social distance being longer, etc. (cf. Itkonen 2004). However, the difference between *He stood up and sang* and *He sang and stood up* must no doubt be considered a case of primary iconicity. Obviously, program music is only iconic for those familiar with the program.[2]

2. There may, however, be another exception in language: shifters, i.e. words signifying by means of their own enunciation, as is the case with "I", "here", and "now". The iconicity involved must be very abstract, as we shall see below.

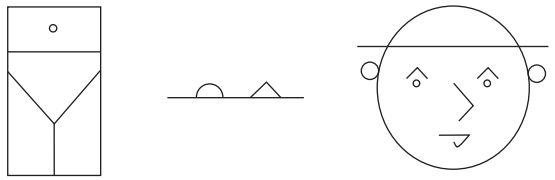

Figure 1. Two droodles and a picture which can be read as a droodle: a) Olive dropping into Martini glass or close-up of girl in scanty bathing suit (inspired from Arnheim as adapted in Sonesson 1992); b) Carraci's key (Mason behind wall); c) face or jar (inspired by Hermerén 1983: 101)

In these cases, knowledge about the sign function already obtaining between the two "things" involved is clearly a prerequisite to the discovery of their iconicity. However, the opposite case, in which it is the perception of iconicity which functions as one of the reasons for postulating a sign relation, would seem to be more germane to Peirce's conception of the icon. Such a *primary* icon is actually realised by the picture sign. Indeed, we know from child psychology and anthropology that no particular training is needed for a human being to perceive a surface as a picture. The possibility of this feat remains a mystery: the properties possessed in common by the picture and that which it represents are extremely abstract. This is why I have suggested that picture perception is only possible because there is a taken-for-granted hierarchy of things in the world of everyday life which makes certain objects and materials more probable sign-vehicles than others (Sonesson 1989, 1994a, b).

3. Icons and iconicity

Conceived in strictly Peircean terms, iconicity is one of the three relationships in which a *representamen* (expression) may stand to its *object* (content or referent). Iconicity is one of three kinds of relationships that may be taken as a "ground" for some two things forming a sign. More precisely, iconicity is the first kind of these relationships, termed Firstness, "the idea of that which is such as it is regardless of anything else" (CP 5.66), as it applies to the relation in question. Considerations of iconicity must start out from the iconic "ground", or what has been described as the "potential iconic sign". Peirce himself identifies "ground" with "abstraction" exemplifying it with the blackness of two black things (CP 1.293). It therefore seems that the term "ground" could stand for those properties of the two things entering into the sign function by means of which they get connected, i.e. both

some properties of the thing serving as expression and some properties of the thing serving as content. The ground is a part of the sign having the function to pick out the relevant elements of expression and content. It thus corresponds to what Saussure calls "form", as opposed to "substance", and which by his followers, in particular in phonology, has been termed pertinence or relevance.[3]

It would appear that two items share an iconic ground, being thus apt to enter, in the capacity of being its expression and content, into a semiotic function forming an iconic sign, to the extent that there are some or other set of properties which these items possess independently of each other, which are identical or similar when considered from a particular point of view, or which may be perceived or, more broadly, experienced as being identical or similar, where similarity is taken to be an identity perceived on the background of fundamental difference (cf. Sonesson 1989: III, 1-3). Contrary to the indexical ground, which is a relation, the iconic ground thus consists of a set of two classes of properties ascribed to two different "things", which are taken to possess the properties in question independently, not only of the sign relation, but also of each other. Indexicality as such involves two "things" (Secondness), and may therefore be conceived independently of the sign function. Since iconicity is Firstness, however, it only concerns one "thing". Indeed, as Peirce (CP 3.1., 3.362, 4.447) never tires of repeating, a pure icon cannot even exist: it is a disembodied quality, which we may experience for a floating instant when contemplating a painting out of awareness. Perhaps, then, to use some of Peirce's own examples, the blackness of a blackbird, or the fact of Franklin being American, can be considered iconicities; when we compare two black things or Franklin and Rumford from the point of view of their being Americans, we establish an iconic ground; but only when one of the black things is taken to stand for the other, or when Rumford is made to represent Franklin, do they become iconic signs (or hypo-icons, as Peirce sometimes said). Just as indexicality is conceivable, but is not a sign until it enters the sign relation, iconicity has some kind of being, but does not exist until a comparison takes place. In this sense, if indexicality is a potential sign, iconicity is only a potential ground. This is outlined in Figure 2:

3. In fact, at least one passage from Peirce (CP 1.551–3; see Peirce 1998: I, 1–10) seems to suggest that Peirce would reserve the term "ground" for the portion of the expression singled out and use the term "correlate" for the corresponding part of the content. This would however seem to do away with the relational character of the notion involved.

	Firstness **Impression**	*Secondness* **Relation**	*Thirdness* **Habituation/Rule**
Firstness			
Principle	Iconicity	—	—
Secondness			
Ground	Iconic ground	Indexicality = indexical ground	Symbolicity = symbolic ground
Thirdness			
Sign	Iconic sign (icon)	Indexical sign (index)	Symbolic sign (symbol)

Figure 2. The relationship between principles, grounds, and signs, from the point of view of Peirce (as revised in the text)

Since the iconic ground is established on the basis of properties the two items possess only because of being what they are, the standard of comparison must be something like similarity or identity. Indeed, Peirce also says that an icon (more exactly, a hypoicon) is "a sign which stands for something merely because it resembles it" (CP 3.362) or "partak[es] in the characters of the object" (CP 4.531). This point of view was pursued by Charles Morris (1946: 98ff.), who considered that a sign was iconic to the extent that it had the same properties as its referent. According to this conception, iconicity becomes a question of degrees: a film is more iconic of a person than a painted portrait, but less so than the person itself. Abraham Moles (1981) has elaborated on this proposal, constructing a scale, which comprises 13 degrees of iconicity going from the object itself to the zero degree, epitomised by a verbal description. Such a conception of iconicity is problematic, not only because distinctions of different nature appear to be involved, but also because it takes for granted that identity is the highest degree of iconicity, and that the illusion of perceptual resemblance typically produced, in different ways, by the scale model and the picture sign, are as close as we can come to iconicity short of identity. Although Peirce does mention paintings and photographs as instances of iconic signs, he much more often refers to abstract properties.

Curiously, Umberto Eco's (1968, 1976) critique of iconicity is almost exclusively concerned with pictures. In pictorial semiotics, both as conceived by the Greimas school, and in the version of Groupe μ, iconicity is supposed to account for one of the two semiotic functions of the picture sign, the one giving the illusion of seeing something depicted in the sign, opposed to the plastic function which is concerned with the abstract properties of the pictorial surface. However, if a circle, as in one of Groupe μ's (1979) examples, is taken to stand for the sun on the iconic level, and on the plastic level for roundness, which, in turn, as we know from

psychological tests, may signify softness, etc., then what is called here the plastic language is as least as iconic, in Peirce's sense, as the iconic layer: for roundness is certainly a property possessed both by the circle representing the sun in this hypothetical drawing, and by the circle prototype; and, beyond that, there must be some abstract, synaesthetically experienced property which is common to the visual mode of roundness and the tactile mode of softness (Sonesson 1994b).

When conceiving iconicity as engendering a "referential illusion" and as forming a stage in the generation of "figurative" meaning out of the abstract base structure, Greimas and Courtés (1979: 148 and 177) similarly identify iconicity with perceptual appearance. In fact, however, not only is iconicity not particularly concerned with "optical illusion" or "realistic rendering", but it does not necessarily involve perceptual predicates: many of Peirce's examples (cf. Sonesson 1989: 204ff.), have to do with mathematical formulae, and even the fact of being American is not really perceptual, even though some of its manifestations may be. For the same reason, McNeill (2005: 38), in his gesture studies, is wrong in reducing iconic gestures to those that "present images of concrete entities and/or actions".

The whole issue of iconicity must be divorced from the very specific case of pictoriality. Not only is pictoriality a kind of iconicity that engenders a perceptual illusion, but it also supposes a mapping from each of the parts of the expression to a single part of the content. Just like the word "face", the picture of the face only gains a meaning as a whole; but once the whole is interpreted as a face, separate components of the drawing become carriers of the meanings corresponding to the different parts of a face. Even considered from the point of view of the whole, the /f/ never comes to stand for the forehead, the /a/ for the eyes, etc. But even in the visual mode, there are more abstract kinds of iconicity. Consider Blissymbolics (invented by Charles K. Bliss, 1897-1985): the signs standing for man and woman may be seen as very schematic, simplified pictures. But the signs signifying "up" and "down" are clearly iconic in a more abstract sense. The sign being "up" in relation to the line of writing comes to signify "aboveness" in general (Fig. 3). This is the kind of iconicity we would expect to find in language or in music.

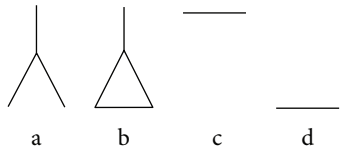

Figure 3. Blissymbolics with the meaning: (a) man; (b) woman; (c) up; (d) down

4. The case against pictoriality

During the renewal of semiotic theory in the sixties and seventies, most semioticians were eager to abolish the notion of iconicity, again taking pictures as their favoured example, while claiming that pictures were, in some curious way, as conventional as linguistic signs. Bierman, Goodman, Lindekens, and Eco, have all argued against using similarity as a criterion in the definition of iconical signs and/or pictures; and even Burks and Greenlee have introduced some qualifications on Peirce's view, which serve to emphasise conventionality. Some of these thinkers, such as Bierman and Goodman, were mainly inspired by logical considerations, together with a set of proto-ethnological anecdotes, according to which so-called primitive tribes were incapable of interpreting pictures; Eco and Lindekens, in addition, wanted to show that pictures, conforming to the ideal of the perfect sign, as conceived by Saussure, were as arbitrary or conventional as the signs studied by the most advanced of the semiotic sciences, general linguistics.

The most interesting arguments against iconicity were adduced by Arthur Bierman (1963), and were later repeated in another form, by, notably, Nelson Goodman (1970). According to one of these arguments, which may be called the argument of regression (Sebeok 1976: 128), all things in the world can be classified into a number of very general categories, such as "thing", "animal", "human being", etc., and therefore everything in the universe can refer to, and be referred to, everything else. Thus, if iconicity is at the origin of signs, everything in the world will be signs. This may not be so far from what Peirce thought: at least Franklin and Rumford are, as we know, potential signs of each other. It is certainly a conception of the world common in the Renaissance, and among Romantics and Symbolists. In the case of more common iconic signs, however, like pictures and models, a conventional sign function must either be superimposed on the iconic ground, or the iconic ground must itself be characterised by further properties. Even in the former case, however, iconicity is still needed, not to define the sign, but to characterise iconic signs (cf. Sonesson 1989: 220ff.).

According to another argument, which has been termed the symmetry argument (Sebeok 1976: 128), iconicity cannot motivate a sign, for while similarity is symmetrical and reflexive, the sign is not. Pigments on paper could stand for a man, but not the reverse; nor will they, in their picture function, stand for themselves. But to identify similarity with the equivalence relation of logic is to suppose man to live in the world of the natural sciences, when in fact he inhabits a particular sociocultural Lifeworld (a *Lebenswelt*, according to Husserl). Similarity, as experienced is this Lifeworld, is actually asymmetric and irreflexive. Indeed, this fact is not only intuitively obvious, but has been experimentally demonstrated (notably by Rosch 1975 and Tversky 1977; cf. also Sonesson 1989: 220ff. and 327ff.).

Contrary to the argument of regression, the symmetry argument may thus be warded off, without introducing a supplementary sign function, and without amending the definition of the iconic ground.

Although the sign relation is thus not needed in order to render similarity asymmetric and irreflexive, it is required in order to distinguish similarities that are signs from those that are not. At this stage, then, it would seem that the picture could be defined by the sign relation, together with similarity; but Eco rightly observes that, on closer inspection, there is really no similarity between the painted nose, and the nose of a real person. However, this observation has no bearing whatsoever on iconic signs which are not picture signs: indeed, the American-ness of Franklin and Rumford is identical, as far as it goes, as is the roundness of circles and other round things, and the pattern and colour of a tailor's swatch and the cloth it exemplifies. Also the aboveness of the sign of Blissymbolics or the openness of the vowel /a/ paradigmatically projected onto the syntagm, such as Jakobson (1965a, b) conceived the poetic function, is entirely identical as such.

The alternative analysis in terms of convention suggested by Goodman, Eco, and others, is conceived to take care of the case of pictures, but paradoxically, it seems that it would really be needed, not for pictures, but for some other iconic signs, which rely on identity. Goodman's and Greenlee's contention that the referent of each picture is appointed individually, and Eco's proposal that the relations of the picture are so correlated with those of the referent, are incompatible with what psychology tells us about the child's capacity for interpreting pictures when first confronted with them at 19 months of age (as demonstrated in a famous experiment by Hochberg). On the other hand, we do have to learn that, in certain situations, and according to particular conventions, objects which are normally used for what they are become signs of themselves, of some of their properties, or of the class of which they form part: a car at a car exhibition, the stone axe in the museum show-case or the tin cane in the shop window, the emperor's impersonator when the emperor is away, and a urinal (if it happens to be Duchamp's "Fountain") at an art exhibition. There is never any doubt about their pure iconicity, or about their capacity for entering into an iconic ground – but a convention is needed to tell us they are signs.

5. The multiple iconicities of words and pictures

When talking about the arbitrariness of the (linguistic) sign, Saussure in fact was concerned (as noted most clearly by Malmberg 1977: 131ff.) with two different relationships: within the sign, between expression and content; and between the sign as a whole and the world of our experience, often called the referent. The first

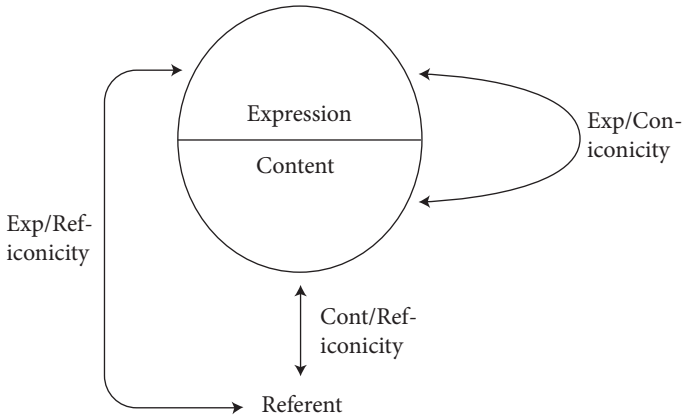

Figure 4. The linguistic sign. Arrows stand for (potential) iconic relationships

relationship is arbitrary, because there are no properties possessed in common by the content and the expression; the second relationship is arbitrary, because (according to Saussure) the way in which signs segment the world is not prefigured in the division of the world itself. Thus, there is not more justification for calling a "bull" /bʊl/ than for using the sound sequences /bøf/. On the other hand, reality does not give us any clues whether a certain phenomenon should be characterised with one sign, such as *wood*, or divided between two different signs, such as *bois* and *forêt*. If arbitrariness can be found between different elements of the sign, its opposite, motivation, which is the term Saussure uses for iconicity, must also be able to manifest itself in multiple relationships (cf. Figure 4 and Sonesson 1989: 203ff.).[4] More cautiously, we should perhaps talk about three potentially iconic relationships: between expression and content, between expression and referent, and between content and referent.

Moreover, the two cases mentioned pertain to different aspects of similarity or its opposite: in the first case, we are concerned with the different subdivisions of expression and content; in the second case, it is the outer borders of the sign and the corresponding phenomenon in the world which are involved. If the first is on the level of what was known in structuralist semiotics, following L. Hjelmslev, as "figurae", the latter is firmly on the sign level. In addition, the former concerns the

4. It would be natural to understand motivation to include both iconicity and indexicality, but this is not how the term is used by Saussure. In the *Cours*, Saussure is really only interested in "relative motivation", which is a relationship between signs, not between expression and content, such as for instance *pommier* ('apple tree') being justified by *pomme* ('apple'). In other passages, however, he talks about mime being motivated but having "a rudiment of arbitrariness" (cf. Sonesson 1989).

properties of expression and content, respectively, while the latter has to do with the way signs and the corresponding chunks of reality are divided up. Even though the radical version of what was derogatively known, in early Chomskyan times, as the Humboldt-Sapir-Whorf-hypothesis (with the injustice done to the scholars mentioned decreasing somewhat from left to right) seems by now to have been falsified by empirical research, there is still room for some attenuated version of the hypothesis. It may be more necessary to divide "red" from "black" and "white" than to do so with respect to any other colour (cf. Berlin and Kay 1969), but there is still nothing that tells us whether woods are of one or two kinds. On the other hand, the thesis of linguistic arbitrariness pertaining to the relation between the properties of expression and content is not likely ever to be declared basically wrong.

In the picture, the case is even more complex. It has been argued by Husserl (1980), and, no doubt independently, by Wollheim (1980), that we "see in" the depicted object directly into the physical object which is the picture expression, making more or less each element of the expression correspond to the content. But Husserl goes on to note that this is not the whole story, because although we can see human figures "into" the spots on the surface of the photograph, what we see still has "photographic colours", and not the colour of real human skin. This may seem a dated observation, but in fact all pictures reduce the scope of colours rendered in relation to reality. In Husserl's terminology, the picture thing is that which may hang askew on the wall, the picture object is the child in black and white which is seen into it, and the picture subject is the object of the world which is taken to be depicted, the real child with rosy cheeks. But here Husserl's cautious phenomenology does not seem to go far enough. To separate the picture object and the picture subject Husserl also offers the distinction between the palace that is seen into the picture and the real palace which is in Berlin. However, the fact that there may no longer be any palace in Berlin does not deter us from noting the difference between a palace in black and white and a real palace. Thus, the referent must be separated from the picture subject, which remains at the level of types, since it is different from the picture object simply by adding our knowledge of the nature of things in the world.

Iconicity thus potentially involves *six* iconic relationships: between the picture thing and the picture object, between the picture object and the picture subject, between the picture thing and the picture subject; and between those three and the referent (cf. Figure 5.).

Interestingly, it is for the relation between the picture object and the picture subject that Husserl requires similarity (1980: 138f. and *passim*), i.e. for two instances that are roughly equivalent to Peirce's "immediate" and "dynamical object". Except once, when he says that a relief is comparatively more similar to its picture object (1980: 487ff.), Husserl never discusses the similarity of the picture object

and the picture thing. Nor does he consider the similarity of the picture thing and the picture subject, which is the closest we come to Peirce's relation between the "representamen" and the "object". It is in the relation between the picture object and the picture subject that pictoriality may be more or less extensive, and more or less intensive, i.e. concern a greater or lesser number of properties, and realise them to a greater or lesser degree ("Extensität" and "Intensität der Bildlichkeit", Husserl 1980, 56f.). However, there does not seem to be any reason not to apply extensivity and intensivity to all iconic relationships. In addition, extensivity can obtain in relation not only to the division of the object into properties (e.g. "red"), but also into proper parts (e.g. "cheeks"), and, at least in the case of pictures, perspectives (e.g. seen from upper left). Such a definition derives from mereology, the study of the ways to divide up the things of the world.

There does not seem to be any comparable model for the gesture sign, but in many ways gesture appears to occupy a position intermediate to language and pictures. Since it is impossible to consider all the different kinds of iconic relationships mentioned here in the following, we will be essentially concerned with the relation between expression and content (amalgamating picture object and picture subject), on the one hand, and referent, on the other. We will however take into account the different mereological divisions.

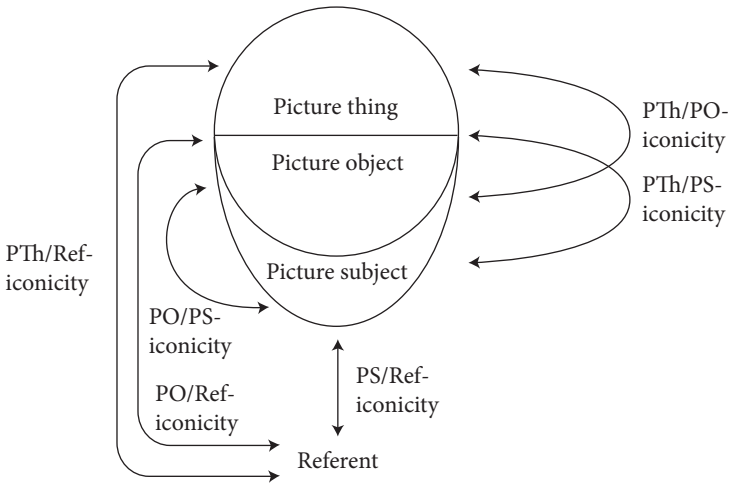

Figure 5. The picture sign. The arrows are (potential) iconic relationships

6. The resources of verbal and visual semiosis

When comparing visual and verbal semiosis, it is still useful to start out from *Laokoon*, a book first published in 1766 by the eighteenth-century German writer Gotthold Ephraim Lessing. Explicitly, of course, Lessing's observations involve "literature" and "painting" (i.e. pictures and, to some extent, other visual modes of mediation, such as sculpture), and he is concerned to show that in order to fulfil the destiny of art, they must each use iconic signs, which is to say that paintings should use signs the expressions of which are shapes and colours in space, whereas literature must employ sounds in time. Contrary to contemporary semioticians, Lessing does not bother to separate questions of fact from normative issues. He stipulates, e.g., that art must be iconic (cf. Todorov 1977: 169ff.). But if Lessing's description of visual and verbal semiosis is correct, the former can only use iconic signs to signify objects in space and the latter only for signifying objects in time.

To evaluate these claims, we need a more adequate terminology than the one used by Lessing. Wellbery (1984) has reformulated Lessing's analysis in terms taken over from Hjelmslev, unfortunately abusing the latter's terminology (cf. Sonesson 1988). Thus, while the terms content and expression are correctly employed, the use to which Wellbery puts terms such as "material", "substance" and "form" is quite foreign to Hjelmslev's intent, because the difference observed by Lessing has nothing to do with relevance. Instead we shall talk about "resources", "units", and "constraints". Resources are what are at hand, the possibilities that are opened up. Units are the principles of individuation, corresponding to actions in time, and to bodies in space. The constraints, finally, are rules, principles, and regularities of the respective semiotic resources.

The content resources seem to be equivalent to what Benveniste (1969) has called the domain of validity of a sign system, and the expression resources are his mode of operation. Verbal language apparently can talk about everything (i.e. it is a "pass-key language", as Hjelmslev said), while pictures must do with everything visible, or everything having visible homologues. The expression resources are Lessing's articulate tones, now called phonemes, etc., again opposed to anything visible (limited to static and bi-dimensional visuality in prototypical pictures).

Since time is not well rendered in pictures, according to Lessing, visual art should ideally pick up one single moment, and, in a parallel fashion, literature, which is not very conversant with space, should be content to describe a unique attribute. Then, as Wellbury reads Lessing, an extension to the whole will take place in the imagination, spatially in language and temporally in pictures, that is, in the domain that the system cannot adequately render. The property that most easily allows such an extension to the whole of the (spatial) object is called the "sensate quality"; and the phase which best permits the anticipation of the complete

temporal succession is called the "pregnant moment". In fact, however, the extension in time is the one most important to Lessing, as shown by his negative view of the possibilities of pictures.

If we are to believe in Lessing, visual art is not only able to describe the whole of space, but it cannot avoid doing so: pictures have to show "fully determinate entities". Taken literally, this must mean that pictures are unable to pick up "sensate qualities". Even if we limit this claim, as is no doubt intended, to sensate qualities in the visual modality (which is itself problematic, not only taking into account recent findings involving mirror neurons, but also Gibsonean affordances), this is certainly not true: as I have shown elsewhere (in Sonesson 1989, 1994b), notably against Goodman (1968), the "density" of pictures is only relative, and all kinds of abstraction are found in them. Simply put, "density" to Goodman means that, no matter how fine the analysis of something (e.g. a picture) into meaningful units, it will always be possible to posit another unit between each two of those already given, and so on indefinitely. This is certainly not true of the expression plane, in the case of more or less schematic pictures; nor does it apply to the content plane of some pictures the expression plane of which is fully "dense". Indeed, for all practical purposes, many pictures are not about a particular person in one or other disguise, but about more or less abstract roles in relatively generic situations. But, contrary to what happens in language, there is no fixed limit between what is relevant and what is not. Properties of some coloured patches which are irrelevant to determine the content "little girl", become relevant in the determination of the further meanings "girl in 17th century clothing", "Spanish Infanta", etc.

Lessing's and Goodman's views are reminiscent of the contemporary distinction within cognitive psychology between "iconic" and "verbal" codes. These "codes", it will be remembered, are not really signs, but rather units for the organization of memory and thinking. But "iconic codes" are said to be "specific", "concrete" and "contextual" (Rubin 1995: 55ff.). Both in the case of "imagery", to use the classical term, and pictures, it is probably sufficient to say that they take bigger chunks out of reality than does language, and that the parts continue to be intricately enmeshed into each other. This should be enough to explain that people can faster decide the size of objects from drawings than from words, and that irregular objects may be rotated in the mind to different degrees, where to accomplish the rotation will take longer time to the exact degree that it would do so in real perception (as in Shepard's famous experiments, described, for instance, by Rubin 1995: 42f.). In this sense, pictures and imagery seems to be more iconic than language as far as segmentation is concerned. Indeed, Paivo (1986), the principal advocate of the "dual-coding" approach, sounds very much like Lessing when he claims that imagery is better for spatial processing (what is to the right, strait on, etc.) and language for sequential processing.

Deriving his inspiration from Peirce, Bayer (1975, 1984) formulates Lessing's problem differently: it concerns the relation between the schema of distribution for the expressions and the schema of extensions for the referents. Bodies are carriers of actions, which is to say that without bodies actions cannot take place. Actions are continuous, but can only be rendered iconically as discrete states. The distribution schema of pictures does not allow for succession, only for actions rendered indirectly by means of bodies and collective actions where several persons act together.[5] It will be noted that Bayer supposes all continuous objects to be temporal. But, clearly, space is also continuous from the point of view of our perception, so there should also be spatial continua. Pictures actually render certain spatial continua better than language – in fact, this is the other side of what was called "fully determinate objects" above. It is indeed the "spatiality", as opposed to the "sequentiality", of Paivo.

However, since spatial objects are (potential) carriers of actions, all spatial details serve to suggest potential stories, in particular if they are sufficiently familiar to us to fit in with many action schemas. Thus, it seems to me that, everything else being equal, a picture containing more spatial details will evoke more virtual courses of action, i.e. it will suggest a greater number of possible continuations of that which is going on in the scene rendered by the picture. In terms of narratology, pictures actually contain a larger amount of "disnarrated elements", that is, alternative courses of actions starting out form the given moment (cf. Prince 1996). In this respect (though of course not in many others), pictures actually are better than verbal language at suggesting a story line (cf. Sonesson 1997). Thus, pictures and imagery also have a stake with sequentiality.

The difficulty posed by narrativity in pictures, as Bayer reads Lessing, is that the picture is unable to abstract: Homer may show the gods drinking and discussing at the same time, but that is too much information to put into a single picture. Actually, it is not the amount of information that is crucial (the picture may easily carry more) but the possibility to organise it: verbal language has fixed means for conveying relative importance, newness, focus, etc. The picture, however, in the prototypical sense of the term, may possess some corresponding mechanisms which are not sufficiently known, but hardly any systematic and content-neutral means for organising such information: that is, in Halliday's (1967-1968) terms, there are no fixed devices for separating that which is given from that which is new, and that which is the theme (what we talk about) from the rheme (what is

5. It is strange that Lessing as well as Bayer claim that, contrary to individual actions, collective actions are rendered equally well in pictures as in language. It seems to me that collective actions must be a conjunction of individual ones, which simply are distributed in space, and they therefore cannot be rendered if individual actions cannot.

said about it). Indeed, although "background", as applied to language, is originally a visual metaphor, just as is "perspective", that which the picture places in front is not always the most weighty element, with importance decreasing according to increasing apparent distance; nor is necessarily the central figure "semantically" the most prominent one.[6] One of the principal difficulties is that, in the ordinary picture, the space of representation is, at the same time, a representation of the space of ordinary human perception, which impedes an organisation by other systems. In the history of art, these difficulties were at least partially overcome by Cubism, Matisse, as well as some forms of collages and synthetic pictures, and it has been even more radically modified by visual systems of information, logotypes, Blissymbolics, traffic signs, etc. (cf. Sonesson 1988, 2004). Yet it remains true that pictorial representations lack systematic means for rendering what Halliday has termed "information structure".

In the present context, it will be sufficient to spell out two conclusions: although pictures do not render the world in the form of "fully determinate entities", they have to divide up the world in bigger chunks in order to convey information about it than is the case with verbal language, and they lack any general means for imposing an internal structuring on these chunks, apart from the one given in perception. In terms of modern cognitive linguistics, the same two points might be driven home by saying that pictures cannot pick one image schema without also having to choose several others, and they are unable to organise these schemas in order of relative importance. Here I do not intend to use the term "image schema" in the sense of such linguists as Lakoff, Langacker, and Johnson, because I have nowhere seen any clear definition of what it means. The words certainly imply that linguistic meaning is different from what logicians call propositions, but is in some way more similar to pictures.[7] The visual representations used, in particular, by Langacker and Talmy, suggest that image schemas are some abstract kinds of pictures corresponding to a single or a very limited number of objects or events. We could still differentiate language from pictures by claiming that, in the latter, no image schema can stand on its own. Considered in relation to the referent, this seems to make pictures "more iconic".

A further observation pertaining to the ability of language to render temporal objects can also be made. Lessing's claim, upheld by Bayer and Wellbery, and, no

6. Kress and van Leeuwen (1996) make a lot of unsubstantiated claims of this kind (also as applied to the left and right side). Curiously, although they declare Halliday to be one of their principal sources of inspiration, they do not even differentiate between given and new, on the one hand, and theme and rheme, on the other.

7. To criticise the notion of image scheme is beyond the scope of this essay; see Zlatev (2005), as well as the editor's contribution to the same anthology.

doubt independently, repeated by Paivo, that language is somehow more capable or rendering temporal continuity than pictures, depends on the idea that linguistic expression, unlike pictures, is itself an action (where of course oral expression is taken as the prototypical case). However, except for a small set of particular cases such as onomatopoetic words, performatives, pronouns and the like taking their meaning from the process of enunciation, quotations, and some cases of preferred word order, the action accomplished by the linguistic expression very rarely is the same as the one rendered by its content. Being actions, linguistic acts may be said to manifest the abstract quality of "actionness"; but it does not follow that this property is in any way connected by means of a sign function to the action described. We are faced with one of these "general categories" mentioned by Bierman that can only function in a *secondary* iconic function. In the semiotic sense, linguistic actions are normally not iconic of the actions they talk about. At some very high and abstract level, the words, sentences or at least the paragraphs used by the radio journalist describing a horse race at the same time as it occurs also uses linguistic actions iconically for the actions accomplished by the horses (e.g., describing the horse as crossing the finishing line at the same time as this occurs). But this is of course a fairly marginal case, even though it may be more common now than at Lessing's time. In any case, this is secondary iconicity, because it can only be so interpreted given our knowledge about the direct transmission of horse races. As we noted above, however, language can no doubt make use of its own continuity to distinguish different meanings (such as *He stood up and sang* and *He sang and stood up*). As a general case, language is no better at rendering temporal continuity than pictures are. Language does not only have to isolate the "sensate" quality, but must also, just like pictures, pick up the "pregnant" moment, i.e. the phase when something significant happens.

On the other hand, theatre, as Lessing himself recognised, and film, as Bayer added, are able to render temporality in an iconic way: they are "moving pictures". What makes pictures, in the central sense of static displays, not very apt at rendering sequence is precisely their static nature. As soon as sequence is added on the expression side, sequential content can be more iconically reproduced than in language. This also goes for visual imagery. Paivo emphasizes that imagery is especially well suited to transformational thinking, e.g. the rapid movement from one situation to another. Somewhat paradoxically, one of Lessing's arguments for language being especially apt to render sequence really seems to show the opposite. When describing objects, such as the shield of Achilles, Homer chooses to tell the stories illustrated on the shield. But such a procedure is not typical of language, but of oral tradition, and students of oral tradition have pointed out that such feats of memory as represented by oral tradition are only possible thanks to visual imagery, precisely because of its higher contextualisation (cf. Rubin 1995).

Much more coarse-grained differences between "linguistic" and "visual structures (which most of the time are taken to be pictures) have been suggested by Kress and van Leeuwen (1996: 75ff.): thus, for instance, they claim that an affirmation such as *Mary gave him a book* must be expressed in pictures as "Mary book-gave him". In their terminology, inspired in Halliday's linguistic theory, processes with three participants, the third of which is a "beneficiary" (often equivalent to the "indirect object" of traditional grammar), are transformed into processes with only two participants, "actor" and "goal".[8] This seems to me to be a completely arbitrary claim. It is true that some languages have specific grammatical constructions that express the part of "participant", but they also have such constructions for "actor" and "goal". The picture has no specific resources for expressing any of these parts. But, just as in perceptual reality, all the parts of participation can be projected onto the picture.

Perhaps Kress and van Leeuwen want to suggest that the relation between actor and goal may be more directly "seen" in the picture than that to the beneficiary. Indeed, they follow the Gestalt psychologist Arnheim in supposing the presence of "vectors" (some kind of directional indications) in pictures. Even supposing such "vectors" to exist, and to be as abundantly present as suggested by Arnheim and Kress and van Leeuwen, there is really no reason to accept curious entities such as "book-give". It could be argued, of course, that the act of giving is not as analytically distinct from the book in the picture (and then also in perceptual reality) than in language. However, other things than books may be given, and books may be the vehicle of other actions than giving. This would thus simply be a particular case of the fact that pictures present reality in bigger chunks which are more difficult to separate from each other (Lessing's "wholly determinate entities") than language. In fact, I don't understand why Kress and van Leeuwen do not go on to suggest that the pictorial equivalent of *Mary gave him the book* is "book-gave-Mary-him". This would have been a way of saying that the pictorial analysis of reality is accomplished in bigger, more closely intertwined chunks than language. If so, one may wonder whether this means that language or pictures are more iconic in relation to reality. The answer is probably that pictures are "more iconic" in relation to the segmentation of the episodic here-and-now, where Mary's action of giving the book to someone cannot be resolved into parts without a residue, while language is "more iconic" in relation to wider spans of memory, in which certain entities, such as Mary, the man, the act of giving, and the book are separated out by repetition and continuity all through their different histories.

8. It is perhaps only a curiosity that exactly this kind of example is used by Peirce to claim that triadic relations cannot be reduced to dyadic relations – which would imply that neither pictures nor other semiotic resources could accomplish this feat.

7. Iconicity in gesture

It is very unfortunate that David McNeill (2005: 38ff.), who in recent decades has been the most influential figure in the study of gesture, uses the term "iconic" in such a misleading way: to him, iconic gestures "present images of concrete entities and/or actions". He opposes them to "metaphoric gestures" which "present images of the abstract", such as, for instance, "holding an 'idea' or 'money' or some other abstract 'object'". In an earlier terminology, initiated by David Efron and taken up by Ekman and von Friesen, these are pictographic (referring to "entities"), kinetographic (referring to "actions"), and ideographic gestures, respectively (Cf. Kendon 2004: 92ff.). In addition, McNeill's "beats", which are Efron's batons, mark the time of the ideational process itself, being, in McNeill's graphic words, "the equivalent to using a yellow highlighter on a written text".

All these four types of gestures are of course iconic, but in different ways. Metaphors, as we have seen, form a sub-category of Peirce's icons, those which are based on relations between relations. It is important to note the difference between pictographs and kinetographs: in the first case, the expression, which is a sequence of movements, is iconic for the content, which corresponds to the limits, or some other static property, of the object rendered; in the second case, however, both expression and content are temporal sequences, and may thus possibly be mapped onto each other iconically in every detail. In fact, there is of course every intermediate case, from the direct quotation of a non-gestural, or even gestural, movement, to some rather schematic correspondence, as the transposition of the movement of the legs to the fingers. Batons are iconic in a very abstract sense: they may be just about anything, which coincides in time and space. Both Efron and McNeill also mention deictic gestures, which, whatever else they are, are clearly indexical. Finally, Efron points to emblems, which are largely conventional.

In his recent book, McNeill (2005: 41ff.) finally realises (as I argued in Sonesson 1989) that terms such as these do not stand for entities but for dimensions: a given sign is more or less iconic, deictic, and so on. Dimension may not be the best term for what is involved, however: it tends to suggest that iconicity is a question of degree, which would bring us back to the Morris/Moles' scale of iconicity. Taking a clue from Kendon, McNeill earlier on proposed something he called "Kendon's continuum", which goes from gestures which are used in conjunction with speech, while at the same time being global in their mode of functioning, to gestures which substitute for language, such as emblems (e.g. the V-sign, the nose thumb, etc.) and, beyond that, sign languages. In his latest work, McNeill (2005: 5ff.) proposes to dissolve this construct into four different continua, relating gesticulation, pantomime, emblems, and sign language in different sequences: more or less speech related, more or less similar to verbal language, more or less

conventionalised, and more or less analytical. Here nothing indicates that the continuum of convention is meant to be the inversion of an iconic continuum. But this seems to be Gullberg's (1998: 95ff.) idea: she inserts McNeill's four gesture categories, beats, deictics, metaphorics and iconics between gesticulation and mime, and then goes on to relate iconics and mime as to their degree of iconicity (which she calls "mimesis"), going from hand gestures which take the viewpoint of the observer, over gestures taking the viewpoint of a story character, to the inclusion of other articulations than the hand, and notably the head. As Kendon (2004: 104ff.) observes, this is really more than an expansion of the Kendon-McNeill continuum: it is a "scale of iconicity". But, as such, it is also misleading. Gullberg accepts McNeill's notion of iconicity as being pictoriality. In fact, deictics are not at all iconic, and beats, however abstract they may be, certainly are. It is not a question of a scale: the difference between pictographs, kinetographs, ideographs, and beats involves diverse properties or parts of the world, not degrees. It is in relation to these diverse parts or properties that they are iconic.

The iconicity relationships that we are talking about is naturally that between content and referent. A sign model resembling that of language seems sufficient for gesture. After all, the difference between picture object and picture subject is only justified by the fact that pictorial content is close to being perceived ("perceptual imagined", in Husserl's paradoxical phrase), though the perceptual illusion does not contain everything we know about the referent. In gesture, such a distinction does not seem warranted.

8. Partitioning the world in language and gesture

There is by now an extensive literature in linguistics about what is usually termed S(atellite)-framed language and V(erb)-framed languages (cf. Talmy 1985), exemplified, to pick some familiar examples, by Germanic languages, on the one hand, and by Romance language, on the other. In S-framed languages, movement verbs obligatorily (i.e. in the verbs involved) express the manner in which the movement is accomplished. The path of the movement must be given expression by other means, such as verbal particles. On the contrary, in V-framed languages, verbs obligatorily express the path of the movement, whereas manner must be conveyed by other means. In English, which is a Germanic language having been very much influenced by Romance languages, examples can easily be found for both types: "roll", "walk" and "crawl" express manner, but "descend" expresses path. In French and Spanish, V-framed constructions predominate: "sortir" and "entrer", "salir" and "entrar", respectively. This certainly is a way in which languages segment reality differently, not only in the sense of dividing it in different ways, but also putting

more emphasis on certain types of properties of the world than on others. Intuitively, it would seem that path and manner of a movement are inextricably connected in real world perception. There is thus no obvious claim for the S-language type or V-language type being "more iconic" than the other. Thus, it becomes interesting to compare this with the way the same actions are rendered in gesture.

Referring to evidence from Sign language, Zlatev (2007) suggests that the lack of conflation between manner and path is probably characteristic of "the vocal modality, which displays more linearity and less iconicity than the manual-brachial one". However, McNeill (2005: 195ff.), in his study of speech-accompanying gestures, claims that Spanish speakers tend to add manner by means of gesture, whereas English speakers, instead of adding path, appear to be occupied with further modulation of manner. This is reminiscent, at another level, of Lessing's claim that while pictures have to compensate for the lacking rendition of time, language, rather than compensating for the lack of space, indulges in more temporality. Another curious fact is the existence, in Nicaraguan Sign Language, of separate signs for the path and manner of actions. This would seem to suggest that also the visual modality (though perhaps only due to the "manual-brachial" analysis) is able to sequence what in perceptual reality appears to be a simultaneous whole. Nicaraguan Sign Language (NSL) is a so-named "home language", socially constructed by the group of deaf people attending a vocational school in Managua. When Senghas, Kita and Özyürek (2004) compared the speech-accompanying gesture of Spanish speakers with the signs used by the first, second and third generation of NSL-users, they found that the first group used only holistic gestures, and that the three generations of NSL-users employed progressively more signs separating manner from path. Thus, they conclude that, even at the prize of becoming "less iconic", gesture may use sequentialization as a way to digitalization.

It remains, of course, that the visual modality is also able, should it care to, to render the whole in its simultaneity, which language seems unable to do. If anything, however, the digitalization accomplished by NSL is only relative. Path and manner, which are simultaneous in perception, may well be separated, but the exact way in which path and manner are varied (size, velocity, shape, etc.) is still able to vary iconically, which is more or less impossible in language.[9] In Husserlean terms, the extensivity (the number of properties) of the iconic relationship between content and referent has been modified, but the intensivity (the degree to which the properties are rendered) largely remains as before.

9. As confirmed by an answer to my question given by Kita during a lecture in Lund on April 1, 2005.

9. Conclusions

There is an extensive scholarly literature about iconicity in language, and iconicity is often mentioned in the studies of gesture. My own earlier studies have mainly concerned iconicity in pictures and other visual displays. It has been the concern of this article to investigate what these studies of visual iconicity may have to tell us, as a contrasting example, about iconicity in language and gesture. In the course of this study, I have distinguished iconicity from the iconic sign. I have suggested that there are a number of different iconic relationships within the sign, between expression, content, and referent. I have also explored the analogies between Lessing's classical comparison between literature and visual art, and the idea of "dual coding" in cognitive psychology. Finally, I have critically reviewed the discussion of iconicity in gesture studies and in the investigation of the relationship between language and gesture.

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Semiotic foundations of natural linguistics and diagrammatic iconicity

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The paper examines the semiotic foundations of Natural Linguistics with special reference to diagrammatic iconicity. In accordance with C. S. Peirce's semiotics, naturalness in language is described as a substratum of iconic, indexical, *and* symbolic signs. Diagrammatic iconicity in language is more than form-meaning isomorphism; it is a structure inherent in the verbal form itself irrespective of whether the diagram is used to represent anything at all. The rules of word formation, syntax, and the structures of discourse constitute verbal diagrams. The system of language is a diagrammatic rhematic legisign. A pure diagram is a relational form without reference to anything else. Diagrams that represent in connection with indexical reference are diagrammatic hypoicons. This is the kind of diagram which has been studied in Natural Linguistics so far. Diagrams in language are both cognitively necessary and rhetorically efficient since icons are superior to other signs when clearness of representation and coherence of argumentation is concerned.

1. Cratylus's echoes

Why do linguists find it of interest to inquire into the *naturalness* of language? Is it not evident that all natural languages evince naturalness as one of their defining features? Or is language essentially conventional and has at most rudiments of nature, which require a specialist to be revealed? Have "natural languages" distanced themselves from their evolutionary origins in nature so much that they should no longer be called "natural" in the first place?

The search for naturalness in language is as old as the philosophy of language in Europe. In Greek antiquity, it began with the Presocratic philosophers Heraclitus and Democritus and culminated in Plato's dialogue *Cratylus*. To the ancient Greeks, the natural is opposed to the conventional in language, and both are seen as characteristics of the relationship between the name (i.e., the word) and the

thing to which it pertains. The hotly debated question is whether names are natural or conventional *in relation* to the things which they designate (cf. De Pater and Van Langendonck 1989/1992, Nöth 2000: 4, 336).

While Hermogenes is convinced that names and things are associated by convention and agreement, Cratylus defends the view that names, at least in their origin, are associated with the things to which they refer by natural likeness: the glottal movements in the articulation of the phoneme [r], for example, imitate the movement of something that moves, whereas the [o:] (whose letter name, *omega*, means 'big o') is an "icon" of something "really" big (*Cratylus* 432d). The study of names cannot only reveal their "natural correctness" (383a). Since "the names of the things depict their essence" (424a), they can also disclose the essence of the things so that "he who knows names knows things" (435d). Mediating between both, Socrates supports Cratylus's view that "representation by likeness is infinitely better than representation by any chance sign" (434a), but he also agrees with Hermogenes: names are given by a "legislator" who is the "name giver". In view of the lack or loss of iconicity in so many words, Socrates finds it advisable to search for the essence of the things in the things themselves, and not their names.

In the history of language studies since Plato, the question discussed by Cratylus and Hermogenes continued to be investigated from changing perspectives. The early dualist either–or approach to the question of nature or convention in language was followed by studies into the degree of naturalness or conventionality; instead of "conventional", the opposite of "natural" was later also called "arbitrary"; and finally, to Saussure and the structuralists, the correlate of the word was no longer a thing "outside" language, but the idea or concept associated with it. In the 20th century, Saussure's dogma of the arbitrariness of language prevailed for many decades in structuralist linguistics, and the end of Cratylus's theory of the natural rudiments of language seemed to have come until *Natural Linguistics* (see Section 4) and research in iconicity put Cratylus's thesis once more on the agenda of language studies.

Despite their differences in detail, the various theories of naturalness in the history of linguistics have two basis assumptions in common. First, arbitrariness, and hence also the lack of naturalness, is usually described as a feature of monomorphemic words, and second, natural words and structures are regarded to be the exception, whereas arbitrariness or conventionality is considered to be the rule, which, to a certain degree, is even valid for onomatopoeic words, since these are never the same in different languages.

The first assumption was brought out most clearly by Saussure. In the *Course in General Linguistics*, the principle of arbitrariness applies only to monomorphemic words. At the levels of word formation and syntax, language is no longer arbitrary but "relatively motivated". Whereas the monomorphemic words *five*, *apple,* and *teach* are arbitrary forms, word formations derived from them, such as *twenty-five*,

apple tree, or *teacher* are motivated, being structured according to the rules of word formation. As will be shown below, this relative motivation of language by the rules of word formation and syntax is a form of diagrammatic iconicity.

The second assumption, according to which all languages are more arbitrary than natural, leads to the paradox alluded to above which implies that the study of a *natural* language is the study of nonnatural, viz. arbitrary or conventional, signs. To deny that language is natural reveals a certain Cartesian hubris whose deeper cause is the assumption that *homo sapiens sapiens* is so different from the rest of nature that human signs must be defined in a radically different framework, viz. ,the one of culture and social convention. Against this dualist assumption of a strict opposition between nature and culture, the results of evolutionary cultural semiotics have shown that no sharp dividing line can be drawn between the cultural and the natural components of language (cf. Koch 1986, Nöth 2002b: 2008); culture has evolved with and from nature, not in contrast to nature.

2. The verbal sign and its object: Correlates of iconicity

A semiotic issue of the study of iconicity, arbitrariness, and naturalness in language often left unresolved is the question of the correlate in relation to which the verbal sign is iconic. Is the verbal sign iconic in relation to the material thing, denotatum, or extension, which is its referent, or is it iconic in relation to the mental concept, which is its *signifié*, meaning, sense, or intension? In other words, is iconicity a relation of reference or of meaning, or are both relations involved?

2.1 Similarity: Reference or of meaning?

The account which linguists give of the similarity relation that constitutes verbal iconicity is not without inconsistencies: sometimes it is described in terms of *reference*, as a relation between the verbal sign and the extension of the (class of) objects to which it refers; sometimes it is conceived of as a relation of *meaning* in the sense of a conceptual structure representing the idea conveyed by the verbal sign; and sometimes it is also described in both ways. If the underlying model of the verbal sign comprises both correlates of the verbal sign, the referent and its meaning, the inconsistency is that iconicity is described according to two different kinds of relation. If the underlying model of the verbal sign is dyadic, excluding one of the two correlates of the verbal sign, it turns out that many forms of iconicity cannot even be described at all.

Onomatopoeic words, such as *buzz*, *ping-pong*, or *cock-a-doodle-doo*, evidently evince an acoustic similarity in relation to the sound event to which they refer.

The description of the relation involved is a matter of reference if the similarity of the acoustic sound event with the onomatopoeic word is measured instrumentally by means of methods of physical acoustics (cf. Pharies 1985). Nevertheless, the similarity involved in sound symbolic words can also be described in terms of meaning. Linguists are studying a relationship of meaning if they conceive of the similarity between the onomatopoeic word *cock-a-doodle-doo* and the sound produced by the rooster as the relationship between the two mental representations, one associated with the sound symbolic word and the other with the mental image generally associated with the auditory qualities and the rhythmic pattern of the word *cock-a-doodle-doo*. Although Saussure does not give a very thorough account of the nature of onomatopoeia, his mentalist sign model is quite in accordance with an approach to sound symbolism in terms of meaning: both the signifier and the signified of his dyadic model of the verbal sign are mental representations, the signifier being the mental representation of a (phonetic) sound image, the signified being the mental representation (the "idea") of the cry of the rooster.

The inconsistency of changing the correlate in the description of iconicity in language according to the necessity of the given example has become particularly evident in the case of the morphological iconicity of the paradigm of adjective grading. The iconicity involved in the morphological paradigm *large / larger / largest* has usually been described in terms of reference: the increase in the number of phonemes corresponds to an increase in the referential domain. However, the adjective grading can also result in referentially aniconic patterns: *small / smaller / smallest* is referentially aniconic since the extensional domain of words relating to smallness diminishes to the degree that the number of phonemes in the three forms increases. As a solution to this inconsistency in the iconicity of the paradigm, the iconicity involved in the grading of *small / smaller / smallest* has been accounted for in terms of meaning. The correspondence between the three verbal forms and their meaning is described as being iconic because of the increase in conceptual complexity from the simple base form (*small*) to the logically complex meaning of the superlative form (*smallest*), which presupposes the logical reference to the concept of the base form in addition to the concept of a maximum of the degree. Since the same argumentation in terms of meaning can also be applied to the paradigm of *large / larger / largest*, one might be inclined to conclude that arguments concerning iconicity should always be made in terms of conceptual and not referential structure.

However, whether iconicity can indeed be conceived of as a relation between the verbal sign and its meaning really depends on the underlying theory of meaning. Some theories of semantics make it difficult to see how a word and its meaning can be similar at all. This is especially true of logocentric theories of meaning, which define the meaning of a word in terms of other words. When Quine (1981:

46), for example, defines "the meaning of an expression as the set of all expressions that mean like it", and formalist linguists account for the meaning of a word in terms of a complex of semantic components, which, although called "semantic primitives", are equally nothing but words (cf. Kempson 1977: 18), the problem of iconicity can no longer be addressed, since it would mean that the correlate of an iconic word is another verbal expression to which it usually evinces no similarity. Rejecting the idea that meanings are mental representations of verbal *and* nonverbal cognitions in their formalizations of word meanings, logocentric semantics operates in a self-sufficient, autonomous, and ultimately self-referential system of verbal signs (cf. Albertazzi 2000: 7) which cannot account for iconicity in language. Such logocentric approaches to meaning make it difficult, if not impossible, to discern iconicity as a similarity between a verbal signifier and its signified. If the signified of *cock-a-doodle-doo* is a verbal paraphrase such as "the loud sound made by an adult male chicken", how can there be similarity to the word *cock-a-doodle-doo*? The onomatopoeic word is not similar to its verbal paraphrase.

2.2 Peirce's object as the correlate of an icon

The problems created by logocentric approaches to meaning in the study of linguistic iconicity are resolved in a very different way in the framework of Peirce's semiotics. Peirce's "object of the sign", in relation to which the icon is defined, is neither the "thing" evoked by Cratylus nor the referent nor the extension of a term in the sense of the class of entities which the term designates. Peirce's "object of the sign" is a semiotic category which has given rise to many misunderstandings (cf. Nöth 2006). It is neither the denotatum nor the meaning of the positivist semanticists. Instead, it is "that thing which causes a sign as such" (CP 5.473, 1905), that which determines the sign to be a representation (cf. CP 4.536, 1906). The object of a sign is the cognition, memory, knowledge, feeling, or experience, whether real, fictional or merely imaginary that enables the interpreter to interpret the sign. Furthermore, it is the determining cause in a cognitive process, called *semiosis*, a process developing in three phases corresponding to the three constituents of the sign, the sign itself (representamen), its object, and its interpretant.

- The *sign* (in our context: a word, sentence, or text) is associated with the present, the moment in which it is thought, uttered, perceived, read, or heard by a mind.
- The *object* precedes the sign in time because it is the event, cognition, feeling, experience, thought, knowledge, or state of affairs evoked in the interpreter's mind in the process of semiosis. The object which precedes the sign "is itself of the nature of a sign or thought. For the sign does not affect the object but is

affected by it; so that the object must be able to convey thought, that is, must be of the nature of thought or of a sign" (CP 3.538, 1903).

– The *interpretant* follows the verbal sign in time as the effect which this sign creates in an interpreting mind. The interpretant is an interpreting sign, which can again be a feeling, an idea, an action, etc.

According to this account, the interpreters of a verbal sign are "determined" by its object insofar as they are under the influence of their "previous acquaintance with what the sign denotes", and without which any adequate interpretation would be impossible. Peirce gives the example of the sentence "Hamlet was mad", and describes the way an interpreter is determined by the object of the word "mad" as follows: "to understand what this means one must know that men are sometimes in that strange state; one must have seen madmen or read about them" (cf. CP 8.178-79, s.d.). The same example shows that a sign can also be determined by an object which is mere fiction. Although the sign "Hamlet" does not refer to a historically real person, the name, uttered several hundred years after Shakespeare created the protagonist of his drama, is nevertheless determined by this object, which is part of "the Universe of Shakespeare's Creation" (ibid.).

If the object of a verbal sign is the experiential *and* conceptual knowledge which makes its interpretation possible, its domain is not restricted to the one of reference but it also includes the domain of sense (cf. Nöth 2006). Hence, the question of how a signifier can be similar to a signified does not pose itself as the question of how a phonetic and a semantic form are similar. Since the object to which the iconic sign is similar is of the nature of a thought and the sign is itself a thought sign, the similarity relation is one between two mental representations ("thoughts"). Peirce gives the following analysis of this approach to the iconicity of an onomatopoeic word (which exemplifies the subcategory of icons called "image"; see Section 5):

> If I write of the sound of the "sawing", the reader will probably do little more than glance sufficiently at the words to assure himself that he could imagine the sound I referred to if he chose to do so. If, however, what I proceed to say about that sound instigates him to do more, a sort of auditory composite will arise in his imagination of different occasions when he has been near a saw; and this will serve as an icon of the specification of the phrase "sound of the saw". If I had used, instead of that phrase, the word "buzz", although this would have been less precise, yet, owing to the sound of the word being itself a sort of a buzz, it would have more directly called up an iconic interpretation. (Peirce 1904: 317-318)

The example shows clearly how iconicity is described as the relationship between two mental representations, the mental image in the memory of one who has been near a saw and the mental representation of "the sound of the word being itself a sort of a buzz". A mental image created by the typical experience of an acoustic

event is compared to the mental image created by the standard pronunciation of the word representing this event. Below, we will see how this elementary constellation of iconicity in language is also applicable to verbal representations of visual and other sensory perceptions.

The domain of the object of a verbal sign is not only the exophoric domain of the thoughts and experiences represented by words, but there is also the endophoric domain of the other words to which the verbal sign refers in the web of its intra- and intertextual references (cf. Nöth 1990), that is, the domain of the verbal and contextual knowledge necessary for the interpretation of the verbal sign in a text and in the system of language. The object of the verbal sign is hence either an extralinguistic object or a linguistic object. Words can be icons of other words within language either by phonetic or by semantic likeness. Phonetically determined iconicity occurs in the form of repetitions, echoes, rhymes, alliterations, assonances, anaphoras, and other parallelisms. Semantically determined iconicity occurs in the recurrence of verbal forms sharing semantic features, as in the case of synonyms, antonyms, hyperonyms, metaphors, topical recurrences, allusions, or semantic variations of a theme. While the noun *sloth* is not an icon but a symbol in relation to the animal which it represents, it is an icon in relation to all words to which it is phonetically similar, for example, the words with which it rhymes (*both*, *growth*, or *oath*) or with which it has semantic characteristics in common, e.g., with its synonym (1. *Choloepus*; 2. *lazybones*), antonym (2. *[eager] beaver*) or hyperonyms (1. *animal*, 2. *character*). Evidently, there are different degrees involved in these diverse forms of phonetic and semantic iconicity. Synonyms are mutually more iconic than antonyms. Notice, however, that antonyms, contrary to popular opinion, are not radically dissimilar (aniconic), but, as all semanticist agree, highly similar in their semantic structure since they share all semantic features except for the one that accounts for their semantic opposition. Peirce gives the following example of an antonym which serves as an icon of its opposite in a passage in which he also explains, en passant, in which sense the term *icon* is more general than the term *likeness*, which he had used as a term for iconicity in his very early writings: "It may be questioned whether all icons are likenesses or not. For example, if a drunken man is exhibited in order to show, by contrast, the excellence of temperance, this is certainly an icon, but whether it is a likeness or not may be doubted" (CP 2.282, 1893).

Not every repetition or recurrence in a text implies iconic representation, though. A sign is only an icon of its object "in so far as it is like that thing and used as a sign of it" (CP 2.247, 1903). Repetitions of the innumerable tokens of the letter *t* or of the article *the* and the preposition *of* on one and the same page of a text in English are usually not "used as" icons of their preceding forms of the same type. Only nontrivial recurrences, such as anaphoras or alliterations function as iconic

signs of their preceding occurrences. Trivial and random repetitions are usually neither noticed nor interpreted as icons of each other. An iconic sign is only an icon if it functions as such; otherwise, it is only a potential icon: "a sign is only a sign *in actu* by virtue of its receiving an interpretation" (CP 5.569, 1901).

Trivially recurrent signs are replicas (or tokens) but not icons of the type of which they are an instance (cf. CP 2.318, 1902). A replica cannot be an icon of its type since the type (qua legisign) "is not a single object" but rather a general law "which, it has been agreed, shall be significant" (CP 2.246, 1897). Furthermore, a replica is a sinsign, a singular occurrence of its legisign (or type), which has no occurrence itself since it is only a mental law; it makes no sense to call a sinsign an icon of its legisign. The argument will be taken up below (Section 4) with the example of the allophone (token) which must not be mistaken for an icon of its phoneme (type).

3. The natural substratum of language from the perspective of Peirce's semiotics

Natural Linguistics and the theory of linguistic iconicity have made much use of the Peircean typology of the sign in relation to its object, distinguishing between symbolic, indexical, and iconic signs, and also of the three subcategories of the icon, i.e. image, diagram, and metaphor (cf. Nöth 2000: 329-331). However, these trichotomies cannot be directly used as a foundation of a theory of naturalness in language, since in Peirce's classification of signs there is no categorical dividing line between the natural and the conventional. Naturalness is not a fundamental category in Peirce's writings on semiotics, in which natural signs are only occasionally mentioned as examples of indexical signs in physical and biological nature.

It is not altogether wrong to associate the icon and the index with naturalness and to define the symbol in terms of arbitrariness and conventionality, but it is important to recognize that symbols are also natural in some respects (see Section 3.1). Furthermore, the trichotomy of signs considered in relation to their objects does not set up three mutually exclusive classes of signs. Peirce's categorial system postulates a system of mutual inclusion among these three sign types. Symbols may include icons and indices, and indices may include icons; only icons do not include any of the other sign types. Words, sentences, or texts are always symbols, but "a symbol may have an icon or an index incorporated into it, that is, […] its interpretation may involve the calling up of an image […] of past experiences, as ordinary common nouns and verbs do; or it may require its interpretation to refer to the actual surrounding circumstances of the occasion of its embodiment, like such words as *that*, *this*, *I*, *you*, *which*, *here*, *now*, *yonder*, etc. Or it may be pure

symbol, neither iconic nor indicative, like the words *and*, *or*, *of*, etc." (CP 4.447, 1903). As will be shown below, the icon included in a symbol, according to this definition, is not due to the similarity of the symbol as a signifier with its object, but it is due to the iconicity of the mental image evoked by the symbol in the interpreter's mind with other mental images previously evoked by the same symbol; but before going further into detail, let us consider the reasons why, or better to which degree, symbols, indices, and icons are natural signs.

3.1 The naturalness of the symbol: Habit, self-replication, and autopoiesis

It is true that the prototype of the sign by cultural convention is the symbol, but Peirce's more general criterion of symbolicity is not social convention but "habit", defined as "general rules to which the organism has become subjected" (CP 3.360, 1885). Habit in this sense is an ontogenetic as well as a phylogenetic category, and, thus defined, symbols can be found in nature as well as in culture (cf. Nöth 2008). The criteria which Peirce enumerates in his definition of the symbol explicitly state characteristics of the signs of animals. In 1902, Peirce states that a symbol is "a sign merely or mainly by the fact that it is used and understood as such, whether the habit is natural or conventional, and without regard to the motives which originally governed its selection" (CP 2.307), and in 1904, natural signs are even more clearly subsumed under the category of the symbol, when Peirce states that the symbol "depends either upon a convention, a habit, or a natural disposition of its interpretant" (CP 8.335). Hence, both the signs by which animals communicate and those of human language are symbols insofar as they constitute species-specific semiotic habits, whether genetically determined or acquired by learning. The so-called "languages" of animals are thus as much symbolic systems as human languages are. This does not preclude that signs used by animals and infants in early language acquisition may evince more indexical and iconic components than fully developed language use (cf. Nöth 1977: 12-28); nor must the "naturalization" of language be misunderstood as a neglect of the differences between human and animal languages. The purpose of emphasizing the natural in the conventional is to reveal the continuity from nature to culture and not to overemphasize the differences, as philosophers do who postulate that symbols are the essence of humankind (e.g., Cassirer 1922-1938).

In addition to habit, there are two other significant features which human symbols share with biological organisms and their evolution. In the terminology of contemporary evolutionary theory, these characteristics described by Peirce are self-replication and autopoiesis (in the sense of self-creativity). A symbol is self-replicative because, as a *Legisign*, it is "a general type or law" (CP 2.249, 1903) which acts as a "general rule" (CP 4.447, 1903) and has existence only in its

replication in the form of a replica (or token): "Take, for example, the word 'man'. […] If the word 'man' occurs hundreds of times in a book of which myriads of copies are printed, all those millions of triplets of patches of ink are embodiments of one and the same word. I call each of those embodiments a replica of the symbol" (ibid.). The self-replicative power of the symbol *man* thus consists "in the fact that a habit, or acquired law, will cause replicas of it to be interpreted as meaning a man or men" (CP 2.292, 1902). Hence, "a symbol is something which has the power of reproducing itself, and that essentially, since it is constituted as a symbol only by the interpretation" (Peirce 1904: 322).

The second capacity which human symbols have in common with biological organisms and their evolution is autopoietic creativity: symbols have the potential of growing by themselves: symbols can create new symbols. Peirce describes this autopoietic potential which symbols have in common with biological organism as follows: "Perhaps the most marvellous faculty of humanity is one which it possesses in common with all animals and in one sense with all plants, I mean that of procreation. […] If I write 'Let Kax denote a gas furnace', this sentence is a symbol which is creating another within itself" (CP 3.590, ca. 1867). Admittedly, the argument sounds daring, and it is likely to provoke the objection that it is not the symbol itself which creates a new symbol, but the symbol maker, in other words, the human being who invents the new word. However, the semiotic argument behind Peirce's claim is more complex and requires taking into account the theory of semiosis (see above) and of synechism, the theory of gradual transitions which rejects dichotomies such as the one of the symbol maker vs. the symbol. According to the theory of semiosis, signs are neither mere products nor tools of the human mind but, to a certain degree, autonomous agents in sign processes, communication, and the evolution of signs. To the degree that it is true that humans create symbols, it is equally true that the human mind is not independent from, but determined by, the symbols, semiotic systems, and above all, the laws of logic which operate in thought, verbal expression, and communication. Hence, to the degree that the human mind, human thought, and symbolic expressions are molded by the laws and logic of its underlying symbolic systems, they are determined by these symbolic systems. In this sense, symbols are, to a certain degree, co-authors and hence, semi-autonomous agents in the processes of semiosis in which humans believe to express "themselves", unaware of the fact that they cannot really claim to be fully atonomous agents expressing "themselves" (for details, cf. Nöth 2002c, 2009).

3.2 The icon and its naturalness in itself

The way in which iconic and indexical signs are natural is more evident. The icon is natural because it is a sign "merely by virtue of characters of its own, and which

it possesses, just the same, whether any such Object actually exists or not" (CP 2.247, 1903). "A quality that it has qua thing renders it fit to be a representamen" (CP 2.276, 1902). Being a sign which has qualities in common with its object, "each Icon partakes of some more or less overt character of its Object" (CP 4.531, 1906). The icon is hence a sign because of characteristics inherent in itself. This is what makes it natural: "an Icon is a sign […] by virtue of its own internal nature" (CP 8.335, 1904). Icons are not only naturally related to their objects, but they can also be found in nature. Mimicry in the morphology of plants and animals are well-known examples; acoustic communication between animals based on imitation or echoing is another example of iconic natural signs.

Hence, similarity is not the principal feature of iconic signs but a consequence of the more essential criterion of sharing qualities with its object. Yet it is true that Peirce has given innumerable definitions of the icon which also include the criterion of similarity. In 1867, his term for this class of signs, "likeness" (CP 1.558), was a mere synonym of similarity. Later definitions in which icons are associated to similarity are: the iconic sign "stands for something merely because it resembles it" (CP 3.362, 1885), or: it "represents its object mainly by its similarity" (CP 2.276, 1902), but whenever similarity is mentioned as a criterion, it is not so much described as a *relation* between the sign and its object, but a characteristic inherent in the icon, for example: icons "resemble their objects in themselves" (Peirce 1909: 461), or: an icon "has no dynamical connection with the object it represents; it simply happens that its qualities resemble those of that object, and excite analogous sensations in the mind for which it is a likeness" (CP 2.299, 1895).

The criteria of "similarity" and "signifying by one's own quality" are not coextensive. Instead, they account for a difference in the degree of the iconicity of the sign to which they apply. A sign by likeness does not only signify by its own qualities but also by other features. It is therefore less iconic. Onomatopoeic words testify to this rule since they differ from language to language and, in this respect, they are symbols, despite their iconicity. A sign that signifies only by its own qualities would be the most iconic sign, a "pure icon" (CP 2.92, 1902), whereas the sign by likeness is not a "pure icon" but a "hypoicon" (CP 2.276, 1902). For example, in as far as a painting follows the conventions of its genre, it is not a genuine icon, but a hypoicon. Pure iconicity is an idealized degree of iconicity which can never be reached completely but only by approximation. Under the influence of its object, the sign cannot signify exclusively by its own quality, since signifying an object already means being under the influence of otherness. Peirce gives the example of a portrait: no portrait signifies on its own because it is painted or photographed under the direct influence of the person which it represents. Such a portrait is a (hypo)icon because of its similarity to the portrayed person, "but, in fact, it is not a pure Icon, because I am greatly influenced by knowing that it is an effect, through

the artist, caused by the original's appearance, and is thus in a genuine Obsistent [i. e., 'indexical'] relation to that original" (CP 2.92, 1902), and this kind of influence by otherness makes the same portrait an indexical sign.

3.3 The index and its naturalness in an existential relation

The naturalness of indices is even more evident although there is again a gradual transition from the natural to the conventional in this class of sign. A genuine index is a sign which is in a "real connection" (Peirce 1909: 461), or in an "existential relation" with its object (CP 8.335, 1904: 2.283, 1902), and "it makes no difference whether the connection is natural, or artificial, or merely mental" (CP 8.368, fn, 1908). The genuine index comprises "all natural signs and physical symptoms" (CP 3.361, 1885), since these evince "a direct physical connection" (CP 1.372, 1885) between the sign and its object. There are two classes of indices. One is the genuine index, also called "reagent"; the other is the "degenerate index" (CP 2.283-290, 1902) or "designation". Among the latter are the indexical words, such as "personal, demonstrative, and relative pronouns, proper names" (CP 8.368, fn, 1908). Degenerate indices are less natural than genuine indices since the sign and its object are not connected by physical causality but by "mental associations" (CP 3.361), which "force the attention to the particular object intended without describing it" (CP 3.369). Designations "can denote nothing unless the interpreting mind is already acquainted with the thing it denotes" (CP 3.361; all 1885).

In sum, neither the distinction between natural and conventional signs nor the one between symbolic, indexical, or iconic signs are conceived of as mutually exclusive. Instead, there are multiple forms of gradual transitions, overlaps, and inclusions between the traditional dichotomies (such as natural vs. conventional or sign vs. symbol) and the Peircean trichotomies set up to distinguish the various classes of signs.

4. Natural Linguistics as semiotic linguistics

All in all, the concept of naturalness in language has not yet been examined very deeply in the framework of Natural Linguistics. Although, according to the above premises, everything in language is natural, Natural Linguistics is evidently not co-extensive with linguistics in general. What is then the specific approach of Natural Linguistics to language, what are its criteria for distinguishing between language structures which are its object of study and others which are not?

Many linguists take naturalness as a synonym of Saussure's "relative motivation" in language (cf. Braunmüller 1982, De Pater and Van Langendonck 1989/1992,

Küper 1993, Engbert-Pedersen 1996). The two forms of relative motivation examined by Saussure were motivation by onomatopoeia and motivation by the rules of word formation. In the framework of the theory of linguistic iconicity, onomatopoeia belongs to the type of iconicity which Peirce defined as image, while motivation by rules of word formation and word order are forms of diagrammatic iconicity. The general assumption of Natural Linguistics is that iconic forms of language are more natural than symbolic ones (cf. Mayerthaler 1981, Wurzel 1984, Haiman 1985, Dziubalska-Kolaczyk and Weckwerth 2002). Anttila and Embleton (1989) as well as Dressler (1989, 1995) also include indexical signs among the natural signs in language. However, if natural means "by nature", this reduction of naturalness to verbal iconicity and indexicality neglects the biolinguistic and neurolinguistic foundations of human symbols (see Section 3.1). Language is natural throughout in the sense that it is part of human evolution in nature. For example, the use of the tongue and the other speech organs as instruments of sign production is natural in the sense that all humans have this speech apparatus by nature and use it to communicate by means of language.

Although language is biologically natural, naturalness may nevertheless be defined as a matter of degree, the degrees being determined according to the evolutionary age of the various forms of human sign behavior. For example, communication by gestures is most probably older than verbal communication, and simple forms evidently precede complex forms in the evolution of language just as speech precedes writing. From this perspective, there are some reasons why iconic and indexical signs are more natural; they are older and more widespread in the ontogenesis and phylogenesis of sign behavior (cf. Nöth 1977: 12-28; 2004).

If Natural Linguistics is the study of the more natural features of language, language universals, the features common to all languages, are evidently among the candidates for the most natural features of language for the simple reason that they are characteristics of more or even all natural languages. For example, if all languages distinguish between vowels and consonants then it is obviously natural for an individual language to have this distinction. However, although Natural Linguistics is indeed interested in universal tendencies and preferences, it also seeks for explanations of language-specific preferences (cf. Dressler 1995: 23). In a programmatic paper, Dressler (1995: 22) enumerates seven common characteristics of the naturalness approach to language studies (NL), which may be summarized as follows:

1. NL gives functionalist explanations.
2. NL studies the cognitive (including semiotic) determinants of grammatical principles and preferences.

3. NL includes external explanatory evidence (e.g., from language pathology or diachrony).
4. NL sets up graded or prototypical categories, not dichotomies.
5. NL shows that the forms of naturalness differ and may be in conflict at the various levels of the language system.
6. The study of naturalness in language reveals tendencies for language change.
7. Iconicity, defined as a "similarity between a *signans* and a *signatum*", is a symptom of naturalness; the iconic *signans* is an icon of its *signifié*, more specifically, an allophone is an icon of its phoneme.

NL is thus based on a great variety of principles, whose foundation in "nature" is not always apparent at first sight. Functionalist explanations (1) are natural explanations, if "function" is the purpose which a structure fulfills in the system of a natural language. The naturalness of cognitive determinants of language structure and use (2) is biologically plausible; the general cognitive faculties and constraints of the human mind naturally determine the cognition of language. External determinants of language structure and processes (3) are as natural as internal (functional) ones if they are natural determinants in themselves. But are prototypical categories more natural than binary ones (4)? In nature, we do find binary structures, but semantic prototypes are often culture specific in their structure; what in English is called a *robin* is not the most typical bird in many other cultures. Finally, if no other determinants interfere, a natural determinant of language must exert its influence not only presently but it will be effective in the future, too (6).

NL thus seeks to discover cognitive and functional determinants of the structure and system of individual languages and of languages in general; it aims at revealing the natural causes of textual preferences in the choice of words and structures in relation to alternative forms and to the meaning of these forms. Finally, NL seeks to determine causes and trends of language change. Insofar as all of the principles are general principles of sign processes, the principles of NL are semiotic principles. Natural Linguistics is a semiotic linguistics.

Scholars working in the field of NL agree that iconicity is a feature of naturalness in language. The study of iconicity is also the bridge between NL and research in linguistic iconicity not explicitly subscribing to the tenets of NL (e.g., Itkonen 1986, Waugh 1992, Anderson 1998). However, iconicity is a weak principle in the study of naturalness in language when it is reduced to the mere "similarity between a *signifiant* and a *signifié*".

Iconicity is certainly not characteristic of the relation between a phoneme and its allophones, as item (7) of the above list claims. If a phoneme is "the smallest unit of the sound system of a language" (Crystal 1985: 228) or, in mentalist categories quite in accordance with modern cognitive linguistics, a mental "sound image

or acoustic-motor intention underlying the objectively produced sound" as Trubetzkoy defined it in a paper of 1929 (quoted in Szemerényi 1971: 58) and if the relationship between the allophones of a phoneme is one of "realization", by which the abstract unit of the "phoneme is 'realized' by its allophones" (Crystal 1985: 13), the phoneme is clearly related to its allophones (and phones) in the same way as a type is related to its token (or a legisign to its replica, see above, Section 2.). A phoneme, at least in its cognitive definition, is a legisign (even though it means nothing) since it is a "general type" of which its allophone is an instance, a "peculiar occurrence". Replicas of a phoneme are not icons which represent their type.

Since neither a comprehensive account of the semiotic foundations of Natural Linguistics nor of linguistic iconicity is possible in the framework of the present paper, the following considerations will have to be restricted to diagrammatic iconicity, a topic whose relevance has always been well recognized in Natural Linguistics, but whose semiotic foundations have often been ignored or even misunderstood. For further semiotic aspects, topics, and approaches to iconicity in language, see the survey in Nöth (2000: 329-331) and Nöth (1990, 1993, 1999a, b, 2001, 2002a).

5. Diagrammatic iconicity

Before diagrammatic iconicity and its various forms in language can be examined in detail, the semiotic characteristics of the diagram must be examined, which requires another excursus into the semiotics of Peirce (cf. Short 2007). A comprehensive account of the semiotics of the diagram in particular is offered by Stjernfelt (2000, 2007).

The diagram is the second of three types of iconicity besides the *image*, which evinces a "sensuous resemblance" with its object (CP 2.279, c. 1895) and has "simple qualities" in common with it, and the *metaphor*, which represents its object by means of "a parallelism in something else" (CP 2.277, 1902). In contrast to the other two types of iconicity, the *diagram* is an icon of relations. Diagrams "represent the relations […] of the parts of one thing by analogous relations in their own parts" (CP 2.277, 1902). Any map depicting a territory, such as the schematic of a metro is a diagram. The circuit diagram of an electrician or the floor plan of a building are similar examples of visual signs that depict relations, but among the diagrams there are also tree or box diagrams, charts, tables, visual aids, and many other graphic representations. The following algebraic equation formula is among Peirce's examples of a diagram

$$a[1]x + b[1]y = n[1],$$

a[2]x + b[2]y = n[2].

Formulae like these, written in "a regular array, especially when we put resembling letters for corresponding coefficients", are diagrammatic because they "make quantities look alike which are in analogous relations to the problem", and Peirce concludes: "In fact, every algebraical equation is an icon, in so far as it exhibits, by means of the algebraical signs (which are not themselves icons), the relations of the quantities concerned" (CP 2.282, 1893). It is evident that not only the constituents of compound numbers in "regular arrays" but also the recurrent morphemes in patterns of word formation and syntax are diagrams, according to this definition. A simple example of diagrammatic iconicity of this kind given by Waugh (1992: 13) is the following:

water	*watery*	*waterfall*
rain	*rainy*	*raindrop*
snow	*snowy*	*snowshoe*

Peirce's concept of diagram is very general; "diagram" is a synonym of "schema" (CP 4.233, 1902). In modern linguistic terminology, one would say that "diagram" is a synonym of "structure" or "construction". Like algebraic formulas, sentence structures are diagrams of their syntactic form, so that "in the syntax of every language there are logical icons of the kind that are aided by conventional rules" (CP 2.280, 1895). The difference between algebraic and logical diagrams "is merely one of degree" in the freedom of the application of the diagrammatic method (CP 3.560, 1898, cf. CP 3.418, 1892). The parallels between syntax and algebra have been much discussed in structural linguistics, especially by L. Hjelmslev. Suffice it to say, in this context, that the system of algebra is diagrammatically more iconic than the system of word formation because its rules of combination are valid without exception. No number is missing between 0 and 1 billion, whereas in language, the potential of possible combinations is always far from being ever fully exhausted; the clash between norm and usage comprises a large number of impossible combinations of phonemes and morphemes as well as many possible but not actualized words (*chair /?chairy / chairman* etc.).

Diagrammatic icons are mental diagrams irrespective of whether they are graphically represented or not. Syllogisms formulated by a logician are "diagrammatic representations of the intellectual relation between the facts from which he reasons and the fact which he infers" (CP 3.599, 1866). Any analogy is a diagram because it represents a parallelism between the structures of two conceptual domains.

Among the examples given so far, two types of diagram may be discerned, the individual and the general diagram. Examples of individual diagrams are maps of specific territories or "a curve of the distribution of errors" (CP 8.335, 1904). In Peirce's list of ten classes of signs, individual diagrams are subsumed under the "iconic Sinsigns", whereas general diagrams ("a diagram, apart from its factual individuality") are among the iconic Legisigns (CP 2.255, 2.258, both 1897). In a general diagram, the object is not individual, but general. The above algebraic formula is a general diagram, and so is a general analogy. "A [logically] Necessary Deduction is a method of producing Dicent Symbols by the study of a diagram" (CP 2.267, 1897). "A regularly stated Syllogism is a Diagram" (CP 4.544, 1906); it is a general icon of the relation between two premises and a true conclusion. The distinction between general and individual diagrams is relevant to other forms of diagrammatic iconicity in language, too. Caesar's *Veni vidi vici*, written in 47 BC immediately after the victory in the Battle of Zela, was an individual diagram. Today, this famous dictum has become a legisign in its usage as a proverbial phrase.

One of the characteristics of diagrams, which these have in common with all other icons but which is especially prominent in diagrammatic iconicity is "that by the direct observation of it other truths concerning its object can be discovered than those which suffice to determine its construction" (CP 2.279, c. 1895). In contrast to the index, which gives no information about its object but merely indicates it, and to the symbol, which is merely associated with its object by means of a habit, the icon exhibits information about its object in its own form. If I use a patch of *yellow* cloth to let you know what color my new shirt is, your observation of this image-icon will let you know more about its object than the mere symbolic word *yellow* or a finger pointing to the shirt could give since the patch does not only *represent* the color in question, it also *has* the color which it represents so that you may find information about the exact hue of this color in it. If you hear the word *cock-a-doodle-doo*, you find more information than from the paraphrase of this word in the form of the verbal symbols 'loud sound made by an adult male chicken' since the iconic word also exhibits the rhythmic pattern of the sound event which it denotes. If you look at the schematic of a metro, you find *more* information than any verbal description of its lines and stations could convey. From its lines and nodes, you can derive "other truths concerning its object" such as the shortest connection between two stations. It is no coincidence that linguists have made use of tree and box diagrams to analyze syntactic structure; the two tree diagrams of an ambiguous sentence reveal the structures of this sentence more efficiently since its diagrammatic form reveals this ambiguity in its form.

6. The general diagrammatic iconicity of language structure

Diagrammatic iconicity is much more comprehensive than form-meaning isomorphism in language, the tendency that one and the same form tends to represent one and the same meaning (cf. Givón 1985, Itkonen 1986, Waugh 1992: 13 and 34). It is neither a particular verbal structure against the background of an otherwise arbitrary morphology and syntax of language nor a mere device of certain diagram-like rhetorical figures, such as parallelism, anaphora, or chiasm in a discourse world in which diagrams are the exception. Instead, verbal diagrams can be found at all levels of the language system. Even at the level of its monomorphemic lexical elements, whose composition reveals morphological arbitrariness and lack of motivation, words may be considered as diagrams. At this level, they are diagrams of their phonological form in the sense that a mental schema of the way the word is to be articulated is a mental diagram of the order, articulation, and stress pattern of its articulation.

All structures that Saussure describes as "relatively motivated" evince diagrammatic iconicity. The semantic elements which combine to a complex concept constitute a semantic diagram, for "a concept is not a mere jumble of particulars […, it] is the living influence upon us of a diagram, or icon, with whose several parts are connected in thought an equal number of feelings or ideas" (CP 7.467, 1893). A complex word is thus a diagram of its semantic and morphological structure, a sentence is a diagram of its syntactic and semantic form, a text is a diagram of its topical and thematic structure, a narrative is a diagram of its plot, and a dissertation is diagram of the thesis it develops.

Ordo naturalis, the correspondence of narrative order to the order of the narrated events, as in Jakobson's much-quoted *veni vidi vici*, exemplifies diagrammatic iconicity only *in addition to* the iconicity which any well-formed sentence evinces. The sentence *Mary married and had a baby* is syntactically as diagrammatic as is the sentence *Mary had a baby after she married*. The reason why the first of the two verbal representations of the same sequence of events sounds more natural is that it is twice diagrammatic, syntactically and semantically. The difference between both forms of representing the same event is thus one of the degrees of iconicity.

Syntactic diagrams are first of all mental diagrams (cf. Midtgarden 2002). They can, but need, not be represented in the form of a graphic representation as a tree diagram, a box diagram, a Venn diagram, or in the form of an existential graph, which was Peirce's method of the graphic representation of logical forms. An example of a simple graphic representation of a syntactic diagram is the structural pattern illustrating the valency of the verb *to buy* by means of blanks to be filled by its possible nominal complements: "– *buys – from – for the price* –" (CP 3.420, 1892; see also Nef 1980). Every sentence presents a mental diagram of its syntactic

and semantic form. For example, the sentence *Cain kills Abel* is a diagram not only because it represents the two biblical figures isomorphically by means of the two proper names *Cain* and *Abel*, but much more generally, because the sentence presupposes the mental image of a dyad "composed of Cain, as first, and of Abel, as second member". Notice that a dyad is an extremely general structure. Elsewhere Peirce specifies: "The Dyad is a mental Diagram consisting of two images of two objects, one existentially connected with one member of the pair, the other with the other" (CP 2.316, 1902). The essence of a diagram is thus not the isomorphic verbal representation of a referential scenario. Such isomorphism may exist, but it is an additional aspect of the same diagrammatic representation, not a necessary one, since a pure diagram is nothing but a structure; it "represents a definite form of Relation. This Relation is usually one which actually exists, as in a map, or is intended to exist, as in a Plan. But this is […] far from being essential to the Diagram as such […]. The pure Diagram is designed to represent and to render intelligible, the Form of Relation merely" (Peirce c. 1906: 316, fn.).

In contrast to the pure diagram, which is an abstract structure inherent in verbal syntax or morphology, the iconicity associated with isomorphic representations of states of affairs or referential scenarios may be called hypoiconic diagrammaticity (see Section 3.2). It is a form of iconicity in connection with a strong element of indexicality. *Cain kills Abel* is a hypoiconic diagram of this kind: the two proper nouns are indices referring to individuals of biblical mythology. The verb *kill*, by contrast, evinces diagrammatic iconicity insofar as its valency conveys the image of an agent and a patient, who must be referentially specified in the form of proper names and a spatio-temporal context. It is this relational aspect of their valency and, more generally, the predominantly dynamical character of verbs that accounts for their diagrammaticity in contrast to the indexicality of the noun phrases, which tend to represent individuals or classes of referential objects.

Caesar's historical utterance *veni vidi vici* is another example of a hypoiconic diagram. The verbal suffixes indicating the first person and the perfect tense are temporal indices. Since no noun phrases are associated with the verbs, the only element of diagrammatic iconicity inherent in this sentence is the one represented by the succession of the three finite verbs, which must be interpreted as a representation of the *ordo naturalis* of the events whose sequence they represent in the form of their own sequence. The great generality of Peirce's concept of diagram may disappoint those linguists convinced of having found in this concept a specific tool for revealing traces of naturalness in language, but the relevance of the more specific forms of iconicity hitherto investigated in the framework of Natural Linguistics is not diminished by the extension of the concept of iconicity according to the implications of Peirce's more encompassing semiotic system of diagrammaticity in language and thought.

7. Verbal diagrams and their need for images, indices, and symbols

Perhaps with the exception of Dadaist sound poems, verbal signs are never diagrams alone; their diagrammatic component is always included in the fundamentally symbolic and indexical substratum of language. Diagrammatic iconicity in language requires and includes iconicity of the category of the image. Like the diagram of a map, which denotes nothing except a mere possibility of a territory before an index identifies its real territory, a verbal diagram can only denote in combination with an index relating the abstract diagram to something more concrete in the world of states of affairs (see Section 3.3). Since diagrams are nothing but structures, they can give no information except the one which is inherent in their own form. This is a restriction which diagrams have in common with all icons: "Icons may be of the greatest service in obtaining information – in geometry, for example – but still, it is true that an Icon cannot, of itself, convey information, since its Object is whatever there may be which is like the Icon, and is its Object in the measure in which it is like the Icon" (CP 2.314, 1902). The difference between "obtaining" and "conveying" information is important in this context. In contrast to an index, which does not convey information because it simply indicates, and to a symbol, which conveys no (new) information by itself because it is associated to its object by habit, which means that its object must be known in advance, an icon is a sign from which new information can be obtained by observing its form, as the example of the schematic of a metro proves, from whose observation we can obtain information about the shortest connection between two stations (see Section 5).

Since every well-formed sentence is a diagram incorporated in a symbol (the sentence itself) and since the complex syntactic symbol also contains indices, it is necessary to specify in which way icons, indices, and symbols interact in verbal language and human reasoning. In reasoning, diagrams, indices, and symbols are equally "indispensable" (CP 1.369, 1885). Any ordinary assertion can be analyzed as a complex sign conveying its message by all three types of sign. The proposition *Cain kills Abel*, discussed as a mental diagram above (see Section 6), is not only a diagram in its syntactic structure of a subject-object dyad representing the two brothers of these names; it also involves two independent icons of the category of the image, that is, mental images which we have of the two brothers: "images of two objects, one existentially connected with one member of the pair, the other with the other" (CP 2.316, 1902). Notice that these two images are not verbal, but a mental sign. Insofar as these two mental images are represented by means of words, one is a "Symbol whose meaning is 'First', and the other a Symbol whose meaning is 'Second'" (ibid.). Furthermore, if the proposition *Cain kills Abel* is interpreted as referring to the two individuals *Cain* and *Abel* from their specific biblical context, these two proper names function as indices.

More generally, there is also a correspondence between the syntactic constituents of a declarative sentence and categories of Peirce's sign trichotomy. All words of a sentence are symbols, but the main verb of the predicate is an icon, whereas the noun phrases in subject or object position are indices:

> Let us take as an example of a symbol the word "loveth". Associated with this word is an idea, which is the mental icon of one person loving another. Now we are to understand that "loveth" occurs in a sentence […]: "Ezekiel loveth Huldah". Ezekiel and Huldah must, then, be or contain indices; for without indices it is impossible to designate what one is talking about. Any mere description would leave it uncertain whether they were not mere characters in a ballad; but whether they be so or not, indices can designate them. Now the effect of the word "loveth" is that the pair of objects denoted by the pair of indices Ezekiel and Huldah is represented by the icon, or the image we have in our minds of a lover and his beloved (CP 2.295, 1893).

Linguists who reduce iconicity to "form-meaning" isomorphisms will find it difficult to make sense of Peirce's interpretation of mental images as iconic signs. Indeed, there seems to be nothing iconic in the dyad of the subject-object structure of the sentence *Cain kills Abel*, but in Peirce's semiotic linguistics, not only words and sentences, but also the concepts or mental images evoked by them are signs. The mental image evoked by a verbal symbol is an icon of the mental image in the mind of the interpreters able to interpret this symbol. In this example, the image of the biblical scene evoked by the sentence *Cain kills Abel* in the interpreters' minds is an icon of the image which the interpreters must have in their cultural memory before they can understand what the sentence means.

Elsewhere, Peirce even describes the mental image evoked in the mind of an interpreter by an utterer of a message as an icon of the mental image of this person who, as a "deliverer" of the message, "makes signals to the receiver. Some of these signs […] excite in the mind of the receiver familiar images […], that is, reminiscences of sights, sounds, feelings, tastes, smells, or other sensations, now quite detached from the original circumstances of their first occurrence. […] The deliverer is able to call up these images at will (with more or less effort) in his own mind; and he supposes the receiver can do the same. […] Not only is the outward significant word or mark a sign, but the image which it is expected to excite in the mind of the receiver will likewise be a sign – a sign by resemblance, or, as we say, an icon – of the similar image in the mind of the deliverer" (CP 3.433, 1896).

8. Language as a hybrid diagrammatic Legisign

If not only "every thought is a sign" (CP 1.538, 1903), every word, "every sentence is a symbol, every book is a symbol" (CP 4.447, 1903), "a whole literature is a sign" (Peirce 1906: 239), and even "man is a sign" (5.310, 1886), language must be a sign a fortiori, although Peirce's examples of signs do not include systems of signs but generally only complex signs and sign processes. Peirce has written some 127 papers on linguistic topics (cf. Nöth 2002a), but he has said little about language as a system, being always more interested in sign processes (processes of semiosis), i. e., in speech acts and in the cognitive processes involved in verbal thought and dialogue, than in language as a *system* or in any other sign system. Nevertheless, it is possible to derive semiotic insights into the nature of language as a system from Peirce's typology of signs.

Language is evidently a system *of* symbols: "Language and all abstracted thinking, such as belongs to minds who think in words, is of the symbolic nature" (1904: 307). However, language as a system is not a symbol itself; it is a complex diagram, more specifically a complex *rhematic iconic Legisign* (cf. CP 2.258, 1903). As must have become evident from the above study of the nature of the diagram, language as a system is first of all a diagrammatic mental icon of the way verbal thought is structured. Any grammar of a language is a diagram of the mental diagrams which its native speakers have of the way they speak, write or think verbally. Secondly, the system of language is a rheme, that is, a sign of mere possibility, neither true nor false (CP 2.258, 1903, CP 8.337, 1904); as such, language lives from its possibilities of realization; in contrast to the dicent (or dicisign) and the argument, language as a system affirms nothing and does not convey any argument. Thirdly, language consists of legisigns (or types, as introduced above, Section 3.1), signs that come to existence, whether mentally, phonetically, or in writing, only by their replicas in the form of sinsigns: "A Legisign is a law that is a Sign. This law is usually established by men. Every conventional sign is a legisign [but not conversely]. It is not a single object, but a general type which, it has been agreed, shall be significant. Every legisign signifies through an instance of its application, which may be termed a Replica of it" (CP 2.246, 1903).

What Peirce says about concepts in particular (see Section 6) is more generally also true of language as a system: the system of our language is "the living influence upon us of a diagram, or icon, with whose several parts are connected in thought an equal number of feelings or ideas" (CP 7.467, 1893). The diagram which exerts a living influence on the speakers of a language is the system of language, its grammar, morphology, and phonology, its structures, forms, and meanings, but the principle of diagrammatic thought is a more general living influence on the speakers of a language, it is the semiotic influence of structures of the human mind on its forms of representation. Unlike the formulae of algebra, the diagrams of language

are neither complete nor fully coherent; language is not a rigid but a hybrid system integrating many components and subsystems with different and mutually independent patterns of diagrammatic iconicity, which may be in conflict. Furthermore, although both language and algebra have elementary constituents that are arbitrary in themselves, that is, morphemes and the single digit numbers from 0 to 9 respectively, the number of arbitrary constituents (monomorphemic words) in language exceeds greatly the number of the elementary constituents of the system of algebra. The higher degree of diagrammaticity in algebra has the advantage of greater coherence and consistency but the disadvantage of a high error risk. Language, by contrast, with its hybrid diagrams, is less coherent, but more flexible. Stjernfelt (2000: 381) concludes in this context: "Some of the strength in natural language probably lies precisely in this: it unites freely diagrams on different levels (expression, grammar, lexical semantics of the different word classes, narratology), the relative independence of which constitutes language's plasticity".

9. The cognitive naturalness and semiotic advantages of diagrams in verbal semiosis

In continuation of his analysis of the onomatopoeic iconicity of the word *buzz* (see Section 2.2), Peirce concludes: "Thus some symbols are far superior to others in point of directness and signification" (1904: 318). This claim, that icons are not only more direct but also far superior to mere indices and symbols in language, brings us back to the initial question concerning the natural element inherent in iconic signs (see Section 3.2). An icon is superior to other signs because it represents its object more clearly than a symbol or an index; it has the quality of clearness (in German, *Anschaulichkeit*). This is so because it does not only represent its object as a mere otherness but as something whose structure it conveys simultaneously with its own structure. The greater cognitive clearness of icons makes them an appropriate tool in the teaching of new words to a language learner: "Icons […] have to be used to explain the significations of words", says Peirce and illustrates this insight as follows: "A man walking with a child points his arm up into the air and says, 'There is a balloon'. The pointing arm is an essential part of the symbol without which the latter would convey no information. But if the child asks, 'What is a balloon', and the man replies, 'It is something like a great big soap bubble', he makes the image a part of the symbol" (CP 2.293, 1903).

The clearness inherent in icons is most conspicuous in verbal diagrams. By observing a diagram, mental experiments become possible which reveal new insights concerning the object of the sign (see Section 5). Peirce illustrates the way diagrams allow mental experiments with the example of syllogistic inferencing as a kind of

seeing by diagrammatically relating the mental images of logically connected things: "A few mental experiments […] satisfy the mind that the one icon would at all times involve the other […]. In the case of a rational inference, we see, in an icon which represents the dependence of the icon of the conclusion upon the icon of the premiss, about what that class of inference is […]. A feature of the icon attracts attention, and must be justified in the inference by experiments upon icons" (CP 2.444, 1893).

The first linguist to recognize the relevance of Peirce's concept of diagram to the study of language as a system (see Section 8) was Roman Jakobson (1965: 357) in whose interpretation, there is a "'system of diagrammatization' patent and compulsory in the entire syntactic and morphological pattern of language". Based on the assumption that the system of language is a diagrammatic icon with a tendency to increase its diagrammaticity, which is compatible with the premise of the greater cognitive clearness of diagrams, Anttila (1989) and Shapiro (1991) have raised diagrammatic iconicity to a principle of linguistic evolution, which allows the explanation of specific language change. Last but not least, the principle of linguistic creativity, which accounts for the possibility of creating an unlimited number of sentences by means of a limited number of syntactic diagrams and verbal symbols, testifies to the necessity of diagrammaticity in language. Diagrams guarantee cognitive economy; without diagrams, the highly uneconomic principle of one-word-one-meaning would prevail in language.

Since "diagram" essentially means "structure" in Peirce's semiotics, diagrams in language are necessary constituents of verbal discourse: "The arrangement of the words in the sentence […] must serve as Icons, in order that the sentence may be understood. The chief need for the Icons is in order to show the Forms of synthesis of the elements of thought. For in precision of speech, Icons can represent nothing but Forms […]. That is why Diagrams are indispensable […]. For Reasoning, nay, Logic generally, hinges entirely on Forms" (CP 4.544, 1906). Verbal discourse in general is a diagram with "symbols repeated in different places and in different juxtapositions, […] the repeated signs being the words, which have relations by virtue of the meanings associated with them" (CP 3.418, 1892).

The fact that an icon represents its object by means of a quality inherent in itself, whereas the index can only *indicate* its object, and the symbol can only *describe* it in a general way accounts for its greater rhetorical and argumentative efficiency. There are two features of the diagram and the iconic sign in general which contribute to its rhetorical superiority and its capacity of giving "rhetorical evidence" (CP 2.279, c. 1895), its immediacy and its unique capacity to convey new insights by revealing "unnoticed and hidden relations among the parts" of the diagram (CP 3.363, 1885).

The information given by an icon is immediate and direct insofar as the feature that makes it an iconic sign, the characteristic which it has in common with

its object, is immediately present in the iconic sign. Remember that it is a sign "by virtue of characters which belong to it in itself as a sensible object, and which it would possess just the same were there no object in nature that it resembled, and though it never were interpreted as a sign" (CP 4.447, c. 1903). The icon is hence the only direct sign; both the index and the symbol are indirect modes of representation since the one depends on convention and habit and the other on an existential connection with its object. Icons are therefore not only more efficient but even necessary in communication, for "the only way of directly communicating an idea is by means of an icon; and every indirect method of communicating an idea must depend for its establishment upon the use of an icon" (CP 2.278, ca. 1893). Among the advantages of the use of diagrammatic icons in discourse and reasoning are greater textual and argumentative clarity and transparency, since diagrams make the line of argumentation "evident" (see below).

The unique capacity of the icon to convey new information will again be apparent from a comparison of the icon with the symbol and the index. A symbol, being a sign based on convention, learning, and habit, can only convey information of which we have previously acquired knowledge. The index can only indicate its object, but it cannot convey any information about its qualities since it "asserts nothing; it only says 'There!'" Indexical words, for example, "denote things without describing them" (CP 3.361, 1885); the fact that these signs only draw our attention to their objects without giving information about them is particularly evident in deictic words, such as *I*, *you*, *today*, or *here*. Genuine icons, by contrast, being undetermined by convention and the constraints of time and space as well as open in their interpretability, their objects being mere "possibilities" and neither (indexically represented) facts nor (symbolically represented) laws, (cf. CP 2.276, ca, 1902), allow for the discovery of new insights, principally by means of analogical reasoning: "For a great distinguishing property of the icon is that by the direct observation of it other truths concerning its object can be discovered than those which suffice to determine its construction. Thus, by means of two photographs a map can be drawn, etc." (CP 2.279, ca. 1885). This potential of icons to convey new insights by their own form accounts for the necessity of diagrams in otherwise symbolic and indexical discourse: "Given a conventional or other general sign of an object, to deduce any other truth than that which it explicitly signifies, it is necessary, in all cases, to replace that sign by an icon" (ibid.). The same advantages which icons bring to discourse are also apparent in diagrammatic mathematical formulas in which the "capacity of revealing unexpected truth is precisely that wherein the utility of algebraical formulae consists" (ibid.).

However, the iconic sign is not semiotically superior in all respects. Icons, like pictures in contrast to language, cannot affirm, deny, nor predict facts (cf. Nöth 1997). Hence, "the value of an icon consists in its exhibiting the features of a state

of things regarded as if it were purely imaginary. The value of an index is that it assures us of positive fact. The value of a symbol is that it serves to make thought and conduct rational and enables us to predict the future" (CP 4.448, 1903). The evidential superiority of the diagram in reasoning is the topic of the following excursus in Peirce's "Prolegomena for an Apology to Pragmatism":

> What is "Evidence"? It consists of the fact that the truth of the conclusion is *perceived*, in all its generality, and in the generality of the how and the why of the truth is perceived. What sort of Signs can communicate this Evidence? No index, surely, can it be; since it is by brute force that the Index thrusts its Object into the Field of Interpretation, the consciousness, as if disdaining gentle "evidence". No Symbol can do more than apply a "rule of thumb" resting as it does entirely on Habit (including under this term natural disposition); and a Habit is no evidence. I suppose it would be the general opinion of logicians, as it certainly was long mine, that the Syllogism is a Symbol, because of its Generality. But there is an inaccurate analysis and confusion of thought at the bottom of that view; for so understood it would fail to furnish Evidence. It is true that ordinary Icons, – the only class of Signs that remains for necessary inference, – merely suggest the possibility of that which they present, being percepts *minus* the insistency and percussivity of percepts. In themselves, they are mere Semes, predicating of nothing, not even so much as interrogatively. It is, therefore, a very extraordinary feature of Diagrams that they *show*, – as literally *show* as a Percept shows the Perceptual Judgment to be true, – that a consequence does follow, and more marvellous yet, that it *would* follow under all varieties of circumstances accompanying the premisses. (Peirce c. 1906: 317-318)

In sum, mental diagrams are inherent in morphology, syntax, and texts, and they are essential to the "clearness of ideas" (CP 3.456, 1897, 1897; cf. Kent 1997: 450). In rational discourse, they are necessary to give and to derive evidence. In rhetoric, icons serve to increase the persuasive force of discourse. The forms of diagrammatic iconicity mostly studied in the framework of Natural Linguistics, general linguistics, and literary studies are evidence of higher degrees of iconicity which result from the coupling of the general forms of diagrammatic iconicity in language with various kinds of more specific forms of iconicity.

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Naturalness and markedness

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The following comparison of Naturalness theory and Markedness theory contrasts naturalness scales and markedness relations and the distinct notions of value in the two theories in order to focus on recent advances in the identification of rules of naturalness syntax and markedness syntax. It is shown that whereas naturalness theory offers little basis for accounts of variation and change, key notions in markedness theory play a central role both in accounts of synchronic variation and in explanations of the initiation and actualization of change. In a concluding comparison of the two theories it is argued that Markedness theory in essential respects subsumes Naturalness theory. This explains why many linguists find the two theories kindred, and it suggests that the future will see their unification.

1. Introduction

Recent developments in Naturalness theory and in Markedness theory document a remarkable convergence between these two theoretical approaches to synchronic and diachronic linguistics and point towards a de facto unification of these theories. This is the main topic of this paper.

Any useful discussion of the concepts 'naturalness' and 'markedness' should begin by acknowledging that in casual usage the words *naturalness* (*more natural*, *less natural*) and *markedness* (*unmarked*, *marked*) – as well as *preference* (*more preferred*, *less preferred*) – may be practically synonymous. In informal usage, these words are assigned common-sense interpretations and employed in accordance with the principle of cooperation ("You accept my informal terminology, and I will accept yours"). In this usage the distinctions between the concepts is naturally blurred. Even in the technical literature on these concepts one often encounters the informal use of some of these terms side by side with the strict sense of the others – as when markedness is explicated with reference to (informally understood) naturalness (e.g. Trask 1999), or when naturalness is explicated with reference to (informally understood) markedness or simply equated with markedness

and preference (e.g. Dressler 2003, Orešnik 2001, 2004).[1] Nonetheless, *naturalness* and *markedness* are technical terms which have precise meaning within their respective theories. In those contexts they are used by linguists who are working with an explicit Naturalness or Markedness theory and are developing and testing coherent ways of describing synchronic and/or diachronic data in terms of one or the other of these theories. In this paper I aim to be consistent in observing the technical senses of these terms.

This paper is organized as follows. In Sections 2 and 3, I will contrast the main features of Naturalness theory and Markedness theory. In Section 4 I will turn to the most recent development in Naturalness theory, the contributions by Orešnik (2001, 2004), which aim to establish a syntax of naturalness values; Orešnik's findings will be compared with some well established patterns of markedness syntax. Section 5 will consider the use of naturalness and markedness in accounts of variation and change. Section 6 sums up the comparison of naturalness and markedness and shows that the phenomena Naturalness theory is intended to account for are better explained in terms of Markedness theory. Section 7 offers some concluding remarks.

2. Naturalness theory and markedness theory contrasted

2.1 Naturalness scales

In Naturalness theory all distinctions in language are viewed as scales. Entities on each scale differ in naturalness, the end points of each scale being *more natural*, respectively, *less natural*.

The terms *more natural* and less *natural* seem to imply the existence of standards of comparison: "X is more or less natural than Y"; thus Dressler (2003: 461). The theory does not define any such standards; what is actually compared are relative values on each naturalness scale, all values being understood as natural (just as on a scale from more salty to less salty all points are salty).

The terms *more natural* and *less natural* make it possible to avoid the logically contradictory terms *natural* and *unnatural*; unnatural cannot seriously be predicated of anything in a 'natural' language (though the word occurs occasionally in theoretical writings). But at the same time the predicates *more natural* and *less*

1. The practical synonymy of *naturalness*, *markedness*, and *preference* in casual usage might suggest it would be useful to discuss and contrast the three theories together. But despite some similarities which set Naturalness theory and Preference theory apart from Markedness theory, there are important differences between them which would require a separate comparison of Preference theory and Markedness theory. That may be the topic of a future paper.

natural emphasize the ideas that naturalness is relative, and that all distinctions in language are scalar, that is, logically contrary.

2.2 Markedness relations

Markedness theory, in the Prague School tradition, was concerned mainly with binary oppositions. But evidence of markedness can in fact be observed in distinctions of all types in language, contradictory, contrary, converse, and orthogonal, binary and n-ary, scalar, hierarchical, and scalar-hierarchical (cf. Lyons 1977: 270–311, Andersen 2001b: 38–47). Entities that form a binary paradigm (an opposition) have opposite markedness values. Entities that comprise a scalar paradigm (a gradation or a cline) have different degrees of markedness.

Gradations and clines are sometimes misnamed 'hierarchies'. A hierarchical paradigm can be pictured as a branching diagram with two or more tiers of binary unmarked (U) and marked (M) branches, or represented by an equivalent string of bracketed, labeled, $_{U}$ and $_{M}$ opposites, e.g. [singular$_{U}$: [plural$_{U}$: dual$_{M}$]$_{M}$]; [[east$_{U}$: west$_{M}$]$_{U}$: [north$_{U}$: south$_{M}$]$_{M}$]; …[one$_{U}$: two$_{M}$]$_{U}$: three$_{M}$]$_{U}$: four$_{M}$]$_{U}$: five$_{M}$]$_{U}$: six$_{M}$]$_{U}$ … A scalar-hierarchical paradigm such as the whole numbers combines markedness scales such as a sequence of units or a sequence of tens (where each number is unmarked in relation to the next higher one) with the hierarchical relations of units, tens, hundreds, etc. (where each rank is unmarked in relation to the next higher rank).

The terms *unmarked* and *marked* are unfortunate in that they seem to imply an exclusive relation, contradictory (as in *married*$_{U}$ vs. *unmarried*$_{M}$) or contrary (i.e. scalar, as in *happy*$_{U}$ vs. *unhappy*$_{M}$). Most theoreticians of Markedness from Jakobson (1932) to Battistella (1996) in fact have tried to explicate the unmarked vs. marked relation as a 'contradictory, but asymmetrical relation' – which is logically incoherent (contradictory relations being symmetrical). Andersen (2001b: 39–40) analyses the desperate logical straits of the explications in Jakobson ([1932] 1971b: 3, 14).

The paradox of these 'asymmetrical exclusive oppositions', in which one entity is often able to substitute for the other (e.g. *present*$_{U}$ 'historical' for *past*$_{M}$ tense, *lion*$_{U}$ for *lioness*$_{M}$) was first resolved by Hjelmslev ([1939] 1970: 87). He pointed out that such substitutions are possible when the reference potential of an unmarked entity (e.g. generic time, a lion regardless of sex) *includes* the reference potential of the marked entity (past time, female lion); as a consequence of this inclusion, an unmarked term may function as the hyperonym of its marked counterpart (e.g. *that lion is a lioness*) and substitute for it when no precision is called for (e.g. *We saw a lion with three cubs. It's quite possible you'll see lions around there*).

Hjelmslev further suggested that an exclusive opposition can be understood as an inclusive relation with some of its reference potential unutilized. Andersen (2001b: 42–45, with diagrams) develops this idea and demonstrates how logical contradiction can be understood as a special case of contrariety, and contrariety, as a special case of logical inclusion. The remarkable fact that markedness is manifested not only in logical inclusions ('present tense', *lion*), but also in exclusive oppositions, which are logically symmetrical (Lyons 1977: 308), as in the other examples above, is interpreted as evidence that all distinctions are cognized first as inclusions (e.g. y_M is a kind of x_U), and that in the life of the individual and the community, these primitive asymmetries survive any later, more precise logical analysis.

2.3 Scales and relations

The inclusive (hyponymic) character of markedness relations explains three properties they have that are important to note. First, markedness distinctions are asymmetrical. Secondly, they can be non-scalar as well as scalar, exclusive as well as inclusive. And thirdly, an unmarked term can substitute for its marked counterpart. These are key properties of markedness relations that have been known since the earliest contributions to Markedness theory (Hjelmslev 1928, 1939, Trubetzkoy 1933, 1958, Jakobson 1932, 1936), but which it has not been possible to offer an explicit, logically coherent account of till recently. The last of these properties, substitutability, is crucial for an understanding of the dynamics of linguistic variation and change. See further below (Section 5.2).

By contrast, (i) naturalness relations are allegedly all scalar; (ii) they are logically exclusive and hence symmetrical; and (iii) the only explanation for the apparent fact that in change, more natural items tend to replace less natural items is an (implicit, inherently circular) preference for whatever is labeled *more natural*. We return to this matter below (Section 6).

3. Values

3.1 Naturalness values

In language descriptions, Naturalness theory assigns naturalness scales to any and all distinctions and by this means interprets (a) relations between content (meaning) entities, (b) relations between expression (form) entities, and (c) mappings between content entities and their respective expressions.

The value 'more natural' is assigned, for instance, to greater morphosemantic transparency (compositionality), greater morphotactic transparency, the more

invariant expression, more diagrammatic constructions, and biunique signs, whereas their opposites are considered 'less natural' (Dressler 2003). Mayerthaler (1981) offers a list of naturalness scales, considerably expanded by Orešnik (2001, 2004).

A fundamental tenet of Naturalness theory is that all naturalness scales and values are founded in extralinguistic reality, the physical or cognitive substratum of language (Dressler 2003). Orešnik (2004: 14–15) offers a list of ten criteria for identifying naturalness values, including general items such as the principle of least effort (processing ease), prototypicality, cognitive simplicity, and relative frequency, several of which may be simultaneously relevant. Besides universal naturalness values the theory recognizes that naturalness values may be defined in relation to individual language types, as well as language-specific systems (Dressler 2003).

3.2 Markedness values

Markedness theory assumes that every member of a community ascribes markedness values to all the elements of the linguistic and other cultural systems that form his or her cultural competence. Specifically, in the grammar, markedness values are ascribed to paradigms of stylistic and sociolinguistic variants, to features of grammatical and lexical categories of content and of expression, and combinations of such features, as well as to the correlative environments that are referred to in rules of distribution. In addition, markedness values are assigned to diverse syntactic parameters, e.g. branching direction, as well as to co-occurring techniques of synthesis, as we shall see below.

Since markedness values are understood as cognitive relations (Section 2.2), they are not all determined by the substantive factors of language processing, but may be ascribed with varying degrees of independence of the substantive substratum of language.

Here it may be useful to recall the different origins of the naturalness and markedness concepts. Unlike Naturalness theory, which had its beginnings in a fairly concrete approach to phonology (Stampe 1972), markedness was first recognized and thematicized against the background of cultural rituals observed and described by the anthropologist Lévy-Bruhl (1910, 1922); cf. Hjelmslev (1928: 257-259). The key aspect of markedness that was first identified was that of substitution (by Lévy-Bruhl termed participation), to which we return in Section 4.2. After markedness was (re)discovered by Trubetzkoy in 1930, Jakobson (1985: 162–163) immediately saw the importance of markedness for the fields of anthropology and history of culture; he pointed to examples of change in cultural values and emphasized that individual members of a culture may differ in the values they ascribe even to such fundamental categories as life and death. "I am sure many cultural phenomena ... which at first blush may appear identical differ precisely by

the fact that what is marked in one system is evaluated as unmarked in the other" (Letter to Trubetzkoy, 26 Nov. 1930; my translation, HA). In accordance with this broad conception, the examples in Andersen (2001b: 24–35) span the gamut from ritual to literary composition to phonetic variation.

Undoubtedly, there are markedness values that are universal on every level of structure – phonology, syntax, lexicon, pragmatics, cultural values and customs. The extent to which markedness values can be freely ascribed to elements of language remains an open question. But markedness shift, a change that typically occurs during the progression of a change, is a good example of the relative freedom with which speakers assign values to linguistic elements in variation. Besides, systems may differ in the way identical categories are ranked hierarchically, alternative rankings resulting in different values. Markedness values that are not universal are presumably ascribed in the process of grammar formation (or grammar revision) on the basis of inferences from observed usage. We return to this question in Section 5.2.

Naturalness theory has made important advances in the inventorization of naturalness scales and through the distinction of universal, typological, and language-particular conditioning of naturalness values. These advances in Naturalness theory suggest how open questions regarding markedness values may be approached in the future.

4. The syntax of values

It is on the question of how values of different naturalness scales or markedness categories are combined that the two theoretical approaches have converged in recent publications. This topic deserves a somewhat detailed exposition.

4.1 'Natural' Naturalness syntax

In two recent monographs, Orešnik (2001, 2004) analyses a considerable number of concrete examples of variation and alternation in different languages and identifies regularities in the way values of different naturalness scales are combined. The 2001 volume presents 258 examples drawn from some fifty languages. The 2004 volume presents 307 examples, all but a few of them from English.

The theoretical framework differs slightly, but significantly, between the two books, but the manner of presentation is the same. Orešnik presents his generalizations as "assumptions" and then works through the examples, one by one, demonstrating that – granted specific assumptions regarding the naturalness scales

that are relevant to each example – the generalizations are borne out, justifying a final "Q.E.D."

A great strength of Orešnik's approach is its explicitness, which demands the specification of whatever naturalness scales are assumed relevant. Unfortunately the aim of providing the amplest possible exemplification has made it impossible to discuss possible alternative interpretations, which in some instances would have been desirable.

4.1.1 *The approach in Orešnik (2001)*

In Orešnik (2001: 12), the generalizations are formulated separately for content scales ("semantics"; abbreviated >sem, <sem, i.e. more natural, less natural with respect to semantic content) and expression scales ("coding"; abbreviated >sym, <sym). The chief generalizations regarding these are that in content or expression combinations, naturalness values tend to be aligned, whereas in mappings between content and expression, opposite values tend to be combined: (i) >sem tends to be associated with another >sem and <sem with another <sem; (ii) >sym tends to be associated with another >sym and <sym with another <sym; but (iii) >sem tends to be associated with <sym and <sem with >sym. Here are a few examples.

Combinations of content values. In German, attributive adjectives are inflected, predicative adjectives are not. Orešnik assumes that it is more natural for adjectives to be inflected for case than not, and more natural for adjectives to be attributive than predicative. Hence, if there is a difference between the use of inflected and uninflected adjectives in German such that one kind occurs in attributive and the other in predicative position, the assumptions predict that (1) it is the inflected use that tends to predominate in attributive position, and (2) it is the uninflected use that tends to predominate in attributive position (2001: 71). These and other naturalness scales in other examples might have to be defined in relation to system or type specific values. However, Orešnik does not make reference to these levels of grammar organization, but tacitly assumes that universal naturalness values apply everywhere.

Combinations of expression values. In French, the normal negation is *ne … pas*, but *ne* occurs in fixed expressions (as in *il n'importe* 'it does not matter'). Orešnik assumes that *ne … pas* is a more natural coding of negation than *ne*, and that nonformulaic expressions are more natural than formulaic ones. Hence, if there is any difference between the two variants of negation such that one is used in formulaic usage and the other not, (1) it is *ne … pas* that tends to be used in nonformulaic expressions, and (2) it is *ne* that tends to be used in formulaic expressions (2001: 49).

The mapping between content and expression. In English, lexical expressions like *once* and phrasal expressions like *four times* covary. Orešnik assumes that the type *four times* is more natural (because more transparent) than the type *once*, and that any low number is more natural than any nonlow number. Hence if there is any difference between low and nonlow numbers in multiplicative numerals (plicatives) such that one kind uses the pattern *four times* and the other the pattern *once*, (1) it is the nonlow numbers that tend to use the pattern *four times* and (2) it is the low numbers that tend to use to pattern *once*.

This last example is thought to illustrate iconic coding. However, this understanding of iconicity is difficult to accept. In an iconic relation one would expect an association between equal degrees of naturalness in content and expression. It seems doubtful that the assumed association of more natural content with less natural expression and vice versa would be generally valid. But valid or not, where it is found it would surely not be iconic, but counter-iconic. There will be more to say about this example in the next section.

4.1.2 *Orešnik's (2004) approach*

In Orešnik (2004) the descriptive framework has been changed somewhat. Distinct terms and abbreviations for semantic and coding scales have been abandoned; instead, all scales are termed naturalness scales (abbreviated: >nat, <nat). And at the same time, the straight, iconic mapping between content and expression just mentioned (in Section 4.1.1) has been tacitly adopted, so that it is now assumed that in all correlations between naturalness values (in content–expression mappings as well as in content–content and expression–expression syntax) >nat is associated with >nat and <nat with <nat. Orešnik justifies this move by referring to Andersen's (2001b) principle of markedness agreement, which will be described in Section 4.2. This is a significant step in the rapprochement between Naturalness and Markedness theory.

The radical change in Orešnik's view of mappings between content and expression may entail revisions of some of the 258 examples in the 2001 book. Here we will look at one example that is analysed in both volumes, the contrasting interpretations of the English plicative types *once* and *four times*. This example is instructive in several respects.

First of all, it highlights an unstated assumption behind Orešnik's analyses. In the 2001 version, the phrasal type *four times* is considered more natural (>sym) in terms of transparency. In the 2004 version, lower numerals are still more natural (>nat), but here it is the lexical type *once* that is more natural (>nat) – now by the principle of least effort. The fact that the same data are assigned different interpretations points to an implicit, overarching assumption in Orešnik's approach: synchronic states are assumed to be maximally natural. It is this assumption alone that

dictates the choice of the transparency principle in 2001 and the economy principle in 2004 for the interpretation of the given *once* vs. *four times* variation. But this assumption of maximal synchronic naturalness is hardly defensible. If every system and subsystem were indeed maximally natural, what would motivate language-internal change, or "grammar-initiated" change, as Dressler (2003) calls it?

Secondly, the revised interpretation of the example agrees poorly with recent changes and synchronic variation in modern English. The point with lexicalization is that it codifies ready-made expressions for what is frequently said. Hence, when *once* and the analogous *twice*, *thrice* were lexicalized (in Old English), the relevant naturalness correlations were presumably between the lower numbers (>nat) and synthetic, lexical expressions (*once*, *twice*, *thrice*; >nat) and of the higher numbers with analytic, phrasal expressions (*four times,* etc.; <nat). This lexicalization would be a manifestation of naturalness in terms of economy of expression – which is the scale of values Orešnik (2004) ascribes to the modern synchronic state. But the recent history of the language shows a development away from that state of affairs: *thrice* has been superseded by *three times* and *twice or thrice* by *two or three times*; synchronically, *twice* covaries with *two times*, *once or twice* with *one or two times*, and *once more* with *one more time*. If the phrasal expressions were 'less natural', why would they be innovated for the (more natural) lower plicatives, and why would they be so acceptable to the speakers of the language? On the surface of things, it might appear that the speakers are giving up economy of expression. But at the same time, the innovated phrasal expressions represent a gain in transparency. Hence, as far as universal naturalness is concerned, there is no net gain to be seen.

And so it seems that a different approach is called for. For one thing, since the variation is part of the synchronic modern state, it cannot be left out of the picture. For another, if one wishes to understand the innovations that have given rise to the contemporary variation and the direction of that variation, one needs a dynamic conception of synchrony. We return to this issue in Section 5.2.2.

4.2 Markedness syntax

The idea that there would be constraints on combinations of markedness values has emerged independently in the work of several scholars since the first definition of markedness in the 1930s. Here I will focus on two of these constraints and mention some additional correlations.

4.2.1 *Asymmetric mappings*

The first of the constraints was discovered by Brøndal (1943: 105), who termed it "compensation". Since Brøndal it has become clear that asymmetric mapping is a more

general principle, which is manifested in a number of relations in grammar, some of which are well known as syncretism, allomorphy, neutralization, and allophony.

Brøndal inferred his principle of "compensation" from mappings between content and expression: often fewer distinctions are made in a marked category than in the corresponding unmarked category. Some examples: In English personal pronouns, the 'third person'$_{U}$ distinguishes three genders in the singular$_{U}$, but none in the plural$_{M}$; the 'first person'$_{U}$ distinguishes two numbers, but the 'second person'$_{M}$ does not. (Here I assume the traditional hierarchy [third$_{U}$: [first$_{U}$: second$_{M}$]$_{M}$]; see Orešnik 2004: 16) In Russian, imperfective$_{U}$ verbs distinguish general$_{U}$ and prospective$_{M}$ (sub)aspects (traditionally 'present' and 'future' 'tenses': *rabotaj-u* 'I work, I am working' vs. *bud-u rabotat*' 'I'll work, be working'), but perfective$_{M}$ verbs do not (*po-rabotaj-u* 'I (will) work a little'). Such asymmetries often arise through observed historical developments. Thus French has a present$_{U}$ vs. imperfect$_{M}$ tense distinction which is fully productive in the indicative$_{U}$ mood, but in the subjunctive$_{M}$ is in a state of decline, the imperfect$_{M}$ being superseded by forms of the present$_{U}$ (Kragh 2006; see further Section 5.2).

Homologous asymmetries can be seen in morphology and phonology. Syncretism is more widespread in marked than in unmarked categories (e.g. fewer distinct case forms in the dual than in the plural or singular). Allomorphy is often more in evidence in unmarked than in marked categories, that is, unmarked categories are more hospitable to subsidiary lexical or grammatical indexes (e.g. Russian nouns have three declensions in the singular, but just one in the plural). Marked phonological features are typically compatible with fewer subordinate distinctions than the corresponding unmarked features (e.g. fewer nasal than oral vowels). Unmarked phonemes often display greater allophonic variation than corresponding marked phonemes. See Greenberg (1966) and the analysis in Andersen (1989: 31–38).

4.2.2 *Markedness agreement*

The principle of markedness agreement is used throughout Orešnik (2004) as the basis for combining >nat elements with >nat elements and <nat elements with <nat elements (see below). It was first described for poetic language (Jakobson 1960) and was then observed in phonology and termed markedness assimilation (Andersen 1973). It was subsequently generalized and interpreted as a cognitive preference for combinations and concatenations of elements that are homogeneous, or agree, in markedness, which is typically in evidence when category values are assigned by rule. Markedness agreement governs the structure of ritual and other customs, of narrative structure and of various poetic devices (e.g. grammatical parallelism, meter, alliteration, rime), the distribution of grammatical categories over foregrounded and backgrounded text portions and in grammatical

concord and agreement, and the distribution of morphological variants in allomorphy and of phonetic features in allophony. Its ubiquity leaves little doubt that markedness agreement is fundamental to all types of human semiotic behavior; see Andersen (2001b: 24–30, especially 29).

Markedness agreement is manifested as well in linguistic change, where the principle ensures the orderly progression of change events: innovated variants spread gradually, gaining acceptance first in environments with the same markedness value and only subsequently in environments with the opposite value. Typically, assimilatory (backgrounding, or reductive) innovations spread first to unmarked environments, whereas dissimilatory (foregrounding, or elaborative) innovations spread first to marked environments; see Andersen (2001b: 30–37, 2001c), the other contributions in Andersen (2001d), and the analyses in Andersen (2001a). The dynamic that drives such gradual developments, in which newer variants replace older variants, will be the topic of Section 5.2.

4.2.3 *Markedness reversal and Markedness complementarity*

The investigation of markedness syntax leads to the identification of occasional examples in which normal markedness values are reversed, for instance, in a category that is combined with the marked term of a superordinate category. One also finds examples that appear to breach the principle of markedness agreement by showing a concatenation of elements of opposite markedness value. In the interest of brevity, these will not be discussed here. For some discussion and references, see Battistella (1996), Orešnik (2004: 19).

5. Variation and change

5.1 Naturalness: static systems and diachronic correspondences

Orešnik's account of the English plicatives (Section 4.1) brings to mind a major criticism that was raised against Saussure's static conception of synchrony. This was one of several aspects of his theory that were early rejected by the Prague School. As Jakobson ([1929] 1971: 19) pointed out, a synchronic description cannot ignore changes that are in progress in a language, for as a change proceeds, its intermediate stages are part and parcel of the language as variants with different stylistic or social value. Thus, variation is an essential element both of diachronic change and of synchronic states. To acknowledge this fact, one needs a dynamic conception of synchrony, and one needs to include in any synchronic description whatever variation is observed.

So far synchronic variation has not been a major concern of Naturalness theory. The recent account of Naturalness theory in Dressler (2003), for example, makes no mention of variation at all. The reason for this may be a superficial, expository one such as a need to conserve space, but it may also have to do with the fact that the very existence of variation conflicts with one of the central principles of naturalness, the 'one meaning–one form' principle. Be this as it may, all change in the perspective of Dressler (2003), regardless of its motivation, is spoken of without reference to intermediate stages, as simple diachronic correspondences between different language states.

On the other hand, Naturalness theory has formed an explicit understanding of the different levels of structuring in language by relativizing the concept of naturalness in the notions of system-defined, type-defined, and universal naturalness. In Dressler's formulation, type-specific Naturalness acts "as a filter and elaboration on universal Naturalness", and system-specific Naturalness acts "as a filter and elaboration on" type-specific Naturalness. "In this way, each lower level filter can specify and even overturn preferences of the preceding higher-order level" (2003: 469).

This understanding has its roots in twentieth-century structuralism. Sapir (1921: 122) distinguished between the language system and its groundplan or type. Coseriu (1968) formed a more articulate conception of levels of structuring, distinguishing the norms, the functional system, and the type of a language, and he explained how, in system-motivated changes the norms gradually come to embody the productive rules of the system, and in type-motivated changes the system comes to conform ever more consistently to the structuring principles of its type. These concepts are essential to a Markedness-theoretic account of variation and change.

5.2 Markedness: actuation and actualization

In a Markedness theory of variation, change is initiated (actuated) when an innovated form is introduced into speech and enters into variation with an existing form, that is, becomes a member of a paradigm of variants; change is actualized through the adoption of the innovation by increasing numbers of speakers and by its gradual extension to ever more environments and the complementary curtailment of the inherited form in one environment after another.[2]

The key notion in a markedness account of variation and change is substitution, for from its initiation to its completion, a change consists in the gradual,

2. In the limiting case of a neologism for a new concept, the new expression is integrated in a lexical paradigm and can be said to enter into a paradigm of variants only in the sense that it is distinct from a possible paraphrase.

orderly substitution of an innovated form for an inherited one. Let us consider two simple examples.

5.2.1 *A system-motivated change*

In an example such as Eng. *weav-ed ~ wove*, the formation *weav-ed* is formed according to the productive rules of the system and hence is unmarked, from a morphological point of view, as it has been since the first time it was produced. The traditional *wove* with its irregular stem and zero tense suffix is marked. The innovated formation, being unmarked, will be accepted earlier in new senses (where it does not substitute for the inherited form) than in received ones, earlier in the speech of younger than older speakers, earlier in speech than in writing, earlier in informal than in formal speech and writing, earlier in prose than in poetry, etc. and in the normal course of events will spread from these to the corresponding marked categories of usage; cf. Andersen (2001b: 30–37, 2001c).

The generalization of *weav-ed* is not guaranteed, however. It depends on the values ascribed to the variants in the norms of usage. The deviant, innovative form might at first be marked in relation to the accustomed, received one. As its novelty wears off it may be evaluated as unmarked (a markedness shift) by more and more speakers and allowed to completely supersede the received form, as has happened with *strived* for *strove*, *thrived* for *throve*, and earlier with *helped* for *holp* and with other originally strong verbs. But if enough speakers adhere to the received norms and continue to evaluate the traditional form *wove* as norm-wise unmarked and the innovation *weav-ed* as marked, the innovation, despite its clear motivation in the productive rules, will not be generally adopted, and the initiated change will be either arrested or reversed. If it is arrested, the two variants may become frozen in distinct stylistic usages or lexicalized in distinct functions (cf. *AHD*, s.v.); if it is reversed, future generations will have only textual (including dictionary) evidence of a stylistic variation that existed for some time.

5.2.2 *A type-motivated change*

In the examples *thrice* > *three times*, *twice ~ two times*, and *once ~ one time*, the situation is different. First of all, here we are not dealing with irregular and regular morphological formations, but with expressions that represent distinct techniques of formation, viz. fusion and analysis. Secondly, there has never been a time when both these formations were not in use for the low plicatives, as they are to this day whenever *times* is modified: *three additional times*, *two separate times*, *one other time*. In other words, the recent change does not consist in the creation and extension of a new variant, but in the curtailment and eventual loss of an inherited one. It would be more accurate to write it as (*three times ~ thrice*) > *three times*.

As mentioned in Section 4.1.2, Orešnik (2004) considers the lexical expression in *once*, *twice* more natural (because it correlates with the low plicatives). But to capture both the creation of the lexical formations in Old English and their gradual demise, which can be observed in the modern variation, the language historian will surely relate it to the typological shift in the language from synthetic to analytic. Thus in Old English, the adverbial use of the flective genitive of 'one' was lexicalized and extended to 'two' and 'three' except where a noun phrase with *time* had to be used. But as the ancient values of the synthetic$_{U}$ and analytic$_{M}$ techniques of expression changed to analytic$_{U}$ and synthetic$_{M}$, *thrice*, *twice*, *once* became marked in relation to *three times*, *two times*, *one time*, and the unmarked plicative variants were made to substitute for the marked ones in one environment after another. The change has run its course with *thrice* and is evidently getting under way with *twice* and *once*.

This is a change of a common type, which I have called *paradigm reduction*. In a change of this kind, a paradigm (here of expression variants) is reduced to a single, unmarked term, typically in a marked (simultaneous or contiguous) environment, in accordance with Brøndal's principle of compensation (see Section 4.2). In the case of the plicatives, one would expect to see the marked (lexical) variants eliminated in the order *thrice*, *twice*, *once*, that is, following the relative markedness of the numerals … [one$_{U}$: two$_{M}$]$_{U}$: three$_{M}$ …, as appears to be the case. Another example of paradigm reduction is the loss of the imperfect subjunctive in French, mentioned in Section 4.2, in which a grammatical paradigm is reduced. For some more examples of paradigm reduction, see Andersen 2006a, 2006b, 2007.

Orešnik (2001: 18) explicitly declines to consider historical explanations. But the relevance of this change to Orešnik's account of the modern synchronic state is not that one needs to know the history of the language to describe it, but that when one integrates synchronic variation into a synchronic description, the nature of the variation may indicate clearly, as in this example, which variant is unmarked and on its way in, and which is marked and on its way out. In a Markedness-theoretic description there would be no doubt about the relevance of this sort of information.

6. Naturalness as a kind of markedness

We can now return to the comparison between naturalness and markedness that was begun in Section 2 to see in what sense Markedness theory appears to account better than Naturalness theory for phenomena that are central to linguistic synchrony and diachrony.

Table 1. Different views of the logical relations observed in language

The tradition	**Andersen (2001b: 47)**
I. Inclusion	I. Inclusion
II. Exclusion	A. Contrariety
A. Contrariety	1. Contradiction
B. Contradiction	a. Conversion
C. Conversion	

6.1 Naturalness scales vs. Markedness relations

Consider first the fact that Naturalness theory holds that all linguistic distinctions are scales. Whatever the origin of this idea, it is clearly not derived from a careful examination of the types of relations that are actually to be observed in language, nor from the works of scholars who have studied these, e.g. Lyons (1977).

Markedness theory by contrast recognizes the actual panoply of observable relations in language and has developed an understanding of them which includes scales. At the same time Markedness theory explains why a variety of relations appear to be easily accommodated by the alleged scales of Naturalness theory even though there is no sliding or step-wise scale, say, between *male* and *female* (contradictories), *parent* and *child* (converses), or *north* and *south* (antipodal). The reason for this is that all such relations can be conceptualized as varieties of contraries with virtual (unrealized) intermediate areas or steps. The exposition in Andersen (2001b) shows that a converse relation is a variety of contradiction, a contradiction a variety of contrariety, and a contrariety a variety of inclusion. This is tantamount to a revision of the traditional classification of these logical relations; see Table 1.

Since nothing prevents degrees of markedness from being ascribed to entities on a scale, and markedness values can be ascribed to contradictory and converse opposites as well, it follows that markedness is a more general concept than naturalness. It subsumes it.

6.2 Symmetry vs. asymmetry

Naturalness theory assumes that linguistic relations are asymmetrical, so that any entity with the predicate more natural will be valued more highly than any less natural entity on the same scale. The theory does not explain where this assumed asymmetry comes from. It is not to be seen in the logical relation between more natural and less natural, for if this is a scalar, contrary relation, it is logically symmetrical. One might suppose that the asymmetry resides in the positive connotations of the lexeme *natural*. But *natural* is merely a metalinguistic cover

term for a variety of real relations in language, and it would be a mistake to take this term too literally, for in the final analysis it might then be found to be meaningless. The difficulty with naturalness scales arises from the logical relations they manifest, which are at variance with what the theory claims.

This is where Markedness theory provides a superior conceptual tool, for asymmetry is inherent in the relation of inclusion, and the cognitive primacy of inclusion entails a principled explanation of the observed fact that asymmetrical values are ascribed also to exclusive relations in language. In fact, it explains why naturalness theoreticians (like some earlier markedness theoreticians; cf. Section 2.2) have thought that a logically symmetrical relation (here the contrariety of scales) could be asymmetrical. By clearing up a conceptual conflict that cannot be resolved within Naturalness theory, Markedness theory proves superior to Naturalness theory.

6.3 Asymmetry and substitution

Finally, as was shown in Section 5.2, the concept that is key to an understanding of the initiation and actualization of change is substitution. The entire course of a typical change consists in an innovated expression gradually substituting for an inherited one in all the contexts in which it can occur, at first encroaching on it and in the end superseding it. There is no corresponding notion in Naturalness theory.

Substitution is the aspect of markedness that was first recognized by Lévy-Bruhl (1910, 1922), who observed what he called the "participation" of certain (unmarked) elements in the function proper to their (marked) opposites. Markedness theory explicates this substitution by clarifying that the greater extension or functional potential of an unmarked term can include that of the corresponding marked term; cf. Andersen (2001c).

7. Conclusion

The comparison between Naturalness theory and Markedness theory that has been made in the preceding pages points up some serious inadequacies of Naturalness theory such as this is presented in the most recent technical literature.

Naturalness theory's odd idea that all linguistic relations are scales makes it impossible for the linguist who applies this theory to attain descriptive adequacy in the face of the actual variety of, say, semantic relations. This may seem a minor point, but precisely by imputing the symmetry of scales to all relations in language the theory is a severe handicap in accounts of both synchrony and diachrony: it leads the practitioner to produce static descriptive statements of synchronic

language data and static statements of correspondences in diachrony. This is equally evident in Orešnik's (2001, 2004) numerous examples of synchronic variation and in Dressler's (2003) explanation of the effects of type-specific and system-specific naturalness values relative to universal naturalness values. By denying the existence of asymmetric relations – which include hyponymy – Naturalness theory is unable to describe the typical dynamic relation between incoming and outgoing synchronic variants, let alone the dynamic relation of substitution without which no variation could arise or eventuate in change.

On the other hand, despite these limitations, scholars working within the naturalness framework have made significant advances in identifying and inventorizing naturalness scales and in demonstrating that naturalness values are not simply universal, but in any language may be defined in relation to traditionally established balanced structural patterns on the levels of type or system. It is only fair to acknowledge the results that have been achieved by scholars working with this theory and the extent to which its predictions have been subjected to empirical testing (Andersen 2005 163).

Despite their considerable differences, which have been detailed in the preceding pages, Naturalness theory and Markedness theory share the important aim of subsuming the multifarious substantive relations in language under a single value paradigm, naturalness and markedness respectively.[3] Undoubtedly this explains why many linguists find the two terms interchangeable. The recent advances in the study of value syntax made by the Slovenian naturalness group under the leadership of Orešnik demonstrate that linguists working with naturalness and markedness concepts define similar goals and achieve comparable results. This is a good indication that in time these two theories can be unified.

3. In a recent publication Haspelmath (2006) surveys various technical and informal uses of the word *markedness*. He finds no unifying concept of 'markedness' behind them, but instead sees several disparate explanatory parameters. In the absence of a clearly discernible concept 'markedness' he concludes that the term can be dispensed with. His proposal to replace the single, seemingly elusive explanans with multiple explanantia (praeter necessitatem) is not really consistent with the aims of science. Andersen (2001b) separates (i) the purely lexicographic project of recording the numerous terminological and non-terminological uses of the word markedness (23) from (ii) the analytic issue of identifying the cognitive basis for the many analogous instantiations of 'markedness' at all levels of cultural and grammatical structure (24–47), and concludes (iii) that both in synchrony and in diachrony it is essential to distinguish between the explanatory, cognitive relation termed markedness and its diverse kinds of substantive manifestation (47–51).

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Natural and unnatural sound patterns

A pocket field guide

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Natural sound patterns are those grounded in physical properties of speech, while unnatural sound patterns arguably have no such physical basis. This study provides a brief history of the study of natural and unnatural sound patterns from antiquity forward. Definitions of natural and unnatural sound patterns are examined in a range of frameworks, and as applied to both synchronic and diachronic phonology. Examples of natural and unnatural sound patterns are provided, with attempts to move beyond linguistic intuitions by providing documentation from phonetic research, psycholinguistics, and laboratory phonology of the types of sound patterns grounded in physical properties of speech. A final issue discussed is the logic and empirical basis for encoding naturalness in synchronic grammars. Many common and recurrent sound patterns can be explained in terms of the way humans articulate and perceive speech, but phonetic explanation should be properly segregated from grammatical description and analysis.

1. Introduction: the study of sound patterns

Phonology is the study of sound patterns of spoken human languages. In all spoken languages it is possible to discover sound patterns that characterize the form and content of words and phrases. These patterns can be divided into three basic types: patterns in contrastive sound inventories, also known as *contrasts*; patterns in the static distribution of sounds, also known as *phonotactics*; and patterns defined by the variable realization of sounds in different contexts, also known as *alternations*. Synchronic phonology investigates systems of contrasts, phonotactics and alternations at a particular point in time, while historical or diachronic phonology concerns itself with changes in these sound patterns over time.

In addition to classifying sound patterns by basic type, phonologists continue to recognize *natural* sound patterns in contrast to *unnatural* ones. Though the

term 'natural' has come to mean many different things to modern phonologists, there is general agreement that 'natural' sound patterns include those grounded in physical properties of speech, where physical properties of speech include articulation and perception. Extensions of this narrow definition are considered in section 2.1, with examples of natural sound patterns provided in 2.2. Since unnatural sound patterns are those which are not natural, identifying them will depend on how natural sound patterns are defined. Definitions and examples of unnatural sound patterns are provided in section 3. Sections 2 and 3 are meant as a brief field guide for linguists interested in identifying sound patterns as natural or unnatural. Though individuals will have divergent intuitions about the types of sound patterns grounded in physical properties of speech, there is now a wealth of documentation from phonetic research, psycholinguistics, and laboratory phonology to support or refute these intuitions.

While recognizing natural sound patterns provides firm phonetic explanations for many of the most common recurrent phonological features of the world's languages, a question that arises is whether naturalness should play a role in synchronic and/or diachronic grammatical descriptions. While most modern grammatical frameworks that address this question (e.g. Generative Phonology, Natural Phonology, Optimality Theory) answer in the affirmative, traditional diachronic approaches answer tacitly in the negative. Anderson's (1985: 346) cogent remarks on this topic are taken up in section 4, where the logic and empirical motivation of encoding naturalness in synchronic grammars is called into question. Before turning to definitions and examples of natural sound patterns, unnatural sound patterns, and the problems inherent in their grammatical encoding, a summary of treatments of natural sound patterns in the world's major linguistic traditions from earliest historical sources to the present is presented below. This bird's-eye view of the field is meant to provide the reader with an inventory of potential precursors to modern notions of naturalness, and to foster renewed appreciation of the ancient heritage of natural approaches in the study of sound patterns.

Phonology is a relatively old science, and systematic study of sound patterns is found in a part of ancient Indic, European, Chinese and Arabic traditions. The work of Pānini (c. 520-460 BCE) is known for its implicit recognition of Sanskrit phonemes, natural classes, and alternations. More explicit phonological categories are described for Ancient Greek in the work of Dionysios Thrax (170-90 BCE). Around the same time, the Tamil grammar *Tolkāppiyam* appeared, which included consonants and vowels as explicit phonological categories, contained detailed discussion of alternations, and even devoted a chapter, 'Mozhi Marabu', to phonotactic restrictions. During the Han Dynasty, Cheng Hsuan (127-200) recognized systematic differences in sound patterns between ancient and modern Chinese, and Sibawayh's treatise on Arabic, *Al-Kitab* (ca. 800 CE), covers phonological contrasts,

phonotactic generalizations, and regular consonant and vowel alternations. However, it is only beginning with this last author that an explicit relationship is defined between sound patterns and properties of the natural world.

Sibawayh proposes a clear causal relationship between sound patterns and their natural phonetic basis. Rules of assimilation, weakening and elision are consistently attributed to ease of articulation and economy of effort (cf. modern notions, as in Lindblom 1983, 1990). In some cases, the natural explanation is extremely precise. In describing cases of total consonant assimilation in which a sequence of two distinct consonants is realized as a geminate, Sibawayh remarks that "speakers find it easier to execute only one action of the tongue to produce the two identical segments" (vol. 3: 530).[1] The realization of *h* followed by a voiced pharyngeal as a voiceless geminate pharyngeal rather than as a voiced one, is attributed to the fact that voiceless consonants are easier to articulate than their voiced counterparts (vol. 4: 450, Al-Nassir 1993: 64-65). These and many other descriptions allow us to view Sibawayh as one of the first 'natural' phonologists, where the natural sound patterns he analyses are those with phonetic motivation, grounded in the way humans produce and perceive speech.

Another major figure in the world history of natural sound patterns is Korean King Sejong (1397-1450), fourth king of the Joseon Dynasty. After sending his advisors many times to study with a greatly respected Chinese phonetician, King Sejong presented a phonetically-based alphabet to the Korean people in 1446. This alphabet, now known as 'Hangul' is phonemic, representing only the contrastive sounds of the Korean language. At the same time, it is clearly based on principles of articulatory phonetics, so that point of articulation and laryngeal mechanism are represented as features of consonant sounds. An interesting aspect of this invention was the King's belief, ultimately supported by subsequent generations of literate Koreans, that a natural phonetically-based system would be easier for people to learn than alternative writing systems. In this way, King Sejong might be one of the first scholars to associate phonological naturalness with ease of acquisition (for more on this association see Section 2.1.).

While Sibawayh and King Sejong provided natural accounts of synchronic sound patterns, by the 16th century, similar views of naturalness were associated with sound change as well. Chén Dì (1541-1617) discovered that regular sound change was responsible for the systematic differences in Chinese pronunciation noted by Cheng Hsuan over a thousand years earlier, and proclaimed: "It is a natural principle that the script and the sounds of language differ according to time and place".[2] Soon to follow were the early works on Indo-European sound

1. This quote is taken from Al-Nassir (1993: 58).

2. This quote is taken from Norman (1988: 42).

correspondences, culminating in the 'phonetic rules' or 'sound laws' of the 19th century comparative tradition. The naturalness of these laws was assumed by most, but explicitly detailed in the work of von Raumer (1856), the Neogrammarians (e.g. Verner 1875, Brugmann 1876, Paul 1880, and Sievers 1901), as well as Baudouin de Courtenay (1895, 1910 [1972]) of the Kazan School. While the major focus was on natural articulatory explanations, perception was also occasionally mentioned (e.g. von Raumer 1856), with Baudouin (1910 [1972]: 267-68) suggesting misperception as an additional source of natural sound change.

A contributing factor to the flurry of references to naturalness in mid-to-late 19th century phonology was cross-fertilization between the linguistic sciences and the natural sciences. Lyell's *Principles of Geology* (1830), *Geological Evidences of the Antiquity of Man* (1863), and Darwin's *The Origin of Species* (1859) and *The Descent of Man and Selection in Relation to Sex* (1871) appeared during this time. These works are notable, not only for their contemporary influence, but also for the fact that they contain analogies to linguistic theories of the time (Alter 1999). In this context, the wide range of references in the opposite direction, is, perhaps, not so remarkable, but a few are worth mentioning in the context of the 19th century authors mentioned above. Consider von Raumer's (1856) title: "Die sprachgeschichtliche Umwandlung und die naturgeschichtliche Bestimmung der Laute" (Linguistic-historical change and the natural-historical definition of sounds). Also noteworthy is Paul's (1880) account of sound change as a function of natural variation in articulation inherent to human speech, modified by natural selection or purposiveness: "Purposiveness (Germ. *der Zweck*) plays the same role as that which Darwin attributed to it in organic nature" (Paul 1880: 32 [Weinreich et al. 1968, 110]), with the direction of sound change due to the fact that it "in some respect *suits* the organs of the speaker *better*" (Weinreich et al. 1968: 111).

The view of sound change, and language evolution more generally, as a natural process continued into the 20th century. Martinet's (1960/1964: 167) position is not so different from that of Sibawayh: "Linguistic evolution may be regarded as governed by the permanent conflict between man's communicative needs and his tendency to reduce to a minimum his mental and physical activity". Similar views of sound change as phonetically motivated were expressed by the American descriptivists, including Bloomfield (1933: 346ff.) and Hockett (1965). However, the study of synchronic phonology in the 20th century, both in Europe and America, was, in many ways, curiously removed from an interest in what sound patterns are phonetically natural, and why.[3] Explicit rejection of a natural basis of phonology is found in the work of Hjelmslev (e.g. Hjelmslev and Uldall 1935), while the Prague

3. For a detailed account of phonology in the 20th century, see Anderson (1985). Anderson's central discussion of naturalness is on pp. 342–347.

school made a distinction between 'natural markedness' and 'logical markedness' (or 'markedness' for short), with most energy invested in the study of the latter.[4] Many American descriptivists and early generativists omit references to naturalness in their attempts to outline general 'discovery procedures' and formal properties of grammars. While terms like 'natural class' are suggestive, they involve formal definitions removed from phonetic content. In Halle's (1962, 1964) system, fewer features characterize more general natural classes than less general ones, while later definitions count two or more segments as a natural class if fewer features are required to specify the class than to specify any one member of the class (Hyman 1975: 139). The *Sound Pattern of English* (Chomsky and Halle 1968) does include a final chapter taking stock of the fact that the theory, as it stands, makes no formal contrast between natural and unnatural phonologies, and suggests a theory of markedness to remedy this.[5] However, as with Prague school markedness, markedness theory took on a life of its own, and was formally dissociated from naturalness in the phonetic sense.[6]

Two 20th century schools of phonology, however, maintained a serious interest in natural phonetic foundations, and can be seen as catalysts of renewed interest in natural sound patterns in the 21st century. One is the aptly named 'Natural Phonology', first formulated by David Stampe in the late 1960s as a direct response to inattention to naturalness within the generative tradition (Stampe 1973).[7] While the demarcation of natural processes was quite specific (see Section 2), their basis

4. These two types of markedness are defined in Trubetzkoy (1939). Natural markedness is assigned to the member of an opposition instantiating the privative phonetic feature in question. Logical markedness, or, more commonly 'markedness', is a relation determined by aspects of a phonological system. One and the same segment may be naturally marked with respect to a feature in one opposition, and logically marked or unmarked for the same feature. For example, if we assume privative voicing, then voiced obstruents will be naturally marked in contrast to voiceless ones. Voiced obstruents will also be logically marked in languages where obstruents neutralize to voiceless in word-final position. But in a language where there is intervocalic neutralization of obstruents to the voiced series, a voiced obstruent will be naturally marked, but logically unmarked in intervocalic position.

5. See Hyman (1975), Chapter 5 'Phonological Naturalness' for a clear exposition of how SPE markedness theory is structured to account for natural and unnatural sound patterns.

6. This is true of many Optimality conceptions of markedness as well, including De Lacy (2006). In this defense of markedness, in over 400 pages, there is no discussion of naturalness *per se*. Natural explanations, where alluded to, are termed 'performance factors' (e.g. p. 351), and are seen as irrelevant (see footnote 16). See Haspelmath (2006) for general arguments against markedness as it is used in linguistic theory.

7. Studies in Natural Phonology include Bruck et al. (1974), Stampe (1979), Donegan and Stampe (1979), and Hurch and Rhodes (1996). The first and last references are edited volumes, and include contributors from North America, Europe and other parts of the world.

in phonetic naturalness and claimed universality have lead many researchers in modern Grounded Phonology (Archangeli and Pulleyblank 1994) and Optimality Theory (Prince and Smolensky 1993, Kager 1999, McCarthy 2002) to refer to Natural Phonology as a forerunner in these areas.[8] A distinct line of research which gathered momentum during the same period was Ohala's school of Experimental (or Laboratory) Phonology. Here, the primary focus of research was, and continues to be, underlying phonetic explanations of recurrent sound patterns (see, e.g., Ohala 1971, 1974, 1975, Ohala and Lorentz 1977, Ohala 1981, 1983).[9] Building on the Neogrammarian view, Ohala and colleagues use the laboratory to test concrete hypotheses regarding natural perceptual, acoustic, and aerodynamic bases of regular sound change. This research paradigm has been central to work in phonetically-based phonology (Hayes et al. 2004a), especially Evolutionary Phonology (Blevins and Garrett 1998, Blevins 2004, 2006, 2006b), whose primary goal is explanation of recurrent sound patterns in the world's languages.

All languages have sound patterns that are described as 'natural', and others described as 'unnatural'. What do these terms mean, and what is the most useful way of defining naturalness in reference to sound patterns? In the remainder of this study, I present concrete definitions of natural and unnatural sound patterns as these terms have been used in the modern phonological literature, and provide examples of sound patterns illustrating the proposed categories. Section 4 discusses the most common explanations for the existence of both natural and unnatural sound patterns in spoken human languages, and a brief critique of theories that insist that naturalness should be encoded in phonological grammars.

2. Natural sound patterns

2.1 What are natural sound patterns?

The overview above has already provided one concrete and commonly assumed definition of natural sound patterns. *Natural sound patterns are sound patterns grounded in articulatory and perceptual properties of speech*. Typically, this means that sound patterns can be explained with reference to articulatory and perceptual properties of speech; not predicted, but understood with reference to concrete

8. McCarthy (2002: 51), for example, remarks that "OT has closer affinities to Natural Phonology than to SPE".

9. The work of Lindblom and colleagues should also be mentioned in this context. Where Ohala's attention focused on local sound change and sound patterns, Lindblom explored system-wide properties and their phonetic bases (e.g. Liljencrants and Lindblom 1972, Lindblom 1986, 1990).

aspects of speech production and perception. Naturalness, in this sense, can be applied to synchronic contrasts, phonotactics, and alternations, as well as to sound change. The definition above is the most common one found in the phonology literature, and the one adopted here. The following paragraphs briefly review differences between this and other definitions, and highlight reasons for adopting it.

A slight difference between the definition of naturalness above, and that proposed by, for example, Ohala (1974), is that there is no claim that the articulatory and perceptual properties of speech must be universal. The majority of fundamental results in this area are universal, but we can imagine otherwise. Consider, for example, the fact that in the majority of Australian languages, there are no contrastive fricative sounds. The most common contrastive fricatives in the world's languages are sibilants, and one might set out to explain why it is that no Australian Aboriginal language has contrastive sibilants.[10] An explanation for this has been tentatively suggested by Butcher (2006: 206-208), and while it must be viewed as a tentative hypothesis, I raise it as an example of a *natural*, but *non-universal*, account of a recurrent sound pattern. Butcher notes that nearly all Aboriginal children develop *chronic otitis media* (COM), a middle ear infection, within a few weeks of birth, and that, as a consequence, up to 70% of Aboriginal children have significant conductive hearing loss. While this loss is mostly in the sub-500 Hz range, it can also occur at higher frequencies, above 4000 Hz. Since the perception of fricative noise in sibilants requires attention to high frequency noise, Butcher hypothesizes that the absence of fricative/stop contrasts may be due to the fact that many Aborigines cannot perceive high frequencies due to COM. The hypothesis in question proposes a natural explanation for the absence of sibilant/stop contrasts in Australian Aboriginal languages, as defined above, since the explanation is grounded in aspects of speech perception. However, in this particular case, the perceptual property referred to is not a universal one, but a natural pathological one.[11]

A second and more subtle reason to exclude 'universal' from the definition of naturalness is the potential self-feeding nature of articulation and perception in

10. The only indigenous languages of Australia with sibilants /s/ and /z/ are those of the Torres Straits, but these are Papuan languages. The most common fricatives in Australian languages are voiced, lenis /β/, /ɤ/ and /ð/ which do not have the intense high frequency noise typical of sibilants.

11. Proto-Pama-Nyungan did not contain sibilants, so Butcher's proposal for Pama-Nyungan languages is meant to account for their failure to develop sibilants over several thousand years. If high rates of chronic otitis media are associated with European contact of only the past several hundred years, then the explanation fails. Nevertheless, the thought experiment is useful, and leads to consideration of the natural systems which evolve when hearing is absent altogether: the sign languages of the deaf. For remarks on their natural phonology in contrast to that of spoken languages, see Blevins (2004, 301–304).

the course of language acquisition. There is extensive research demonstrating that learning a language results in language-specific perceptual biases (Mielke 2003), and that such biases appear early on (e.g., Polka and Werker 1994). Mielke (2003) shows that universal as well as language-specific factors contribute to differential perception of /h/ by Turkish, Arabic, English, and French speakers. French speakers, who have little native experience in distinguishing /h/ from other sounds fare the worst. Consider now how this perceptual deficit my play a role in the course of language acquisition. If a natural sound change like *s > h (Ohala 1974: 267, Ferguson 1990) is in progress, French learners might fail to perceive [h]s, with the historic record showing a seemingly *unnatural* one-step *s > zero change. In fact, *s-loss or desibilization (preceding consonants) has occurred in many dialects of French (Hall 1949, Map 8), providing a potential instance of self-feeding perception in the course of acquisition. In sum, following suggestions of Dressler (1998: 47), Hume and Johnson (2001), and Blevins (2004), a perception-production feedback loop in the course of language acquisition may result in language-specific aspects of articulation or perception playing an active role in sound change, which in turn gives rise to natural sound patterns.[12]

Other uses of the term 'natural' move beyond the physiology of speech to other linguistic domains. Donegan and Stampe (1979: 168-169) define the common ground of theories of Natural Phonology as "the basic thesis that phonological systems are phonetically motivated". However, from this starting point, they make an unwarranted leap by assuming that sound patterns in children's speech, which may differ significantly from adults, reflect *universal natural phonological processes* (also visible in synchronic natural alternations, and regular sound change), which may later be inhibited in the course of language development (ibid.: 130-131). Three major objections to this point of view have been raised, beginning with Dressler (1974), continued in subsequent work in child language phonology (Locke 1983, Vihman 1996), and further elaborated in Dressler (1998: 47-50) and Blevins (2004: 227-232). The first problem with equating sound patterns in child speech to natural (adult) phonology is that many aspects of early pronunciation are due to the immature state of the articulators and undeveloped patterns of coordination among them. Given this, these aspects of articulation should be viewed as real performance problems, independent of phonological competence. A second observation that undermines the Natural Phonology position is that many common sound patterns in children's speech (e.g. context-free cluster reduction; fricatives produced as stops; total consonant harmony) are unattested or rare as sound changes or regular alternations in adult phonologies. A third finding complicating the 'natural' view of child phonology is the discovery of covert contrasts:

12. For simulations making use of this feedback loop, see Wedel (2007).

children make their own recognizable contrasts, but adults of the same speech community are not aware of these (Scobbie et al. 2000). A final piece of evidence against the universal naturalness of child phonology is that children have distinct individual strategies for overcoming their pronunciation difficulties, resulting in individual patterns which contradict others, like devoicing for one child, and voicing for another (Dressler 1974: 101, with reference to Smith 1973: 31). Much of child phonology, then, represents adult speech, transmogrified by articulatory development, where this transmogrification bears no clear relation to natural processes in adult or historical grammars.

An additional claim made by Natural Phonology as detailed in Donegan and Stampe (1979), is that there are only three types of natural phonological processes: fortition processes, lenition processes, and prosodic processes. The original idea was clearly to link this restricted typology with the functional view of sound patterns as natural outcomes of the competing forces of perceptual contrast and articulatory inertia. However, the typology is too restrictive, leaving no room for natural processes with perceptual bases, like those studied by Ohala and colleagues in the work noted above, or the perceptual metatheses detailed in Blevins and Garrett (1998, 2004).

A final association made in Natural Phonology, and carried over to Natural Generative Phonology (e.g. Vennemann 1971, Hooper 1976), is that natural processes in synchronic grammars (phonetically conditioned rules, or P-rules in Natural Generative Phonology) are automatic, insuppressible and exceptionless. At the same time, there is recognition that natural processes may be variable, and that variability may be associated with emerging sound patterns that are not yet established (Donegan and Stampe 1979: 140, Hooper 1976: 14). While the majority of automatic, exceptionless sound patterns in the world's languages are natural in the sense defined above, there are also exceptionless sound patterns that are arguably not natural. Consider sandhi epenthesis of [ɻ] in coda r-less dialects of English (e.g., *Rosa [ɻ] is coming. Law[ɻ] and order*, etc.). Though some have argued that the distribution of this segment can be viewed as 'natural' in the phonotactic sense of supplying a consonantal onset to a following vowel-initial word, the segmental content of the inserted consonant is an accident of history (Blevins 2004: 252-53), as is generally the case with similar patterns of regular consonant epenthesis in the world's languages (Blevins 2008). In addition, it is possible to find natural phonetically motivated sound patterns which, superficially, appear to be exceptional. These are sound patterns with highly restricted language-internal distributions, as in the case of the total assimilation of /l/ of the Arabic definite article /ʔal/ with a following coronal consonant (Blevins 2004: 253-254). The fact that this assimilation is restricted to this particular clitic domain suggests, not that it is unnatural, but that the natural prosodic conditioning factors specific to this change are only

found in this particular prosodic environment.[13] Evaluating naturalness, then, requires not only a detailed understanding of the segmental phonology of a language, but an understanding of its prosodic phonology as well.

In sum, a long tradition in phonology defines natural sound patterns as those grounded in articulatory and perceptual properties of speech. Natural sound patterns are those with plausible phonetic sources or explanations. No particular theory of grammar is associated with this definition. At the same time, in the spirit of Baudouin, Ohala, and many others, hypotheses regarding the natural phonetic bases of sound patterns can be tested in the laboratory, and evaluated against the natural history of sound change as mapped out by the comparative method. With these strategies in mind, a guide to the most common and well documented instances of natural sound patterns are presented below.

2.2 A sampler of natural sound patterns

There is a wealth of literature on natural sound patterns and their phonetic basis. This section outlines a range of cases where evidence is more than anecdotal or hypothetical. Some sound patterns are written in a very specific form, others in general symbols, and others in prose. In an effort to condense information, some abbreviations are used. These are:

P = Primary perceptual basis	C = consonant
A = Primary articulatory basis	V = vowel
S = Synchronic	C_{vd} = plain voiced obstruent
D = Diachronic	C_{v} = plain voiced obstruents
Cf = Context-free	and implosives
Cs = Context-sensitive	$C\text{-}_{vd}$ = voiceless obstruent
inc. = includes	N = nasal consonant

In some cases, where perception and articulation appear to play equal roles, a sound pattern is marked P/A. In order to keep the bibliographical section of this paper compact, only a few primary references are given for each sound pattern. These references contain phonetic explanations for the sound pattern in question, and in many cases, further references as well. In schematic notations, I use '>' as a cover symbol for any alternation, and '<>' to show bidirectional alternations between sound types.

13. For arguments that a fixed prosodic hierarchy is in need of extension see Schiering et al. (2006).

2.2.1 *Alternations*

Natural alternations include those that occur in synchronic grammars (S), and those that have occurred across time in regular sound change (D), or are present in synchronic variation. Below is a list of sound patterns/sound changes based on perceptual similarity (a-m) and apparent biases in the human perceptual system (n, o).

– Alternations with a primary perceptual basis (P)

a.	fricative > fricative, inc. θ > f, s > ʃ/_l	P, D, Cf	Ohala (1974), Blevins (2004: 134-35)
b.	t > k	P, D, Cf	Blust (1990, 2004), Blevins (2004: 122-25)
c.	flat > flat inc. pharyngealized, labialized, retroflex, velarized	P, D, Cf	Ohala (1974) Blevins (2004: 136-37)
d.	aspiration <> nasalization, *aka* rhinoglottophilia	P, D, Cf	Blevins (2004: 135-36)
e.	velar palatalization	P/A, S, D	Guion (1998)
f.	l > w	P, S, D	Ohala (1974)
g.	tonogenesis	P/A, D	Hombert et al. (1979)
h.	coronal rhotic > uvular rhotic	P, D	Engstrand et al. (2007)
i.	final vowel shortening	P, D, S	Myers & Hansen (2007)
j.	pre-vocoid vowel length neutralization	P, D, S	Myers & Hansen (2005)
k.	perceptual metathesis	P, D, S	Blevins & Garrett (1998; 2004)
l.	dissimilation	P, D, S	Blevins (2004: 148-49)
m.	neutralization of release features when consonant is unreleased (inc. laryngeal and place features)	P, S, D	Steriade (1999), Blevins (2004: Ch. 4 and 5)
n.	regressive assimilation of release features in CC clusters (inc. laryngeal and place features)	P, S, D	Ohala (1990), Steriade (2001) Blevins (2004: Ch. 4 and 5)
o.	progressive assimilation of retroflexion in CC	P, S, D	Steriade (2001)

– Alternations with a primary articulatory basis (A)

There are far too many of these to list in a detailed way, so cover symbols are used wherever possible. Sound patterns in this category can be grouped into basic articulatory sources (coarticulation, mistiming, lenition, fortition) and aerodynamic factors. When sounds are coarticulated, the pronunciation of one has an effect on that of the other. A wide range of local and long-distance assimilatory sound patterns have their basis in coarticulation, including:

q.	local CV, VC, CC, VV assimilations	A, D, S	Hardcastle and Hewlett (1999), Recasens and Pallares (2001)
r.	vowel harmony	A, D, S	Majors (1998), Harrison et al. (2002), Przezdziecki (2005)
s.	consonant harmony	A, D, S	Hansson (2001, 2004)

Segmental fusion can also occur under local assimilation, e.g., the well studied development of tautosyllabic VN sequences into nasalized vowels, with loss of the nasal consonant, e.g., French [vɛ̃] *vin, [fɛ̃] < *fin, etc. (Ohala 1975, Hajek 1997).

In the domain of tone, downdrift, sandhi rules and lexical tone assimilations have all been explained phonetically. Some key references are:

t.	tonal downdrift	A, D, S	Hombert (1974)
u.	tone sandhi	A, D, S	Shih (2005), Xu (2006)

Other alternation types with well-studied phonetic grounding are:

v.	compensatory lengthening	A, D, S	Kavitskaya (2002)
w.	positional neutralization	A, D, S	Barnes (2006)
x.	final obstruent devoicing	A, D, S	Blevins (2006b)
y.	consonant lenition	A, D, S	Kirchner (2004)
z.	consonant fortition	A, D, S	Kavitskaya (2005)

2.2.2 *Phonotactics*

All languages appear to have CV syllables, while many others have syllables that show regular syllable profiles which rise in sonority to the peak, and optionally fall in sonority thereafter. The study of the phonetic basis of recurrent phonotactic patterns is relatively young, but already has a range of concrete results. Redford et

al. (2001) provide perceptual and articulatory explanations for preferred phonotactics, which are supported by the simulations of Oudeyer (2001). Wright (2004) presents an overview of segmental cue robustness, and argues that perceptual factors alone may favor common phonotactics, including alternating vowels and consonants, and syllables that respect the sonority scale. Gordon (2002, 2004) provides a phonetically driven account of syllable weight, showing how tone and stress systems may have different phonetic requirements, and hence determine different weight systems.

The distribution of stress within words is the domain of metrical theory. A general question is to what extent the stress patterns of the world's languages have phonetic motivation, especially where rhythm is concerned. Hyman (1977: 44-45) suggests that many instances of word-stress are phonologizations of phrasal intonation patterns. Hayes (1995: 79-85) discusses the rhythmic basis of a universal foot inventory, while Trehub and Hannon (2006) summarize a wealth of studies on human perception of pitch and temporal patterns in music, suggesting a range of universals which, in cases where they have been tested, appear to hold of speech as well.

A range of natural consonant-tone interactions, including those realized as phonotactics are described in Odden (2005). Kochetov (2002) provides a case study of the phonetically-based emergence of the phonotactics of contrastive palatalization.

2.2.3 *Contrasts*

There is a great deal more literature on unnatural contrasts than natural ones, for the simple reason that most contrasts made use of by the world's languages appear to be natural. Solé (1999) considers the naturalness of voiced trills (vs. unnatural nasal fricatives and nasal trills), and Maddieson (1984) discusses natural factors that play a role in common sound inventories and common (vs. uncommon) contrasts.

Systems of contrast seem to be central to an understanding of historical chain shifts, when two or more sound changes appear linked together, so that subsystems of contrast move together within the perceptual/acoustic space. The same is true of near-mergers, where a contrast appears to be neutralized, but maintains what appear to be significant phonetic differences. Both of these issues may be best tackled within exemplar models, as Yu (2007) suggests for near-mergers in Cantonese tone.

3. Unnatural sound patterns

3.1 What are unnatural sound patterns?

On first thought, one might view unnatural sound patterns as any sound patterns that are not classified as natural in the sense defined above. However, the term 'unnatural' is used by many to express an opposition that is stronger than this, with a cline of naturalness, from the truly 'natural' at one extreme, to the truly 'unnatural' at the other. The most unnatural sound patterns are those that have all the distributional hallmarks of naturalness, being regular and exceptionless, but lack phonetic grounding. A less extreme definition is adopted here: *Unnatural sound patterns are those with no plausible single phonetic source, origin, or explanation*. As with naturalness, unnaturalness, in this sense, can be applied to synchronic contrasts, phonotactics, and alternations, as well as to sound change. In the realm of alternations, another term for unnatural sound patterns is 'crazy rules' (Bach and Harms 1972). In the domain of regular sound change, 'unusual' or 'bizarre' changes are highlighted in Blust (2005), where the basis of this classification is, again, the lack of clear phonetic grounding.

The most widely-studied source of unnatural sound patterns is likely analogy, as this term was used and understood in the 19th century and contrasted with natural 'mechanical' sound change (e.g. Paul 1880). Under analogy, a sound pattern may emerge from word-level changes based on form/meaning similarity relations between other sets of words. However, unnatural sound patterns have a variety of other sources. These include: 'rule inversion' where a historical sound change taking A > B in some environment is reinterpreted as a generalization on the distribution of A in the complement environment (Vennemann 1972); rule telescoping, where a sequence of historical sound changes A > B, B > C, etc. has a condensed form A > C in the grammar, with no evidence for intermediate stages (Hyman 1975: Ch. 5); accidental convergence of diachronic processes that result in regular sound patterns (Blevins 2004: 69-70, 162-164); analogical morphophonology, where morphophonological alternations are reinterpreted as phonological ones (Garrett & Blevins, to appear); conscious or deliberate manipulation of linguistic symbols that result in regular sound change (Blust 2005: 264); and language contact (Blevins 2006a).

Providing empirical support for the classification of a sound pattern as 'unnatural' is more difficult than evidence for naturalness, since no amount of positive evidence will show that, for example, under certain conditions, [t]s *cannot be* perceived regularly as [k]s. In fact, though a regular context-free sound change **t* > *k* might at first glance seem unnatural, there is now evidence that it may be natural after all: where this change occurs, the earlier system lacks /k/, so that the shift of *t*

> *k* can be viewed as enhancement of a stop category with weak burst (labial [p]) in contrast to one with strong bursts (Blevins 2004: 122-125, Blust 2004). With instances of rule inversion, like the well-known English dialects with sandhi [ɹ]-epenthesis (e.g. *Rosa[ɹ] is coming. Law[ɹ] and order,* etc.), the unnatural status of the rule is established by evidence from historical linguistics, typology and phonetics. These factors contribute to an understanding of this particular alternation by identifying an earlier process of coda /ɹ/-loss, highlighting cross-linguistic correspondences with similar regular sound patterns with parallel histories, and by underscoring the lack of any phonetic evidence suggesting that speakers will tend to spontaneously produce [ɹ] or hear a non-existent [ɹ] in the contexts where the epenthetic consonant occurs (Blevins 2008). Similar multifaceted considerations are used in arguing for other sources of unnatural sound patterns. What all of these have in common is a starting point where the sound pattern in question is one that is not known to follow from any natural phonetic principle.

In the domain of regular sound change, the great majority of changes show evidence of phonetic grounding. Nevertheless, exceptional cases are noted in the literature. Blevins (2004: 164-167) mentions several unexplained regular sound changes, suggesting potential phonetic bases, while potential feedback loops in the course of acquisition may ultimately provide a source for the seemingly unnatural loss of final consonants in a range of Austronesian languages (Blevins 2004b). However, it has been argued that certain regular sound changes defy phonetic explanation. Blust (2005) classifies ten regular sound changes in Austronesian in this way. Since the majority of these changes involve unlikely single-step changes in the feature composition of segments (e.g. **b* > *-k-* in Berawan), there is always the possibility of intermediate steps which have been erased from the historic record (cf. the discussion of French **s* > zero in 2.1).[14] However, after considering a range of potential linguistic explanations for these sound changes, Blust (2005: 264) concludes that "speakers may sometimes engage in a conscious, arbitrary manipulation of linguistic symbols which produces systematic or semi-systematic results that resemble phonetically motivated sound change."[15] Section 3.2 lists a sample of these potentially unnatural regular sound changes.

14. Blust (2005: 264) remarks: "No amount of speculation about possible intermediate steps is likely to provide a plausible phonetic motivation for more than a few of the changes considered here…".

15. Deliberate speech modifications, including speech disguise and accomodation, do not typically have the form or content of the regular sound changes Blust assembles. Can a speaker simply decide that all medial /b/s will be pronounced as [k] (as required for Berewan), perform this operation without exception, and then be correctly imitated by others? This seems to be what Blust is suggesting.

The definition of unnatural sound patterns given above includes a large number of morphologically conditioned phonological alternations. Since word-internal morphological boundaries or domains are not, in general, associated with specific phonetic properties, any word-internal morphological conditioning must be viewed as non-phonetic, and therefore 'unnatural'.

However, the same definition will classify many rare or unstable patterns as 'natural'. Consider, for example, the famous CCCCCC onset clusters of Georgian. Onset clusters of this kind are extremely rare in the world's languages, but are they 'unnatural'? As this term is defined above, they may not be and, though uncommon, they claim a natural history as well (Blevins 2004: 213-214). In the realm of contrast, the three-way contrast between oral, weakly nasalized, and fully nasalized vowels, documented for Palantla Chinantec is also extremely rare, occurring only in this language, where it appears to be unstable. Here too, however, there is good reason to believe that the sound pattern has a natural history, and that its instability is also rooted in natural factors (Blevins 2004: 202-204). In short, rare or unstable sound patterns can be natural, with rarity following from the uncommon convergence of various phonetic factors, and instability due to related or independent natural phonetic factors.

A final topic of general interest is the role of purported *unnatural* sound patterns in modern approaches to markedness. The dissociation of markedness and naturalness noted in section 1 has lead to a somewhat strange logic in recent Optimality studies. The argument goes essentially as follows. Universal markedness constraints or principles must be recognized as components of phonological grammars because there are many *unnatural* sound patterns in the world's languages that demand explanation. For example, de Lacy (2006: 5) claims that the output of regular epenthesis rules is always a coronal or glottal, and never a labial or dorsal. Glottals may be natural outcomes of epenthesis, due to phonologization of the common laryngeal closing and spreading gestures which mark prosodic boundaries (cf. Blevins 2008), but there is no *natural* explanation for why coronals should be preferred over dorsals and labials. This is the justification of synchronic markedness constraints, in this case, one favoring coronal place over dorsal and labial. In this approach, markedness becomes the means of expression of *unnatural* sound patterns in contrast to its original structuralist and generative use. While the theory-internal logic may be sound, the empirical basis is not. Restricting consonant epenthesis to coronals and glottals is indeed unnatural, and no such

restriction is evident in the natural history of sound patterns (Blust 1994, Vaux 2002, Mortensen 2004, Blevins 2008).[16]

3.2 A sampler of unnatural sound patterns

Since unnatural sound patterns are defined negatively, by the lack of phonetic grounding, they will be more difficult to identify than natural sound patterns. Nevertheless, the examples below should give the reader a good feel for the types of sound patterns which, to date, appear to have no such motivation. In 3.2.1 exemplification is limited to extreme cases of unnatural rules – those sound patterns that have all the distributional hallmarks of naturalness, being regular and exceptionless, but which lack phonetic grounding. Since these unnatural sound patterns are specific to particular languages or families, language and family information is provided as well.

A special note is in order regarding the sound change in 3.2.1 h. which could be viewed as 'natural' if open syllables are natural (in contrast to closed ones). Blevins (2004b) notes, however, that the sound change in h. is one which only occurs (in non-contact situations) when the output is a language with uniformly open syllables across the word. This is a case, then, where the feedback loop discussed in 2.1 may play an important role in language change.

In the set of synchronic alternations referred to in 3.2.1 u.-z. below, the class of sound referred to as the target or context of the alternation is a non-natural (or unnatural) class (i.e. a class which cannot be defined by a conjunction of distinctive features within standard feature theory). In these examples, the general alternation type is given together with the language in the middle column. For more on the widespread existence of non-natural classes in synchronic phonology, see Mielke (2008).

3.2.1 *Alternations*

a.	w/j > p/_]	Drehet, Levei	D,Cs	Blust (2005)
b.	w/b > nc/V_V	Sundanese	D, Cs	Blust (2005)

16. De Lacy (2006: 19), however, is not concerned with the natural history of sound patterns, or naturalness in the sense defined here: "speech-related asymmetries that are caused by factors external to I-language are not relevant to the theoretical proposals made here". Phonetic factors are included in this notion of 'external', and regular sound change is excluded from the empirical database.

17. This sound change is also listed as a potentially natural one in 2.2. See Blevins (2004: 122–125) and Blust (2004) for further details.

c.	dr > k^h	Drehet	D, Cf	Blust (2005)
d.	b > k/V_V	Berawan	D, Cs	Blust (2005)
e.	t > k	Oceanic	D, Cf	Blust (1990)[17]
f.	Ø > j / [_a	Oceanic	D, Cs	Blust (1990)
g.	C > Ø /[_	Pama-Nyungan	D, Cs	Blevins (2001)
h.	C > Ø / _]	Oceanic	D, Cs	Blevins (2004b)
i.	C > Ø / _]	Cajun English	D, Cs	Blevins (2006b)
j.	t,t^h,d > s/_m	Ancient Greek	S, Cs	Paul (1880) Garett & Blevins (to appear)
k.	p > s/_i	Bantu	S, Cs	Hyman (1975: 174-175)
l.	i > u/d_	Kashaya	S, Cs	Buckley (2000)
m.	n > ʃ /_i,j	E. Ojibwe	S, Cs	Buckley (2000)
n.	M > L/_ C_{vd}	Zina Kotoko	S, Cs	Odden (2005)
o.	M > L/C_{v}_	Zina Kotoko	S, Cs	Odden (2005)
p.	Ø >dz/V_i	Chamorro	S, Cs	Blevins (2008)
q.	Ø > ŋ /V_V	Uradhi	S, Cs	Blevins (2008)
r.	h > l /{V+$_{bk}$,C}_V	Wiyot	S, Cs	Blevins & Garrett (2007)
s.	C-$_{vd}$ > C_{vd}/ _]	Lezgian	S, Cs	Yu (2004)
t.	antigemination[18]	Tonkawa, Tunisian Arabic, etc.	S, Cs	Blevins (2005)
u.	/t,k,s,ʃ,h/ but not /p/	Japanese, target of voicing	S, Cs	Mielke (2008)
v.	/v s g/, but not /b/, /d/, /x/, etc.,	Evenki, target of post-nasal nasalization	S, Cs	Mielke (2008)
w.	_/t g s j/, but not other Cs	River W. Tarangan, /m/ regressive place-assimilation	S, Cs	Mielke (2008)
x.	/_{ʃ s^w n}, but not other Cs	Thompson, /t/-deletion	S, Cs	Mielke (2008)
y.	{n n’ ʔ h}_, but not other Cs	Thompson, /t/-deletion	S, Cs	Mielke (2008)
z.	/_ {C-$_{vd}$, N}, but not other Cs	Pero stop assimilation	S, Cs	Mielke (2008)

3.2.2 *Phonotactics*

In the realm of phonotactics, no widely accepted notion of 'natural' vs. 'unnatural' exists in the literature. Assume, following the discussion in Section 2.2.2, that one adopts the results of Redford et al. (2001), Oudeyer (2001), and Wright (2004) on the perceptual and articulatory basis of preferred phonotactics and syllable types where major class features and sonority are involved. It then follows that languages with long consonant clusters (e.g. Georgian, Bella Coola), syllabic obstruents (Tashylhit Berber), and syllable-internal sonority violations (Georgian, Polish, English) would all be instances of languages with decidedly 'unnatural' phonotactics. Since languages of this type are not unusual (Blevins 1995), and phonotactics of this type can be quite stable (Blevins 2006b), this constitutes further evidence that unnatural patterns are common features of synchronic grammars.

The preference for CV syllables may be related to a cross-linguistic tendency for VCV to be syllabified as V.CV. Languages with seemingly unnatural syllabification patterns include Oykangand and Arrernte where intervocalic single Cs and consonant clusters are syllabified as codas rather than onsets (Blevins 2004: 69-70, 234-245).

3.2.3 *Contrasts*

As mentioned in Section 2.2.3, there is a great deal more literature on unnatural contrasts than natural ones, though unnatural contrasts or systems are those which are typically unattested in the world's languages. For example, there is no language which has only voiced and voiced implosive oral stops: the occurrence of phonologically voiced stops seems to imply voiceless stops as well. Though one might claim this to be an implicational universal, the question is whether a language with only voiced stops and no voiceless stops is impossible, or simply rare due to the tendency for obstruents to inhibit vocal fold vibration. Most of the contrasts made use of in the world's languages appear to be natural in the sense that they can arise in natural ways, and they do not push the articulatory or perceptual limits of human speech. A few exceptions to this are noted in Blevins (2004: Ch. 7) where certain rare contrasts are discussed, and strongly associated with unique realization of morphological contrasts. These include the rare three-way nasalization contrast in Palantla Chinantec vowels, mentioned earlier, as well as three-way length contrasts in Estonian, Saami, and Dinka. In these cases, phonological contrast does appear to push the perceptual envelope: for example, Estonian stressed Q2 (long) and Q3 (extra-long) syllables, which contrast only within paradigms (Q2 *kooli* 'school, gen/sg' vs. Q3 *koo:li* 'school, pt/sg'), are not distinguishable by Estonian speakers when spliced from contrasting words (Eek and Meister 1997).

18. Antigemination is the sound pattern so-named by McCarthy (1986) in which a regular syncope rule is blocked just in case it results in adjacent identical consonants.

4. Naturalness and synchronic grammars

All languages appear to have natural and unnatural sound patterns. The simplest and most widely accepted explanation for this is a historical one. Though natural synchronic sound patterns can evolve as true reflections of natural phonetically based sound change, the same sound patterns can be rendered unnatural by subsequent natural changes, inversions, analogical changes, lexicalization, and language contact. Given that we understand the natural phonetic basis of such patterns, is there any reason to believe that identical or similar principles are part of phonological grammars, or that phonological grammars instantiate preferences for 'natural' sound patterns?

Anderson (1981: 497) answers in the negative. Phonetic explanations are explored in phonology precisely "to determine what sorts of facts the linguistic system proper is not responsible for". Similar conclusions can be found in Ohala (1974, 1981), Lass (1975, 1980, 1984), Anderson (1985: 346) and Hyman (2001). All of these authors highlight that the explanations of sound patterns by reference to naturalness is a distinct enterprise from describing aspects of grammars. Further, where attempts are made to encode naturalness in the grammar, problems inevitably arise. In reviewing the differences between the simple definition of naturalness proposed in 2.1 and the extended definitions made use of in Natural Phonology the same point is clear. Natural Phonology fails, not because naturalness is irrelevant to explaining sound patterns, but because naturalness is simply irrelevant to grammatical description and analysis (Hellberg 1978). Natural and unnatural sound patterns can both be regular and exceptionless, and naturalness may also be dissociated from universality, as suggested in Section 2.1.

Despite these seeming failures, certain schools of Optimality Theory maintain the position that naturalness is a part of synchronic grammars. Kager (1999: 11) states that phonological markedness constraints in OT are universal, and that universality should ideally be established by showing that these constraints are "phonetically grounded in some property of articulation or perception". While this position has been abandoned by most practitioners, there are still proponents of phonetic naturalness in OT grammars. Hayes and Steriade (2004: 3) do not define markedness constraints as innate and universal, but do view phonetic knowledge as the "source of markedness constraints as components of grammar" (ibid.: 1). Continued challenges to this position have forced proponents of markedness to test their proposals with new experimental methods. One line of research attempts to defend grammar-internal expressions of markedness by showing that natural rules are easier to learn than unnatural ones.

If it is the case that all languages show evidence of natural and unnatural sound patterns, then surely both types of patterns are learnable in the course of language

acquisition. But are natural patterns easier to learn than unnatural ones? This is the claim of, e.g., Tesar and Smolensky (2000).[19] In order to test this hypothesis a range of experiments have been carried out. Results in this area are difficult to evaluate, as they often use artificial languages, and may be carried out on adults, as opposed to children in the relevant stages of language acquisition. An additional problem is very general: if learners do indeed learn a natural pattern more easily than an unnatural one, how can we be sure this is due to phonological knowledge, as opposed to more general cognitive strategies?[20] In one of the few studies carried out on infants, Seidl and Buckley (2005) exposed 9-month old infants to phonetically grounded sound patterns as well as ungrounded ones, with one experiment focused on consonant manner and the other on place of articulation. In both experiments infants showed no learning preference for the natural pattern over the unnatural one, suggesting that, at this age, they have no clear bias towards natural sound patterns.

For those interested in understanding sound patterns, naturalness plays a clear and fundamental role. For those interested in understanding grammars, the natural or unnatural status of a sound pattern may be of little or no import, with naturalness independent of grammatical description. Is this independence consistent with recent work on the form and content of phonological grammars? Yes, it most certainly is. First, there is a growing literature on language as a complex self-organizing system, with positive and negative feedback loops, and multiple interacting levels. This type of modelling provides evidence that many aspects of phonological systems are emergent properties, from segment inventories (De Boer 2001), distinctive features (Mielke 2008), and regularities across the lexicon (Wedel 2007), to general phonological architectures that decompose words into syllables, segments and features (Oudeyer 2006). These emergent properties, in turn, free grammars from much of the burden of universality. Second, there is mounting evidence that the majority of phonological knowledge is learned and language-specific, and that this learning begins to take place well before children learn to speak (Kuhl et al. 1992, Saffran et al. 1996, Kuhl 2000, 2004). If sound patterns, whether natural or unnatural, are learned aspects of grammar, what is gained by importing notions of 'naturalness' into the grammar? Finally, there is experimental data showing that phonological knowledge is phonetically detailed, and also includes probabilistic

19. Their proposal is actually that unmarked sound patterns are easier to learn than marked ones, where OT markedness constraints are involved. As the authors have different notions of the extent to which this may be universal and/or phonetically grounded, their definition of 'naturalness' may not overlap significantly with the one adopted here.

20. See Trehub and Hannon (2006) for arguments that infant music perception is grounded in domain-general (non-music-specific) cognitive mechanisms.

knowledge of sound sequences across the lexicon, syntactic probabilities, social characteristics of speakers, and much more (Johnson 1997, Pierrehumbert 2000, 2003, Ernestus & Baayen 2003, Gahl & Garnsey 2006). If phonotactic well-formedness judgments are graded according to properties of the lexicon, how can importing a notion of naturalness improve a grammatical description?

In sum, many common and recurrent sound patterns can be explained in terms of the way humans articulate and perceive speech. The study of naturalness through the ages has deepened our understanding of sound patterns, and continues to do so, especially where it is properly segregated from grammatical description and analysis.

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The iconic function of full inversion in English

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Over the past few years, full inversion constructions in which the subject follows the entire verb phrase in a declarative clause have been the subject of extensive research (cf. Bresnan and Kanerva 1992a and 1992b, Schachter 1992, Birner 1996, Dorgeloh 1997, Chen 2003, Kreyer 2006), the focus of each individual study varying according to the nature and goals of the specific theoretical framework adopted. This paper offers a contrastive corpus-based analysis of a particular type of full inversion, namely prepositional phrase inversion (for example, "*On the table beside him* sat his crown, his sword and his dagger"), in English fictional and non-fictional texts. It is argued that in fictional prose prepositional phrase inversion can be considered a marker of spatial experiential iconicity through which the process of physical perception is reflected in the syntax, whereas in non-fiction prepositional phrase inversion is used merely as a text-structuring device.

1. Introduction[1]

Over the past few years, 'full inversion' – constructions in which the subject follows the entire verb phrase in a declarative clause, as in "On the near corner was *Herb's gas station*" or "Upstairs was *a bedroom and a bathroom*" – has been the subject of extensive linguistic research. Although some work has been carried out from a generative perspective (cf. Coopmans 1989, Bresnan and Kanerva 1992a, 1992b, Schachter 1992), most studies on English full inversion are functionally

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oriented (cf. Birner 1996, Dorgeloh 1997, Biber et al. 1999, Chen 2003, Kreyer 2006, Prado-Alonso 2004, among others) and base their statements on empirical, corpus-based data. The present paper continues this line of research and offers a contrastive corpus-based analysis of one type of full inversion, namely 'prepositional phrase inversion', in written fictional and non-fictional English texts.

Prepositional phrase inversions are syntactic constructions in which a prepositional phrase is placed clause-initially in a position typically occupied by the grammatical subject, which itself takes a postverbal position, as illustrated in sentences (1) – (4) below. This type of full inversion may also occur with a clause-initial adverb before the prepositional phrase, as in (5).

(1) *At the back* was the biggest and most elaborate: a giraffe made from perhaps twenty pipe-cleaners. (FLOB, General Fiction. K11)

(2) *Between the summits of Bachian polyphony and Beethovenian symphonism* came Papa Haydn and the infant Mozart. (FLOB, Press Reportage. A26)

(3) *Underneath a light blue Pringle sweater* was a pair of headphones attached to a Walkman set. (FLOB, Mystery and Detective fiction. L15)

(4) *Of interest* is the observation that on day 7, only 43.6% of the uterine horns were positive for pathology whereas 63.8% were isolation positive. (FROWN, Science. J12)

(5) *Also on tap* are another Beresford-Zanucks collaboration about blues legend Bessie Smith; "The Baboon Heart," a restaurant romance with Christian Slater and Marisa ("My cousin Vinny"). (FROWN, Press Reportage. A43)

The corpora used here to analyse the behaviour and distribution of prepositional phrase inversion in written texts are the *Freiburg-Lancaster-Oslo-Bergen Corpus of British English* (FLOB; compilation date: 1991), and the *Freiburg-Brown Corpus of American English* (FROWN; compilation date: 1992), both included in Hufland et al. (1999). Each corpus comprises 500 samples of approximately 2,000 words each, thus totalling 1,000,000 running words organised into fifteen textual categories, of which the following eight have been selected for the present analysis: *Science Fiction*, *Adventure and Western, Mystery and Detective fiction*, *Romance and Love Story*, *General Fiction*, *Science*, *Press Reportage* and *Miscellaneous*.[2] These categories have been further grouped into fictional and non-fictional texts. A total sample of 1,084,000 words was analysed, distributed as indicated in Table 1.

2. The *Miscellaneous* textual category comprises government documents, institutional reports, industry reports, college catalogues and in-house industry texts.

Table 1. Sources and distribution of the corpus texts selected from FLOB and FROWN

Flob				Frown			
Fiction		Non-Fiction		Fiction		Non-Fiction	
Textual Category	Samples Words	Textual Category	Samples Words	Textual Category	Samples Words	Textual Category	Samples Words
Science Fiction	6 12,000	Science	80 160,000	Science Fiction	6 12,000	Science	80 160,000
Adventure/ Western	29 58,000	Press Reportage	44 88,000	Adventure/ Western	29 58,000	Press Reportage	44 88,000
Mystery/ Detective	24 48,000	Miscel-laneous	30 60,000	Mystery/ Detective	24 48,000	Miscel-laneous	30 60,000
Romance Fiction	29 58,000			Romance Fiction	29 58,000		
General Fiction	29 58,000			General Fiction	29 58,000		
Total	**117 234,000**		**154 308,000**		**117 234,000**		**154 308,000**
542 Samples / 1,084,000 Words							

Since the categories of fictional (117 samples, 234,000 words) and non-fictional texts (154 samples, 308,000 words) differ in size, frequencies have been normalised following Biber's (1988: 14) proposal for a "normalised frequency of a feature". As Biber notes, "raw frequency counts cannot be used for comparison across texts when they are not at all of the same length", since in this case longer texts would tend to have higher frequencies simply because there is more opportunity for a feature to occur within them. Using Biber's procedure and comparing the frequency per 100; 1,000; 10,000, or 100,000 words – depending on the frequency of the feature under investigation – this possible bias is eliminated. In the present study, given that full inversion is considered a relatively rare syntactic construction compared to unmarked SVO word-order (cf. Biber et al. 1999: 926), normalised frequencies are computed by dividing absolute frequencies by the total number of words of each category. The total is then multiplied by 100,000. Hence, if the *Press Reportage* category of FLOB and FROWN contains 32 examples of prepositional phrase inversion, the normalised frequency will be as follows: (32 instances / 88,000 + 88,000 words) x 100,000 = 18.18.

Section 2 of this paper offers the overall distribution of the construction in fiction and non-fiction. Section 3 gives a pragmatic analysis of the construction. Finally, a summary of the main conclusions is offered in Section 4.

2. Prepositional phrase inversion in fictional and non-fictional written English discourse

2.1 Distribution of the construction

According to the surface structure of the verb phrase, most studies on English inverted constructions base their classifications on the preliminary distinction between two main types of inversion: *full-verb inversion* (cf. Birner 1996, Chen 2003, Kreyer 2006) and *subject-operator inversion* (cf. Quirk et al. 1985, König 1988). Both categories have received a host of different names. Thus, Huddleston and Pullum (2002) rename 'full-verb' inversion 'subject-dependent' inversion, whereas Quirk et al. (1985) and Biber et al. (1999) refer to 'subject-verb' inversion, and Green (1985) and Stein (1995) to 'inversion-over-verb' and 'Type-A' inversion respectively. Likewise, Huddleston and Pullum (2002) speak of 'subject-auxiliary' inversion or 'partial' inversion instead of 'subject-operator' inversion, while Green (1985) refers to 'inversion-over-auxiliary' and Stein (1995) to 'Type-B' inversion. This heterogeneity is indicative of the numerous ways of classifying inversion in research on present-day English.

'Full-verb inversion', henceforth 'full inversion', which is the concern of this study, occurs when the grammatical subject follows the entire verb phrase, that is, when "the subject occurs in postposed position while some other dependent of the verb is preposed" (Huddleston and Pullum 2002: 1385), as illustrated in (6). It is therefore distinguished from 'subject-operator inversion', which refers to those syntactic structures in which "the subject is preceded by the operator rather than by the main verb or a full verb phrase" (Biber et al. 1999: 911), as shown in (7).

(6) Beside him was a table crammed with refreshments and medicaments. (FLOB, Press Reportage. A26)

(7) Nor does he enjoy the arduous process of learning complex new words. (FLOB, Press Reportage. A26)

On the basis of the kind of phrasal category occurring as clause-initial constituent, six different types of full inversion have been traditionally distinguished in the literature on the topic: *noun phrase*, *adverb phrase*, *verb phrase*, *adjective phrase, prepositional phrase*, and *subordinator full inversion*, as illustrated in (8) – (13).

(8) A comprador mentality is the attitude that the best practices are invariably connected with the global capitalist system.(FLOB, Science. J26)

(9) Therein lie the reasons for Clinton's confidence that he can stave off any Bush comeback. (FROWN, Press Reportage. A06)

(10) Looming above them were the hulls of two Altan stock boats. (FROWN, General Fiction. K17)

(11) Important to our construction of the map will be a decomposition of the formula into three domains determined by its coordinates. (FROWN, Science. J20)

(12) On the table are a flask and three glasses of wine. (FLOB, Adventure and Western. N22)

(13) These men were very courageous, as was Sgt King. (FLOB, Press Reportage. A24)

Recent studies (cf. Birner 1996, Dorgeloh 1997, Chen 2003, Kreyer 2006, Prado-Alonso 2004) have shown that prepositional phrase inversion is by far the most frequent type of full inversion found in written English discourse. The analysis of FLOB and FROWN provides a total of 152 instances of prepositional phrase inversion, which are distributed among the fictional and non-fictional genres as illustrated in Figure 1.

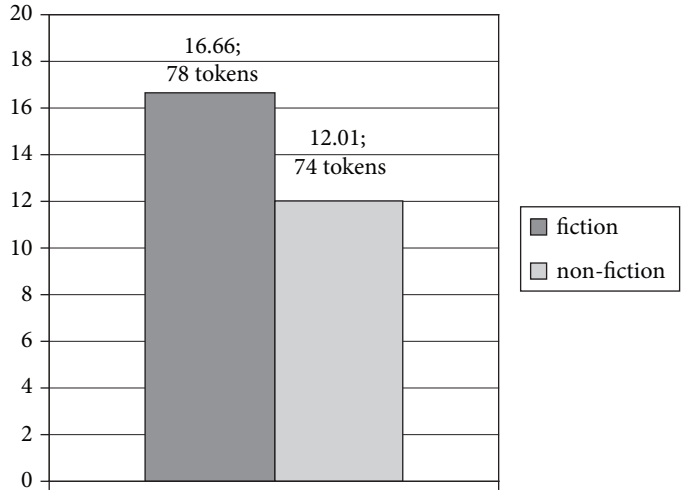

Figure 1. Normalised distribution of prepositional phrase inversion in the fictional and non-fictional genres

As Figure 1 makes clear, prepositional phrase inversion takes place more frequently in fictional text styles than in non-fictional ones, for reasons which will be explained presently. This higher frequency is even more notable in the individual analyses of the different categories in the corpora, as illustrated in Figure 2, below.

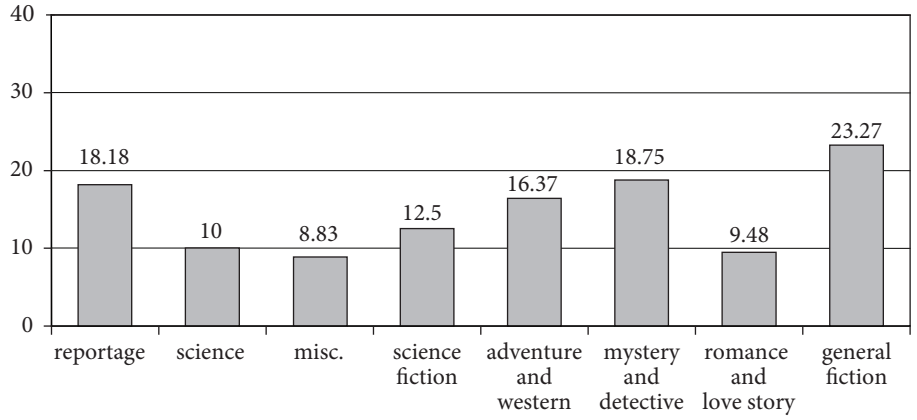

Figure 2. Normalised distribution of prepositional phrase inversion in the textual categories of the written corpora

With the exception of *Press Reportage* (18.18), frequency of occurrence is consistently higher in fictional than non-fictional categories, with *General Fiction* (23.27), *Adventure and Western* (16.37) and *Mystery and Detective Fiction* (18.75) showing the highest frequencies.

In order to examine the possible reasons for this marked difference in distribution, a more detailed analysis of the prepositional phrase inversion types in both genres will now be given.

2.2 The clause-initial constituent in fictional and non-fictional *prepositional phrase inversions*

In addition to statistical differences, the current data also show that the type of prepositional element placed in clause-initial position differs in fiction and non-fiction. Fictional texts, which tend to contain substantial reference to past time and places (cf. Biber 1988), show a strong preference for the use of prepositional phrases conveying a locative meaning, as illustrated in (14) – (20) below, where the themes provide a psychological landmark. This is also the case in *Press Reportage*, though to a more limited extent, where the locative use of prepositional phrase inversion is justified because reportages include non-narrative text portions, such as news analyses, but also narrative-text portions with physical or temporal

descriptions (cf. Biber 1988: 191), as can be seen in (21) – (23) below (see Section 3 for more discussion):

(14) On its edge stood a squat, dirty little town. (FROWN, Science Fiction. M06)

(15) In the middle was a circle of hard light, glaring, like the light in the dusty street. (FLOB, Adventure and Western. N11)

(16) Behind the desk sat Alex studying a large atlas. (FLOB, Mystery and Detective fiction. L16)

(17) On the back seat was a heap of packages. (FROWN, Romance and Love Story. P17)

(18) Near the window is a built-in display cabinet with willow-pattern plates. (FROWN, General Fiction. K25)

(19) He leaned back to look at them. The five animals stood in a row, as though about to enter a pipe-cleaner ark. At the back was the biggest and most elaborate: a giraffe made from perhaps twenty pipe-cleaners, with an elaborately plaited neck and one of its back legs wittily cocked like a dog. In front of that came an elephant with a long, Baroque trunk, and a snake that MacCready had arranged so that it was slithering over the rim of an ashtray, […] and at the front was something that I couldn't at first identify consisting of elegant swirls topped by a strange horned head. (FLOB, General Fiction. K11)

(20) On the left side of the stage, in front of the false lake, was a stage for, as it said in the play's stage notes, "private theatricals". (FROWN, Adventure and Western. N28)

(21) In its centre is the Bristol Museum and Art Gallery, almost 170 years old and occupying a listed Edwardian building (Our Arts Correspondent writes). (FLOB, Press Reportage. A11)

(22) Just down the coast at Cromer is the last end-of-pier variety show. (FLOB, Press Reportage. A17)

(23) In the bottom right-hand corner is a picture of Shakespeare over-printed with the words "Cheque guarantee". (FLOB, Press Reportage. A18)

By contrast, the remaining non-fictional texts, *Science* and *Miscellaneous*, make less use of prepositional phrase inversions triggered by a clause-initial locative constituent, mainly because they include fewer spatial, physical and temporal descriptions, which are the linguistic contexts in which these inversions tend to occur. In other words, in these texts there is less need to introduce scenes from new,

previously unshared fictive worlds. There is less scope for narration and description, because in general the texts contain expository or procedural information and "descriptions of what to do, rather than what somebody else has done" (Biber 1988: 138). Therefore, the fronted element in the prepositional phrase inversions found in *Science* and *Miscellaneous* does not normally convey a locative meaning, but is rather an abstract prepositional phrase, as in (24) – (28):

(24) Of more interest in the present context, however, is an experimental situation in which the admission process is not fast, but becomes comparable or even slower than the reaction timescale. (FLOB, Science. J06)

(25) Among the reasons for public dissatisfaction with the American legal system was contentious procedure. (FROWN, Science. J44)

(26) Against this somber backdrop came the changes in Moscow's policy toward Eastern Europe. (FROWN, Science. J65)

(27) Of perhaps greater significance have been the questions of fabrication cost and operational cost and maintainability. (FROWN, Science. J73)

(28) Of particular note is the effort now being made to care for the victims of domestic violence. (FLOB, Miscellaneous. H09)

As will be noted in Section 3, the different clause-initial constituents in prepositional phrase inversion in fiction and non-fiction entail important differences in the pragmatic use of this construction in both text styles.

3. Spatial experiential iconic markers and text-structuring devices

As pointed out above, fictional and non-fictional texts differ not only in their distribution of prepositional phrase inversion, but also in the linguistic contexts in which they make use of the construction, and also, as will be noted, in the function it serves in discourse. In non-fictional texts from the categories *Science* and *Miscellaneous*, prepositional phrase inversion typically lacks a locative aspect. That is, the clause-initial constituent is not a locative phrase and the inversion is used in contexts where no physical or spatial arrangement is described. This is not surprising, since academic and official texts are most often concerned with the description of non-physical concepts, ideas, arguments or explanations, rather than with the description of physical or temporal entities. Fiction, by contrast, makes consistent use of prepositional phrase inversions which convey a spatial meaning, since this genre is characterised by a regular introduction of new scenes with their internal topography. An explanation for this is that locativity is inherent to fiction. Spatial and temporal reference is not an optional or peripheral feature of narration but a core property that

helps constitute narrative domains; narrative texts, for example, are marked by considerable reference to past time or places and change of scenes (cf. Herman 2001).[3] As discussed by Chen (2003), full inversion with a preposed locative constituent is the most common type of full inversion in written English, and indeed is the prototypical form. Both prepositional and adverb phrase inversions have traditionally been considered the best examples of so-called 'locative inversions' (cf. Coopmans 1989, Bresnan 1994, among others). Since fictional discourse is more locative-oriented than non-fictional discourse, it comes as no surprise that these types of full inversion are more common in fiction than in non-fiction.

Over the last few decades, many linguists have come to support the view that language is closely interrelated with human cognition and perception (cf. Langacker 1987, 1991, Croft 1990, Ungerer and Schmid 1996, Tomasello 1998). It has been argued (cf. Dorgeloh 1997, Kreyer 2006) that in spatial descriptions the distribution of information in prepositional phrase inversion reflects how the scene is observed. The fronted constituent points to a particular location, which represents given information, and guides the addressee's focus of attention in that direction. Once the location expressed by the fronted element is established, the addressee can focus 'more easily' on the postposed subject, which introduces the new information. Starting from this assumption, the analysis of FLOB and FROWN makes it clear that, in fiction, the use of prepositional phrase inversion is related to the *Principle of experiential iconicity* postulated by Enkvist (1981). This principle is derived from C. S. Peirce's notion of 'icon' (cf. Peirce, CP 2.247 and 2.274ff.) and has to do with the ordering of the elements within a linguistic unit which reflects experiences of the physical world. According to Enkvist, the text "becomes a portrait of our experience of the world" (1987: 207). This fact is also observed by Greenberg (1966: 103), who claims that "the order of elements in language parallels that in physical experience", and by Halliday (1994: 106), who argues that the experiential function concerns the clause in "its guise as a way of representing patterns of experience". In his taxonomy of signs, Peirce distinguishes three types of iconicity: *images*, *diagrams* and *metaphors* (Peirce, CP 2.277). According to Peirce, an iconic image is a single sign which resembles its referent with respect to some characteristic. Clear examples of this kind of iconicity are photographs, statues etc. An iconic diagram is a systematic arrangement of signs, none of which necessarily resembles its referent, but whose relationships to each other mirror the relationships of their referents. Examples of this type of iconicity are a football line-up and a radio circuit. Finally, metaphors are signs representing a "parallelism in something else", according to Peirce.

3. See Biber (1988: 191) for a similar view.

In more recent work on iconicity in language, notably that of Haiman (1980: 516-517), two types of diagrammatic iconicity are distinguished: *isomorphism* and *motivation*. The former codes the tendency for there to be a one-to-one correspondence between form and meaning. The latter is related to the reflection in linguistic structure of some aspect of the structure of reality. Enkvist's experiential iconicity must be understood as a type of diagrammatic motivation in Haiman's sense.

Enkvist (1981) distinguishes three major types of experiential iconicity in language: social, temporal, and spatial, as illustrated in (29) – (31) respectively:

(29) Ladies and gentlemen, you will note from the Chairman's introduction that my background is in aircraft maintenance. (FLOB, Science. J77)

(30) Susan and Tom got married and had a baby. [Adapted from Enkvist 1984: 56]

(31) In the west aisle are monuments to Sir Ralph Abercromby (1734-1801) and to Sir John Moore (1761-1809), who died at Corunna. To the left above is a memorial by Princess Louise, to the Colonial Troops who fell in the South African War. [Quoted from Enkvist 1981: 99]

In (29), the linear order of the elements in the noun phrase *ladies and gentlemen* reflects a social order of politeness by which ladies are mentioned before gentlemen in this idiomatic structure. Similarly, in (30) the elements in the clause are ordered in the same way as their referents in the world of things and the world of events; the addressor is temporally instructing the reader that *Susan and Tom* got married first and only afterwards did they have a baby. Finally, in (31) the writer indicates the order of operations in different spaces; through the use of thematisation he moves the addressor's attention from one place to another and implies "first take a look at the monuments in the west aisle, and then look left above to see the memorial". Through this *mimetic or experiential order* (cf. Enkvist 1981: 101) the text becomes an icon of experience. On the basis of FLOB and FROWN, the prepositional phrase inversions found in fiction are clear examples of spatial experiential iconicity. The process of perception in real life functions in such a way that viewers perceive the salient entities first, and only afterwards do they focus on particular entities or particular parts of these salient entities. However, this is done in a spatial context which is not only essential in the interpretation of the figure but is also normally experienced or shared in the knowledge of both addressor and addressee. In fictional descriptions, conversely, this shared knowledge about the context does not necessarily exist and the importance of the context is conspicuously mirrored in the syntax by the writer through the iconic fronting of locative

adverb and prepositional phrases and the postponement of the subject, as shown in (32) below.

(32) A terrace of Georgian houses glowed in the evening. The air raid was late tonight. **In front of the houses** stood a row of To Let signs. I was led down some iron steps and into a low, dark basement with stone paving on the floor. **Around the walls** were four or five mattresses, heaps of bedding, and an old sofa with the stuffing coming out. **In the middle of the room** was a table, at which sat a long-haired man, a woman who had once been pointed out to me in the Belgravia as MacCready's 'model', and the mysterious visitor. (FLOB, General Fiction. K11)

As can be seen in this example, every time the narrator introduces new features of the place being described, a spatial theme is selected (signalled in bold in the text). Each prepositional phrase provides a background for a new micro-event. The succession of spatial themes is the linguistic realization of a global spatial strategy chosen by the writer to guide the reader throughout the text, where he provides him with the physical schema needed to anchor the specificity of the events. In this sense, the writer creates an adequate spatial framework to locate the reader, before providing him with all the information about the particular place which is described, making – in Enkvist's terminology – the text *mimetic* with the way viewers experience the importance of spatial context in real-life. The inversions reflect the structure of the perception of a particular setting as someone experiencing the fictional world might, since the context is provided first. As a consequence, what is being communicated is made transparent for the reader, because, as Givón (1985: 189) notes, "a coded experience is easier to store, retrieve and communicate if the code is maximally isomorphic to the experience in the real world". Under these circumstances, then, the prepositional phrase inversions used in fictional texts can be considered markers of spatial experiential iconicity in discourse: the order of the constituents iconically resembles the importance of the spatial context in the interpretation of what is being described. Focussing on the context first is essential for contextualising the figure.

The above-mentioned spatial experiential iconic use of prepositional phrase inversion in fiction has also been attested in *Press Reportage*, although to a lesser degree. Reportages are concerned with news analyses but also involve the description of settings and physical entities, which justifies the experiential iconic use of the construction here, as illustrated in (33) below:

(33) A thoroughly normal living room is utterly changed by the invasion of a train, miniature in scale, but real. What makes the incongruous juxtaposition surreally logical is that the opening of the fireplace resembles the mouth

> of a railroad tunnel. All the elements of the pared-down picture contribute to its theme. On the mantel is a clock with its time stopped at 12:43 – has the train arrived on time? On either side of it are two candlesticks empty of candles, traditional symbol in still lifes of the irredeemable passage of time. Magritte is saying he doesn't need to fall back on such hackneyed symbols to make his point. Behind the clock is a mirror that reflects the clock's back and one of the candlesticks, but which otherwise reflects only the gray nothingness of the room, the existential void that is always the real subject of Magritte's paintings. (FROWN, Press Reportage. A38)

In (33), where the writer describes the arrangement of objects on a mantelpiece, three entities are described: *the clock*, *the candlesticks*, and *the mirror*. In clearly marked steps, these entities are introduced in the discourse one after another, beginning from the front of the mantelpiece – *the clock* and *the candlesticks* – and finishing at the back – *the mirror behind the clock*. Further, *the clock*, which is the most significant element in the description, is presented first, and afterwards the narrator scans the situation "beside it" and "behind it". It seems clear then that the description is a precise linguistic representation of the way viewers would approach the scene in real-life perception: we focus first on a nearby object, and then our attention wanders to more distant objects. It is this perceptual experience which can be observed as an important shaping factor in the textual progress and coherence of the description. Contiguity in fictional discourse mirrors contiguity in perception in these prepositional phrase full inversions, and it is the XVS syntactic arrangement with a fronted locative constituent that contributes to such a process. The different inversions are therefore ground-promoting structures which are used to anchor the events in the spatial descriptive process.

The texts in categories *Science* and *Miscellaneous*, by contrast, make a less consistent use of prepositional phrase inversion as a marker of spatial experiential iconicity in the sense discussed above, mainly because their texts are less concerned with spatial or physical descriptions. As a consequence, the writer is in less need of matching his linguistic representation to the way of presenting the physical perception of reality, and thus fewer prepositional phrase inversions with a spatial clause-initial constituent are found in these texts. As illustrated in (34) – (35), below, in *Science* and *Miscellaneous*, prepositional phrase inversion also conveys an iconic meaning, but this differs from that discussed for fiction. As has been proposed by a number of linguists (cf. Haiman 1985), one of the universal principles motivating word-order is that old information comes first whereas new information comes later in an utterance. In this sense, the inversion in (34) is iconic in that the temporal order of the constituents in the utterance reflects the temporal order of the introduction of information in discourse. In other words, the inver-

sion serves to place the old information – *this (a change in the variability in landing position)* – in clause-initial position, and to link it to the new information – *the possible effect of interference during a saccade* – which is introduced and placed in clause-final position. This is also noted in Biber et al. (1999: 914), who argue that examples such as those mentioned below "generally contain anaphoric links with the preceding text". In other words, prepositional phrase inversions of this kind perform a text-structure function in these categories, since the fronted element serves as a link to the previous discourse, as further illustrated in (36) – (38). In (36), for instance, *among those who endorsed the appeal* must be considered given information, because even though the process of endorsement has not been mentioned before, it is established in relation to a previously mentioned item *the appeal*, which represents given information, and links the new information – the postposed subject – to the previous discourse. The informational value of the subject is normally high and typically denotes a listing of entities, facts, or events which are introduced for the first time in the discourse.

(34) On the other hand, if the effects of premature triggering on saccades of normal extent is to increase the frequency of both under – and over-shoot, the overall result will be a change in the variability in landing position. To this will be added the possible effect of interference during a saccade. (FLOB, Science. J25)

(35) Poverty is the state of deprivation of fundamental human needs and expectations. Among these are the desires for sufficient food and water, adequate shelter, good health, long life, knowledge, and the capacity to provide materially for oneself and one's family through productive endeavor. (FROWN, Miscellaneous. H14)

(36) The appeal stated that women's direct participation in politics "is made impossible either by disabilities of sex, or by strong formations of custom and habit resting ultimately upon physical difference, against which it is useless to contend." Among those who endorsed the appeal were Beatrice Webb, Mrs. Humphry Ward, Eliza Lynn Linton, Mrs. Matthew Arnold, and Mrs. Leslie Stephen; a supplementary list of two thousand names was added two months later. (FROWN, Science. J65)

(37) Among the twelve were Sir Joshua Walmsley (president of both the Association and the Society); Cobden; Joseph Hume, the promoter of 'the Little Charter'; Samuel Morley; and Gilpin. (FLOB, Science. J59)

(38) Among these are the desire for sufficient food and water, adequate shelter, good health, long life, knowledge, and the capacity to provide materially

for oneself and one's family through productive endeavour. (FROWN, Miscellaneous. H14)

The non-locative cohesive effect of prepositional phrase inversion in non-fictional texts is further illustrated in examples (39) – (40) below. The clause-initial prepositional phrase is deprived of its locative meaning, that is, it no longer represents a physical space, and represents a cohesive tie by which contrast is expressed in the development of the argument. The prepositional phrases function as linking adverbials which highlight the contrast of information and also lead the reader to the main points that the writer puts forward. They do not, however, contain the presentation of the spatial perspective taking found in fiction.

(33) *On the one side stand those who hold that human embryos have the same moral status as mature adults from the time of their conception onwards and that any steps leading to their destruction must be analysed as a breach of fundamental human rights*. From this standpoint, research must be outlawed unless it can be carried out without interfering with the embryo's development. Abortion can only be permissible where it is carried out to protect this same value of human life, that is to save the life of the mother. *On the other stand those who believe that whatever status should be accorded to the human embryo, it is less than that of mature adults and may therefore sometimes be outweighed by the interests of adults who stand to benefit from research or termination*. (FLOB, Science. J50)

(34) NEH is able to play as an equal partner with much larger enterprises for several reasons, but none as important as its reputation over the years for being a well-run agency with a highly competent professional staff. *On the administrative side of the agency, are knowledgeable, collegial professionals who serve as stewards of taxpayer funds*. And *on the program side of the agency are dedicated, intelligent officials who daily encourage and inform potential applicants, and who, most importantly, assure fair and impartial review*. (FROWN, Miscellaneous. H26)

4. Conclusions

The present analysis has sought to show that fictional and non-fictional texts differ not only in the overall distribution of prepositional phrase inversion but also in the pragmatic function that this construction serves in both genres.

Fictional texts make a more extensive use of prepositional phrase inversion than non-fictional ones. An explanation for this is that full inversion with a

preposed prepositional locative constituent is the most common type of full inversion in written English (cf. Chen 2003); also, as is well-attested in the literature (cf. Biber 1988, 1989; Herman 2001, among others), fictional discourse is more locative-oriented than non-fictional discourse. In fact, since fictional texts are marked by considerable reference to past time and places, the different prepositional phrase inversions typically include a clause-initial constituent which conveys a spatial meaning. In other words, the inversions are used in contexts where a physical arrangement is described, and can be considered markers of spatial experiential iconicity (cf. Enkvist 1981). This iconicity, which is a variant of diagrammatic iconicity in the sense of Peirce (cf. Haiman 1980), is found in literary descriptions imitating in their structure the process of the (visual) experience in real-life. The process of perception in real life functions in such a way that viewers perceive the salient entities first, and only afterwards do they focus on particular entities or particular parts of the salient entities. Nevertheless, this is done in a spatial context which is not only essential in the interpretation of the figure but is also normally experienced or shared in the knowledge by both addressor and addressee. In fictional setting descriptions, however, this shared knowledge about the context does not necessarily take place, and the importance of the context is conspicuously mirrored in the syntax by the writer through the iconic fronting of locative adverb and prepositional phrases and the postponement of the subject. The use of prepositional inversion as a device which creates spatial experiential iconicity provides a means of shaping a descriptive discourse that follows the sequence of perceptual experience, and is a common way of organising narrative discourse. The order of the constituents iconically resembles the importance of the spatial context in the interpretation of what is being described. The description is therefore structured in a way which favours its understanding by the addressee, because the context encourages such an interpretation. Focussing on the context first is essential for contextualising the salient entity.

In contrast to fictional discourse, non-fictional discourse, with its attested less locative orientation, does not make use of prepositional phrase inversion as a marker of spatial experiential iconicity. In this text type, the construction is still iconic, in that the temporal order of the constituents reflects the temporal order of the introduction of information in discourse; the old information is placed in clause-initial position whereas the new information is placed in clause-final position. In this sense, the inversions are still text-structuring devices which code abstract relations, but there is no imitation of the spatial perspective-taking found in fiction, mainly because the clause-initial constituents of these inversions convey an abstract rather than a locative meaning. Clearly, this is due to the fact that in the non-fictional texts analysed here there is less scope for narration and spatial descriptions, and there is less need to introduce new scenes due to the world being

different from the shared common ground. A notable exception to this fact has been the category of *Press Reportage*, which is concerned with news analyses but also involves the description of settings and physical entities (cf. Biber 1988) and which, for this reason, also comprises a proportion of prepositional phrase inversions which serve a spatial experiential iconic function. Overall, however, the different prepositional phrase inversions are related to the type of discourse in which they take place. Fictional discourse favours prepositional phrase inversions which serve a spatial experiential iconic function, whereas non-fictional discourse favours prepositional phrase inversions which serve a different purpose and convey an abstract non-locative meaning. The discourse determines the type of prepositional phrase inversion used, and each type must conform and serve the discourse in which it occurs.

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What is iconic about polysemy?

A contribution to research on diagrammatic transparency

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This paper is a contribution to research on iconicity and diagrammatic transparency in the lexicon. The focus lies on the potential contribution of polysemy to iconicity that is generally neglected by iconicity researchers. The three Peircean icon types of images, diagrams and metaphors are scrutinised with respect to their relationship to polysemy. It is shown that polysemy is diagrammatic and also closely connected to Peircean metaphor, since the icon types of metaphor and diagrams considerably overlap. Consequently, polysemy also plays a role in diagrammatic transparency and therefore must be considered as a distinct degree on scales of diagrammatic transparency. Existing scales of diagrammatic transparency should be revised. The most important problem with them is that they concentrate on the formal part of word transparency and neglect the semantic part of transparency issues. Evidence from questionnaire studies on lexical motivation suggests that diagrammatic transparency is not only a formal issue, but strongly depends on the semantic relation connecting a stimulus and its motivational base. Stimuli that are related by metaphorical similarity to a potential motivational partner are perceived more easily as motivated than stimuli that are potentially motivated by contiguity.

1. Introduction[1]

Iconicity has been traditionally treated as a phenomenon limited to grammar (see, for example, Haiman 1985), though Roman Jakobson (1971 [1965]: 354) recognized that the lexicon, too, is iconic. However, it is only since Linda Waugh that the importance of iconicity for the lexicon has been taken seriously. Waugh (1994:

1. Special thanks to Sam Featherston and Dylan Glynn for the stylistic revision and the fruitful comments on an earlier version of this paper.

60-65) goes beyond traditional iconicity research, but still argues that there is an important constraint on iconicity in the lexicon, that is polysemy.

In this paper I will argue that, on the contrary, polysemy can contribute to iconicity in the lexicon. In order to demonstrate this, it will be first necessary to take a closer look at exactly how the Peircean icon types are related to polysemy (Section 2). As polysemy will be shown to be diagrammatic, I will (Section 3.1) claim that polysemy should be considered to be a distinct degree of iconicity by researchers establishing scales of iconicity, such as Dressler's (1985) scale of diagrammatic transparency. In this context, I will present a questionnaire based study (Section 3.2) that gives an interesting insight into the role the semantic part of diagrammatic relations plays in deciding whether an item is transparent or opaque. Section 4 sums up the findings of the paper.

2. How polysemy contributes to iconicity in the lexicon

2.1 Peirce's definition of iconicity

Though Peirce never completed his semiotic taxonomy (Short 2007: 207), his sets of sign classes, especially the distinction of icons, symbols and indexes, initiated and still stimulates modern research on iconicity in language (see, for instance, Nänny and Fischer 1999, Fischer and Nänny 2001, Müller and Fischer 2003, Maeder, Fischer and Herlovsky 2005, Tabakovska, Ljungberg and Fischer 2007). Short (2007: 207-234) gives an overview of the evolution that Peirce's taxonomy of signs underwent from 1902 to 1908 (the number of sign classes increased from 10 to 66, for example), but also states that in spite of the ongoing evolution and the fact that he never completed his theory of signs, "its main lines were clear from the start" (Short 2007: 207). In fact, Peirce never changed the essential definition of icons, symbols and indexes. He talks of icons in terms of a similarity between the sign and the object it stands for: "Anything whatever, be it quality, existent individual, or law, is an Icon of anything, in so far as it is like that thing and used as a sign of it" (CP 2.247, 1903). And, again, in another passage, "[...] A sign may be *iconic*, that is, may represent its object mainly by its similarity [...]" (CP 2.276, 1903). He distinguishes three subtypes of icons, that is, *images*, *diagrams* and *metaphors* (CP 2.277, 1903), whose relation to the phenomenon of lexical polysemy will be discussed in the following sections.

2.2 Polysemy and diagrammatic iconicity

In this paper, polysemy is understood in Blank's sense (2003: 273-278) who distinguishes it from homonymy by means of a set of seven semantic relations. If two meanings that are designated by the same linguistic form are linked by one of these semantic relations, we have to do with polysemy. If there is no semantic link between two meanings having the same linguistic form, they have to be considered as homonymous. Blank exemplifies this by the English word *arm*:

(1) The arm on the statue looks better than yours.

(2) A special arm of the government is to investigate the matter.

(3) His religious ambitions kept him from bearing arms.

(4) Three lions passant gardant (sic) … the Royal Arms of England.

Blank demonstrates that the meanings of *arm* in (1) and (2) are linked by metaphorical similarity, which means that we have to do with a polysemous word arm_1 having the meanings (1) and (2). Similarly, the meanings of *arm* in (3) and (4) are linked semantically, or more precisely metonymically "as indeed a noble's family's crest was painted on a shield, i.e. on an *arm*" (Blank 2003: 276). Thus, there is another polysemous word arm_2 having the meanings (3) and (4). Since there is no semantic relation between arm_1 and arm_2, they have to be considered as homonyms.

Let us now take a look at the most researched Peircean icon type, that is, *diagrams*. According to Peirce, diagrams are characterised by the fact that the relations between the parts of the signified are represented by analogous relations in the signifier's structure, in Peirce's words: "those, which represent the relations, mainly dyadic, [...] of the parts of one thing by analogous relations in their own parts, are *diagrams*" (CP 2.277, 1903)[2], as in Caesar's sentence *veni – vidi – vici*,

2. This definition of *diagram* is easily applicable to linguistic signs. However, Peirce also writes that "many diagrams resemble their objects not at all in looks, it is only in respect to the relations of their parts that their likeness consists" (CP 2.282, 1893). By saying that "many diagrams resemble their objects not at all in looks", he implicitly states that there are also diagrams that resemble their objects in looks. In spoken language this is of course impossible. In sign languages, on the other hand, at least lexical diagrams can resemble their objects quite closely in looks (cf. Demey et al., this volume). Written signs, especially pictograms, also can resemble the signified quite closely (for a more detailed discussion of this subject see Koch 2007). In written language this resemblance not only exists at the word level, but also at the text level, as in visual poetry. Google maps (http://maps.google.com) are an excellent non-linguistic example for different types of icons and diagrams. The satellite picture version can be classified as *image* in Peirce's terminology, whereas the traditional city map version is a *diagram*, because it represents the relations of the parts of the city. The hybrid version, which is a map superimposed on the satellite picture, is a diagram, too, but one that resembles its object in looks.

that Jakobson (1971 [1965]: 350) made into the best known example of diagrammatic iconicity. Jakobson argues that the temporal structure of Caesar's actions is reflected iconically in the sentence structure. It therefore is a grammatical, or more precisely, a syntactic diagram.

It seems to be obvious that this kind of iconicity does indeed also exist in the lexicon, most obviously in word-formation: the compounding of two words, for example, such as German *Apfel* 'apple' and *Saft* 'juice' into *Apfelsaft* 'apple juice' iconically reflects the combination of the concepts APPLE and JUICE into the concept APPLE JUICE. Of course, there are more complex examples of compounding than German *Apfelsaft*. There are compounds whose meanings are not simply an addition of the meanings of their parts, but are idiomatic to a certain extent, such as Ungerer's (1999: 310-311) example *wheelchair* that is not simply a chair with wheels, but has a special purpose, too. Consequently, the concept WHEELCHAIR is a fusion of more than two concepts and there is a certain disparity between the structure of the content level and the structure of the formal level at first sight. However, according to Ungerer (2002: 377), this instance can be regarded as iconic from another point of view: If the compound is lexicalised to the extent that the fusion of the concepts is total and a new, absolutely independent concept is created, and the form is no longer structurally analysed, the structure of the content is still preserved and reflected in the structure of the form. Thus in this case too we can talk of diagrammatic iconicity.

However, this kind of iconicity is not the only one to be found in the lexicon. In Hiraga's terminology (1994: 8), we can say that the instances discussed above are examples of *structural* diagrams, because the structure of the meaning is paralleled by the structure of the form. Yet, there is a second type of diagram which, at least in the area of the lexicon, is much more important, that is Hiraga's *relational* diagram. Hiraga considers relational diagrams to be a subtype of structural diagrams because relational diagrams, too, "presuppose the working of structural analogy" (1994: 8). The difference is that relational diagrams do not only reveal an analogy between the structure of content[3] and the structure of form, but are diagrams because they reflect, to a certain extent, the form and the content of *other* linguistic diagrams. That is, if the form of a relational diagram A is related to the form of diagram B, this relation is mirrored by a corresponding link between the contents of the diagrams A and B.

This icon type comes close to what Nöth (2001: 21-23) calls *endophoric* iconicity, which is different from *exophoric* iconicity because it has "to do with relations

3. Throughout this paper *content* is understood as an abstract, extralinguistic entity, corresponding to what is called *concept* by Blank (2001: 9). This concept comprises our encyclopaedic knowledge about things and is not language dependent.

of reference within language" and does not refer "to something beyond language" (2001: 22). Although Nöth focuses on the formal part of endophoric iconicity by defining it as "form miming form" (2001: 22), his examples (e.g., the singular-plural opposition) clearly show that there always is a semantic dimension too. Certainly paradigmatic relations like the singular-plural opposition enrich the iconicity of grammar rather than the iconicity of the lexicon, but similar paradigms exist also at the lexical level (cf. *singer – singers* vs. *singer – sing* below).

The difference between structural and relational diagrams can be shown by means of an example taken from Dressler (1985: 328). As stated above, a structural diagram is a diagram by virtue of the structural analogy between its form and its content. Thus, if a form consists of two parts, like the English word s*inger* (*sing* + *er*) the content has two parts, too. In this case the formal structure is paralleled by the conceptual structure in that the meaning of the verb is completed by the meaning AGENT, and thus, 'make musical verbal sounds' changes into 'a person who makes musical verbal sounds'.

Now, *singer* could also be analysed as a relational diagram, which is the point of view implicitly adopted in word-formation and motivational research (for word-formation research see Bauer 1983, Lipka 1990, Fleischer and Barz 1995, Pounder 2000, Apothéloz 2002, Grossmann/Rainer 2004; for motivational research see Saussure 1916, Gauger 1971, Fill 1980, Rettig 1981, Koch and Marzo 2007).[4] From this perspective what counts is that the relation between the two forms *singer* and *sing*, that is the relation between two forms that are similar, is paralleled by a relation between the respective contents.[5] Many linguists, Linda Waugh (1994: 63-65) included, speak of "similarity of meaning" in such cases. I would not say that the concepts of 'the one who makes musical verbal sounds' and 'to make musical verbal sounds' are *similar* (see also Kövecses 2002: 69-77), but, of course, it is true that they are experienced together, or, to say it in other words, connected, in this case by a contiguity relation (see the discussion of the notion of contiguity in Koch 1999 and Radden and Kövecses 1999: 19-21). Thus, iconicity does not only exist *within* signs, but is also an important phenomenon *across* signs.

4. Of course, both word-formation and motivational research also deal with the inner structure of words and therefore with structural diagrams. However, given that morphemes can only be singled out by comparing words and that transparency is defined as ease of identifying other formally and semantically related items "behind" a given word, the focus of this research implicitly lies on relational diagrams.

5. Certainly, the same holds for the relation between *singer* and *-er*, though this is not a relation between two lexical items in the narrow sense. In this case, we are again confronted with two similar forms, and the formal similarity is paralleled by a relation on the content level: *-er* meaning 'the person performing an action' is taxonomically superordinated to *singer* in the sense of 'a person performing the action of making musical verbal sounds'.

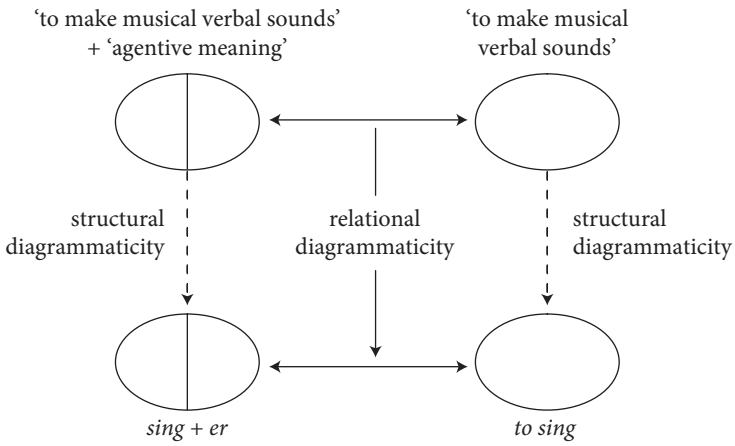

Figure 1. Structural vs. relational diagrammaticity; singer vs. to sing

The focus just no longer lies on the parallelism between the structure of the formal and the structure of the content part of a diagram (see the broken arrows in Figure 1 below), but on the parallelism between the relation of one diagram's form to another form and its content's relation[6] to the content of the other form (see the bold arrow in Figure 1).

In this context we must take a closer look at the principle of isomorphism coined by Haiman (1980: 515), that is, the one-to-one correlation between form and content. This principle is the basis of traditional morphology (Waugh 1994: 57) and implicitly underlies also the original Peircean diagrams. Haiman himself states, that "only by virtue of this correspondence between individual *signans* and *signatum* is it possible for the relationship of sets of *signantia* to mirror the relationship of sets of *signata*" (1980: 515). This means that isomorphism is a prerequisite for diagrammatic transparency, as it is understood by lexical motivation researchers such as Saussure (1916), Ullmann (1962, 1966 and 1969), Gauger (1971), Fill (1980), Rettig (1981), Dressler (1985), Ungerer (1999 and 2002), Koch (2001), Zöfgen (2008) and Koch and Marzo (2007). To put it in Linda Waugh's words (1994: 56), from the principle of isomorphism follows that "sameness of form from one sign to another signals sameness of meaning and difference of form signals difference of meaning". Waugh exemplifies this by words belonging to the same

6. Just like any formal relation between two diagrams can be further qualified in terms of word-formation devices, such as affixation, the relation between the content parts of two diagrams can be further described in terms of a set of semantic relations, like contiguity and metaphoric similarity (cf. Koch 2001). The implication for the Peircean distinction of diagrams and metaphors will be discussed in Section 2.3.

word family, such as *water*, *watery* and *waterfall*, that all somehow "share" a meaning that is formally represented by *water*. In terms of lexical motivation and word transparency research we can say that these words are transparent with respect to *water* or even to each other (for the bidirectionality of motivation and transparency see Umbreit, in press).

Linda Waugh (1994: 62-63) correctly states that if the principle of isomorphism was omnipresent, word meanings should always be recognizable from the word's parts. However, words do not necessarily or exclusively have the meaning their parts predict according to the principle of isomorphism. These phenomena lead Waugh (1994: 63) to posit that polysemy is a constraint on iconicity in the lexicon: it offends the principle of isomorphism, because one form is no longer correlated to one, but to two or more different meanings.

That this offends the principle of isomorphism is certainly true, if we think of diagrams as whole words that are, as a rule, polysemous. But if we take another look at the definition of diagrams, we can see that, irrespective of how many meanings a word might have, diagrams by definition always only have one content. Thus, what we are dealing with when speaking of diagrams, are not whole *lexemes*, but *lexical units* in the sense of Cruse (1986: 49, 80), that is, pairs of one form and one meaning.[7]

In fact, in the context of modern research on lexical motivation (Radden and Panther 2004, Koch 2001), it has been emphasized that words are not simply motivated as wholes, but rather via *lexical units*. Koch's definition of lexical motivation (2001: 1156; Koch and Marzo 2007: 263-264) perfectly matches the definition of relational diagrammatic iconicity given above. Koch argues that a lexical item L_1 is motivated with respect to a lexical item L_2, if there is a cognitively relevant relation between C_1 (= one of the concepts designated by L_1) and C_2 (= one of the concepts designated by L_2). Thus, motivational relations always hold between two units consisting of one form and one single content, as outlined in Figure 2. In other words, this means that they are qualified as relations between subparts of words rather than between whole words.

This view allows Koch (2001) to consider instances of polysemy as being motivated both *semantically* and *formally*. Considering the two lexical units, *mouse* 'small rodent' and *mouse* 'computer device' in English, we can say that there is not only a relation between the two senses, but also between the *forms* of the two lexical units, that is the relation of *formal identity* (Figure 3):

7. Cruse (1986: 49, 80) defines *lexical units* as units consisting of one form combined with one single meaning. Thus, from Cruse's point of view, the lexeme *arm*$_1$ consists of two lexical units (two identical forms with one meaning each), that is *arm* 'body part between the shoulder and the hand' and *arm* 'branch, section'.

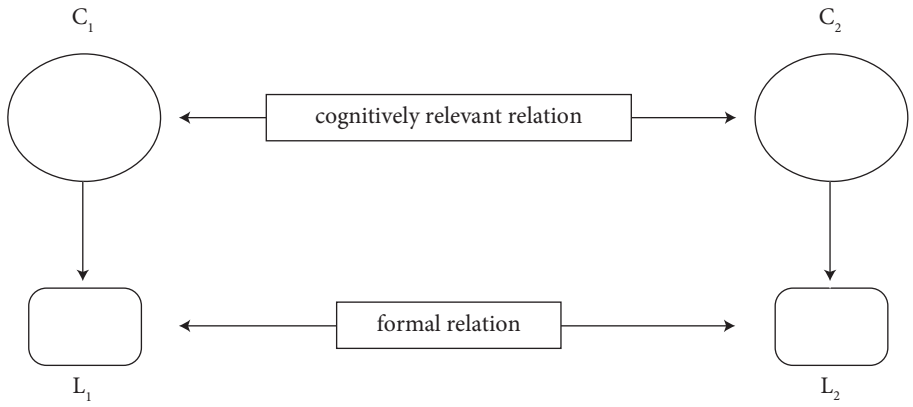

Figure 2. Motivational square (cf. Koch 2001: 1156)

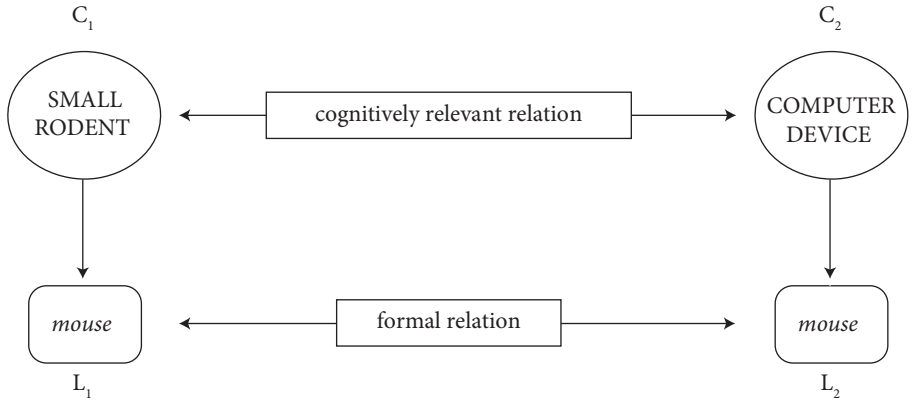

Figure 3. Motivational square for English mouse

Consequently, we have to do with two *distinct* units, as we also have in morphologically related cases like *computer* 'calculating machine' and *compute* 'calculate'. Morphologists such as Dressler (1985) agree that there is a diagrammatic relation between *computer* and *compute* since morphological reasoning follows, to a certain extent, the isomorphic principle that similarity in form signals similarity in meaning: being confronted with a known morpheme in an unknown word, the known morpheme gives us a cue to the meaning of the word. Similarly, if two identical forms mean two different things, we are induced to believe that the two meanings must somehow be related, and indeed they very often are, for example by metaphorical similarity or conceptual contiguity.

Interestingly, this point of view is also shared by Roman Jakobson (1971 [1965]: 352). He does not only speak of diagrammatic iconicity in grammar, but also of diagrammatic iconicity in the lexicon. In this context, he does not just name word-formation, but also polysemy. What is important for our purposes is that Jakobson, when speaking of the absolute prerequisite for a diagrammatic relation between forms, that is formal similarity, points out that formal similarity can also be absolute similarity, that is identity, and therefore polysemy. Thus, in contrast to Dressler's view, Jakobson (1971 [1965]: 355) claims that there is no need for a formal "increase" for an item to be diagrammatically iconic. "A partial similarity of two *signata* may be represented by a partial similarity of *signantia* […], or by a total identity of *signantia* […]", in other words: formal identity, that is, polysemy, too, is diagrammatically iconic, as we can easily see in the example he gives: in English *star* 'a fixed luminous point in the night sky' and *star* 'a famous or exceptionally talented performer in the world of entertainment' are formally absolutely similar, that is identical. Yet, they are not homonyms. Jakobson points out that there also is a relation on the content level, more precisely a metaphorical relation.

Jakobson's observation about the potential absolute similarity of the formal part of two diagrams is to be completed as there is the reverse phenomenon too, i.e. the potential absolute identity of the content parts of two diagrams. *Quick* 'fast' and *quickly* 'fast', for example, are not just similar, but completely identical in meaning. Hiraga (1994: 13) states that "a difference in form cues a difference in meaning, but it does not cue the nature nor the degree of the difference". Correspondingly, similarity in form *does* signal similarity in meaning, but it does not tell us anything about the nature or the degree of similarity (if we want to use the term similarity at all in this case, cf. Section 2.1), which is the reason for the existence of identity in content.

2.3 Polysemy and the icon type of metaphors

Jakobson's example of *star* leads us to another of Peirce's three icon types, that is, metaphor. According to Peirce *metaphors* signify an "object" by pointing to the parallelism between the "object" and something else. The *signans* points to important characteristics of the *signatum*. Peirce puts it this way: "Those which represent […] by representing a parallelism in something else, are *metaphors*" (CP 2.277, 1903). As we have seen, Jakobson's *star* in the sense of 'a famous or exceptionally talented performer in the world of entertainment' is diagrammatically iconic, because it is related to *star* in the sense of 'a fixed luminous point in the night sky' not only at the formal, but also at the level of content, by metaphor. From this perspective we might wonder whether metaphors and diagrams are really distinct types of icons or whether they are interconnected. Ungerer (2002: 374), for example, points

out that the distinction of diagrams and metaphors is a somewhat tricky affair. Fischer and Nänny's (1999: xxii) taxonomy of types of iconicity points very much in the same direction. They distinguish imagic (for example English *miaouw* 'sound made by cat') from diagrammatic iconicity, which can be either structural (Latin *veni – vidi – vici*; the sentence structure reflects the temporal order of Caesar's action) or semantic. Semantic diagrammaticity is characterised as mainly metaphoric. Thus, the concepts BODY PART AT THE END OF LEGS and LOWEST PART OF MOUNTAIN, for example, are expressed by the same linguistic form *foot* thanks to their conceptual similarity. As relational diagrammatic iconicity always involves a formal and a semantic dimension (see Section 2.2), Fischer and Nänny's subordination of metaphor or metaphorical similarity to diagrammatic iconicity is absolutely necessary at least for linguistic diagrams. However, Fischer and Nänny's separation of structural and semantic diagrams into two different subtypes of diagrams is problematic for exactly the same reason: if diagrams always involve a formal and a semantic dimension, structural and semantic iconicity are not different types of diagrammatic iconicity, but just two dimensions of the same phenomenon. In other words, this means that a diagram is not *either* of the semantic *or* of the structural type, but *always* has a semantic *and* a structural dimension at the same time, otherwise it would be no diagram. Hiraga's (1994) discussion of metaphoric iconicity gives a more detailed account of the relation between metaphors and diagrams than Fischer and Nänny's (1999). Talking of images, diagrams and metaphors, Hiraga (1994: 15-20) not only states that "in concrete examples of any iconic sign, the distinction appears to be fuzzy as we often encounter examples which show greater or lesser mixtures of these subtypes of icons", but even demonstrates that "metaphorical signs, with special emphasis on conventional and poetic metaphors, manifest all three aspects of icons".

In fact, considering Peirce's definition, we can say that metaphors are always relational and therefore diagrammatic in character, because a metaphoric icon always points to the parallelism between the signified "object" and something else, as relational diagrams typically do. This is also true for Jakobson's example *star* that we just have classified as a *diagram*: we can definitely say that the diagram *star* in the sense of 'a famous or exceptionally talented performer in the world of entertainment' points to certain characteristics of 'a fixed luminous point in the night sky'. We might imagine that people admire entertainment stars like they might admire a star in the sky, or that entertainment stars somehow illuminate the world of entertainment like stars in the sky enlighten the night. In this special case of *star*, and in many other cases, the relation between two contents is represented by a metaphor. Jakobson (1971 [1965]: 355) states that in other cases than *star* this job might be fulfilled by metonymy, but there are some more candidates performing the function of relating diagrams at the content level (Koch 2001), like conceptual

identity (English *quick* <> *quickly*), taxonomic relations (*booklet* <> *book*) or conceptual contrast (*possible* <> *impossible*). Thus, Peircean metaphor is closely connected to the notion of diagrams, or, to put it differently, the Peircean icon types of diagram and metaphor considerably overlap.

To sum up we can say that a (lexical) metaphor is always also a diagram, but a diagram does not necessarily involve a metaphor at the content level. As metaphors in the lexicon are more typical within the same word than across words (though, of course, metaphor may accompany morphological derivations at the content level as for example in Italian *rosa* 'rose' – *rosone* 'rose window'), the Peircean icon types of diagram and metaphor especially overlap in the area of polysemy, which, consequently, turns out to have an enormous potential to contribute to iconicity in the lexicon.

2.4 Polysemy and the icon type of images

Now that we have considered diagrams and metaphors, we need to take a look at Peirce's third icon type, that is, *images*. Images rely, by definition, on a physical similarity between the icon and its object (CP 2.277, 1903): "Those which partake of simple qualities or First Firstnesses, are *images*". In natural languages this is true for onomatopoeic words. Telephones, for example, usually emit a sound that English native speakers imitate by the word *ring*. This is an image insofar as there is a physical, more precisely acoustic similarity between the form and the content. The form the sound is designated with is supposed to be (at least) *like* the sound, just as in any other primary onomatopoeia.[8] As in these cases the content is supposed to motivate the form directly, that is without the interference of any other form or content, we should conclude that Peircean images do not have anything to do with polysemy. Of course, the lexical unit *ring* 'sound emitted by telephones' is diagrammatically related to the two lexical units *ring* 'to produce the ringing sound which indicates that there is a caller on the line' and *ring* 'to call (someone) by telephone'. Not only are they formally similar, there is also a continguity relation between the three words at the content level. However, the formal relation between the sound of a telephone and the two verbal forms is not that of polysemy, as they do not belong to the same word class: on the one hand, we have to do with verbal lexical units belonging to one and the same word, on the other hand we are

8. Ullmann (1962) distinguishes primary from secondary onomatopoeia. Primary onomatopoeia directly imitate sounds, the signified is a sound itself, such as Eng. *miaouw* 'sound cats typically emit'. Secondary onomatopoeia, in contrast, do not directly represent an acoustic impression, but mean something that is associated with an acoustic impression they try to imitate. Eng. *slither*, for example, means a certain movement. The form of the word is onomatopoetic, because it imitates the sound that is typically produced when someone or something is slithering.

confronted with an interjection. Thus, polysemy seems to be perfectly possible in the case of secondary onomatopoeia like the verb *to ring*. Primary onomatopoeic words that are the real Peircean images, in contrast, are very unlikely to be connected to another lexical unit by formal identity and word-class identity, because they are supposed to correspond directly to what they mean.

3. Polysemy and scales of diagrammatic transparency

3.1 Where to place polysemy on scales of diagrammatic transparency

The assumption that polysemy is to be put on a par with other formal motivational devices[9] implies that it necessarily plays a role also in diagrammatic transparency research and should therefore be placed on scales of diagrammatic transparency such as Dressler's (1985).

Dressler (1985: 328) assumes that diagrams can be more or less diagrammatic. In order to prove this assumption, he gives four examples. Thus, in his opinion English *song* with respect to *sing* would be less diagrammatic than *singer* with respect to *sing*, because there is no formal increase in the formal part of the sign *song*. Consequently, he considers word class alternations like the one between the English verb *to cut* and the corresponding noun *cut* as not at all diagrammatic. However, following the reasoning in Section 2, word class alternation can contribute to diagrammatic transparency in the lexicon for the same reason as polysemy. As soon as a lexical unit is related formally as well as semantically to another lexical unit, they are connected diagrammatically. His fourth example, subtraction, is even qualified as anti-diagrammatic "because less form contradicts more meaning" (Dressler 1985: 328). According to Dressler subtractions are extremely rare as a word-formation device, but still exist like in Hungarian diminutives, such as *zongora* 'piano' vs. *zongi* 'dear little piano'. In this case one could argue that *zongi* is indeed not diagrammatic if we consider it from the point of view of structural diagrams. Still, it definitely *is* diagrammatic from the point of view of relational diagrams, because there still is a formal as well as a semantic relation between *zongi* and *zongora*.

In the same paper Dressler (1985: 330-331) establishes an eight-point scale of morphotactic transparency based exclusively on cases of suffixation (subdivided

9. Formal motivational devices are for example word formation types such as affixation (Eng. *sing-er*), composition (*blue-bell*), but also gender alternation (Italian *pero* 'pear tree' <> *pera* 'pear'), grammatical category alternation (Eng. *love* <> *to love*) and many more (see Koch 2001, 1159–1161). All of these devices only account for the formal part of lexical motivation and are always accompanied by a semantic relation (see Figure 2).

into six points) and suppletion (subdivided into two points). As for suffixation, there are again two subgroups (of three points each), one corresponding to changes at the phonological level, the other corresponding to changes at the morphological level. In the first group transparency is only slightly obscured, e.g. by resyllabification in spoken language such as *to exist* vs. *existence* in English, whereas in the second group transparency is affected more seriously, such as *to decide* vs. *decision*.[10] As for suppletion, Dressler distinguishes weak suppletion, by which he means "alternation of single segments which is not predicted by a rule" (1985: 331), like English *child – children*, from strong suppletion that is characterized by the change of whole stems, like English *to be* vs. *am*, *are*, and *was*. Both types of suppletion are put at the end of his transparency scale, because they are "most unnatural on the scale of morphotactic transparency" (1985: 330), that is, the minimum of formal correspondence required for an item to be regarded as transparent is lacking. Comparing this scale of morphotactic transparency with his scale of diagrammaticity it is interesting to see that the principle of formal correspondence between two lexical items is apparently used to explain one phenomenon and its exact opposite at the same time: the scale of diagrammaticity is based on the need for formal increase for a lexical item to be diagrammatic (meaning that absolute formal correspondence hinders diagrammaticity like in English *cut* vs. *to cut*), whereas the scale of diagrammatic transparency is based on the need for formal correspondence for a lexical item to be transparent (implying that formal increase, like in the case of English *child – children* can reduce the degree of transparency). This apparent contradiction is extremely disturbing if we think of the fact that diagrammaticity and diagrammatic transparency are, at least from a cognitive and psycholinguistic point of view, exactly the same phenomenon.

This induces Koch and Marzo (2007: 272) to establish a scale of formal transparency based on the principle of formal correspondence by merging both of

I cases of total transparency due to polysemy:
Fr. *bois* 'forest' <> *bois* 'wood (the substance)'

10. The single degrees of transparency within these two groups (phonological vs. morphological level) in suffixation will not be discussed in detail here as the purpose of this paper is not to establish different transparency scales for each single motivational device, but aims at being a first step towards the elaboration of a transparency scale that accounts for transparency differences not only *within* single motivational devices, but also *across* different motivational devices. Dressler's scale (1985: 328) of diagrammaticity is a starting point in this direction. Unfortunately he does not elaborate this scale, but switches to a very fine-grained scale of morphotactic transparency (1985: 330–331). Even if this scale only accounts for transparency differences within suffixation, Dressler again shows that it is desirable to establish a transparency scale applicable to completely different formal phenomena by putting instances of suffixation and suppletion on the same morphotactic scale.

II total transparency, i.e. no allomorphic variation in the lexeme:
Fr. *service* <> *servir*
III reduced transparency, i.e. allomorphic variation at that end of the lexeme where an affix is added:
Fr. *décision* <> *décider*
IV minimal transparency, i.e. allomorphic variation in central parts of the lexeme:
Fr. *jeu* <> *jouer*
V non-transparency, i.e. no motivation, e.g. strong suppletion etc.:
Fr. *vite* 'quickly' vs. *rapide* 'quick'

Figure 4. Scale of formal transparency (from Koch and Marzo 2007: 272)

Dressler's scales into a five-pointed scale (illustrated in figure 4) that accounts for transparency differences not only *within* single formal motivational devices, but also *across* different motivational devices including polysemy:

Degree V corresponds to Dressler's degree VIII, the degree of strong suppletion. It is the degree of non-motivation like in French *vite* 'quickly' vs. *rapide* 'quick'. Degree IV represents cases of minimal transparency: there is allomorphic variation in central parts of the lexeme, like in French *jeu* 'game' and *jouer* 'to play'. Degree number III stands for cases of reduced transparency, which means that there is allomorphic variation only in that end of the lexeme where an affix is added, like in the motivational pair *décision* 'decision' and *décider* 'to decide'. Lexical units are totally transparent (degree II) if there is no allomorphic variation in the lexeme at all, as in French *service* 'service' and *servir* 'to serve'. Following the reasoning of this scale, from a theoretical point of view, lexical units that are part of one and the same word and consequently are formally identical, have to be considered as cases of total formal transparency too, because there is no allomorphic variation whatsoever, and what is more, no formal increase at all (degree I).

3.2 The impact of semantics on diagrammatic transparency: *a questionnaire study*

The assumption that the degree of transparency increases as the degree of formal correspondence between two elements increases, does not necessarily hold if we consider data from questionnaire studies on lexical motivation.[11]

11. Lexical motivation is understood in Koch's sense (2001: 1156) who defines it as a classical diagrammatic relation, i.e. as two lexical units connected by a formal and a semantic relation at the same time.

In the Tübingen research project *Lexical Motivation in French, Italian and German*[12] motivational partners (so-called reference units) are elicited in two steps. After an introductory part in which the subjects are presented with the question "Why is X called Y?", an explanation and examples, subjects are first asked to name a plausible *reference form-meaning pair* for a given *stimulus form-meaning pair*. In a second step, the informants are asked to describe the relation between their reference form-meaning pair and the stimulus form-meaning pair.

The present study was carried out on the internet with 56 German native speakers aged between 20 and 60 from comparable educational backgrounds (all of them were either still university students or had finished their university studies). The stimulus consisted in a word-form combined with a meaning definition and was followed by a usage example, such as in (5):

(5) Wort: *beschimpfen*
Bedeutung: 'jemanden wütend verbal angreifen'
Beispielsatz: Als ich mich in der Schlange vordrängelte, begann sofort einer der Wartenden mich zu *beschimpfen*.

English translation:

Word: *to insult*
Meaning: 'to attack somebody verbally in anger'
Example: When I jumped the queue, one of the people waiting immediately started *insulting* me.

The questionnaire seemed to work quite well in cases of morphologically complex lexical units that were almost all motivated with respect to a morphologically simpler lexical unit. Thus, a very frequent answer to the German stimulus *beschimpfen* in the sense of 'to insult' was *schimpfen* in the sense of 'to curse, to swear' (55%). To give another example, subjects of the same study had no difficulty in relating *Tischler* 'carpenter' to *Tisch* 'table' (93%). In contrast, in certain cases the formal motivational device of formal identity, that is polysemy, played a significantly minor role for motivation than might have been expected. The most impressive example is the German word *Tag*, which means 'time of sunlight' and 'space of 24

12. The DFG funded research project B6 *Lexical Motivation of French, Italian and German* within the Collaborative Research Centre 441 *Linguistic Data Structures* elaborates investigation methods to research lexical motivation empirically (cf. http://www.sfb441.uni-tuebingen.de/b6/index-engl.html).

hours'.[13] We might predict a motivational relation between the two lexical units *Tag* 'space of 24 hours' and *Tag* 'time of sunlight': on the formal side, there is the relation of formal identity, on the semantic side, we can speak of a part-whole contiguity relation, because the time of the sunlight is part of the period of 24 hours. However, in different pilot studies, subjects that are presented with one of the two form-meaning pairs do not think of the other form-meaning pair when asked to motivate one of them (96% and 100%). On the other hand, other German examples of motivation via polysemy worked out quite well, like *Krone* 'crown of a tooth' that was related by 98% of the subjects to another meaning of the same word, that is 'crown of a king'. How can the difference in the transparency of German *Tag* and *Krone* be explained? If we have a closer look at these examples, we can see that there is an important difference between them: The different senses of *Krone* are connected metaphorically whereas the senses of *Tag* are related by contiguity.

In order to check whether the difficulty of motivating contiguity-based polysemy is a systematic phenomenon, I have carried out another questionnaire study on 8 German lexical units. Four of them were supposed to have a metonymically related motivational partner, the other four were supposed to have a metaphorically related partner. As is shown in table 1, the stimuli were exclusively morphologically simple words in order to avoid the existence of potential formally different motivational partners. The stimulus meanings in column 2 were the second most salient ones obtained from a preliminary questionnaire study on polysemy. I expected the hitherto 10 subjects (from the same educational background as in the previous experiment) to relate these lexical units to the most salient meanings of the words, which are listed in column 3. Again, they first had to name a reference unit (that is, the lexical unit by which, in their opinion, the stimulus is motivated) and then to explain the relation between the stimulus and this reference unit. I expected that the stimuli would not be motivated in case of contiguity, but that they would in case of metaphorical similarity. Summarizing this table, we actually can say that metaphorical relations tend to be perceived more easily than metonymy-based relations.

13. The stimulus meanings were obtained as results of a preliminary questionnaire study on the polysemy of words. By using only the most salient meanings of this polysemy study in the questionnaires about lexical motivation, the research group makes sure that the stimulus meanings do not only exist in the dictionary, but are also psycholinguistically real.

Table 1. Results of a German questionnaire study on the motivatability of morphologically simple lexical units

Semantic relation	Stimulus	Expected reference unit	Percentage of subjects that actually responded as expected
contiguity	*Glas* 'material'	'drinking glass'	20%
contiguity	*Tag* 'time of sunlight'	'space of 24 hours'	0%
contiguity	*Erde* 'soil, earth (the substance)'	'the planet Earth'	40%
contiguity	*Weg* 'stretch of the road'	'concrete path on which we walk'	7%
metaphorical similarity	*Auge* 'globule of fat (on soups)'	'eye (organ)'	100%
metaphorical similarity	*Blatt* 'sheet'	'leaf'	100%
metaphorical similarity	*Ziel* 'objective'	'finishing line', 'destination'	93%
metaphorical similarity	*Schritt* 'abstract step'	'concrete step'	100%

What do these results mean for scales of diagrammatic transparency? First of all, they tell us that polysemy cannot simply be put at the top of such scales as proposed by Koch and Marzo (2007: 272). From the native speaker's point of view, this scale has to be revised in order to correspond to some "metalinguistic reality". Total formal transparency should be placed at the top of the scale for cases of metaphor-based polysemy (for example French *couronne*) and somewhere near the bottom as soon as contiguity-based polysemy is concerned. This could lead to a scale of transparency like the one in figure 5:

I cases of total transparency due to metaphor-based polysemy:
Fr. *couronne* 'crown of a tooth' <> *couronne* 'crown of a king'

II total transparency, i.e. no allomorphic variation in the lexeme:
Fr. *service* <> *servir*

III reduced transparency, i.e. allomorphic variation at that end of the lexeme where an affix is added:
Fr. *décision* <> *décider*

IV minimal transparency, i.e. allomorphic variation in central parts of the lexeme
Fr. *jeu* <> *jouer*

V Non-transparency, i.e. no motivation, e.g. strong suppletion and metonymy-based polysemy:
Fr. *vite* 'quickly' vs. *rapide* 'quick' and Fr. *bois* 'woods' <> *bois* 'wood (the substance)'

Figure 5. Revised scale of diagrammatic transparency

However, this scale of diagrammatic transparency is still not fully satisfactory, because it takes into account the semantic part of the motivational device of formal identity, but not yet the one of the other formal motivational devices. Let us have another look at the original scale, the one by Dressler (1985). This scale relies on findings of psycholinguistic experiments carried out by MacKay (1978). In his experiments, MacKay proved that the stem of a word can be best perceptually isolated from suffixed words in circumstances corresponding to II, and that isolation of the stem becomes more and more difficult as variation of the stem increases. What is of interest for our purposes is that the semantic relations involved in these experiments were exclusively the relation of contiguity (for example in English *to govern* 'to rule' <> *government* 'the ruling body') and, to a lesser extent, the relation of identity (for example *assign* 'to allocate something to someone' <> *assignment* 'the allocation or attribution of something to someone'). Therefore, we do not know how subjects would have reacted if other semantic relations had been involved, such as metaphorical similarity. And as has been shown in the experiments that have led to the revised but still provisional transparency scale in Figure 5, the consideration of metaphorical similarity can significantly alter scales of diagrammatic transparency. The difficulty of motivating polysemy in some cases and not in others shows indeed that matters of diagrammatic transparency seem to be much more complicated than outlined by Dressler (1985) and Koch and Marzo (2007), at least when metalinguistic speaker judgments are used as the criterion. From a cognitive and psycholinguistic point of view, the formal and the semantic dimension of lexical motivation and transparency are always closely connected and influence each other to a degree that is difficult to measure and does not allow the establishment of a transparency scale without a full account of all semantic relations, as has been done so far.

To sum up what has been said in this section, we could say that in order to be perceived as motivated, lexical units need to be *formally different* enough to be clearly regarded as separate, and *conceptually distant* enough from their potential motivational base. On the formal side, this *need* for difference accounts for the lack of "motivatability" in some cases of polysemy, such as German *Tag* 'time of sunlight' in contrast to morphologically complex stimuli, such as German *Tischler* 'carpenter'. Two identical forms like German *Tag* 'time of sunlight' and *Tag* 'space of 24 hours' are just not different enough to be consciously regarded as two distinct

items, even if they have different meanings.[14] This problem can be surmounted semantically, if the involved related meanings are conceptually distant enough, like in German *Krone* 'crown of a king' and 'crown of a tooth' that do not belong to the same conceptual frame. Thus lexical units related by formal identity are more likely to be motivated in the case of metaphorical relations than in the case of metonymic relations, just because the involved concepts, belonging to distinct frames, are relatively more distant, and therefore more noticeable.

4. Conclusion

In this paper, I have shown that the study of polysemy in the context of iconicity is instructive in various respects. First of all, in contrast to traditional assumptions, it has been demonstrated that polysemy can contribute to iconicity in the lexicon because lexical units can be diagrammatically related to other lexical units via formal identity combinable with any semantic relation. Hence, polysemy should be considered as a distinct degree on scales of diagrammaticity. I have shown that although it is necessary to put polysemy on scales of diagrammatic transparency, the exact point on which it has to be put is not as obvious and self-explaining as it looks at first sight. Questionnaire studies on lexical motivation have revealed that the semantic part of diagrammatic relations can considerably modify the degree of transparency we might have predicted. Indeed, it appears that morphologically simple lexical units that have a potential formally identical motivational partner are, in principle, as motivatable as any other lexical unit, but that the degree of transparency of these units significantly depends on the semantic relation by which they are connected to the potential motivational partner: metaphorical similarity seems to enhance motivatability whereas contiguity may limit it.

14. One could object that the lack of motivatability in cases like German *Tag* proves that German *Tag* is simply not polysemous in the speakers' minds. This assumption has been counterchecked in a small experiment on the polysemy of the eight German words presented in Table 1. 10 German native speakers were asked to name as many different meanings of the given stimuli as they could think of by formulating disambiguating sentences and giving short definitions. Interestingly, all 10 subjects distinguished the two meanings. In view of this evidence we must conclude that the lack of motivatability in cases like *Tag* is probably not due to the subjects not distinguishing the meanings linguists would expect as motivational partners. The contiguity relation between the two meanings of German *Tag* is traditionally described as a case of semantic neutralization (cf. Willems 2005).

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Iconicity in sign languages

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Sign languages are visual-gestural communication systems with a great potential for iconic structures and indeed, in sign languages iconicity is pervasive, both on the lexical and the grammical levels. However, in early sign language research the role of iconicity was downplayed in order to stress the similarities in structure between sign languages and spoken languages. For some authors, on the other hand, iconicity has been a reason for claiming that sign languages are organised in a fundamentally different way from spoken languages. Looking at sign languages from a phonological perspective, important questions remain unanswered in both these approaches. In this paper we try to provide answers to two questions. First, does iconicity play a part in the linguistic structure of sign languages and are sign language users aware of it? Second, what is the status of the sublexical elements in sign languages, and more specifically, should they be considered as phonemes or as morphemes? In the first section of the paper we shall explore the various forms of iconicity in sign languages, using the framework of Taub's Analogue Building Model (2001). In the second and third sections we shall confront two approaches of sign language phonology, Cuxac's sign language differential view with a focus on iconicity as the fundamental organising principle (1996, 2000) and the more spoken language compatible concepts of phonetic and semantic implementation by Van der Kooij (2002). These two accounts are the point of departure for the fourth section in which we shall put forward a proposal of an iconic superstructure which addresses iconicity in both the spoken and signed modalities and which offers an answer to both above-mentioned questions.

1. Introduction

In the past sign languages were completely ignored by linguists, essentially because they were not considered to be genuine human languages. This changed when in 1960 the American linguist William Stokoe published his book *Sign Language Structure* and showed that signs should not be considered indivisible wholes

but should be analysed as consisting of various smaller component parts. As such he was the first to show that a sign language exhibits duality of patterning, exactly as is the case for the words of spoken languages. This first modern linguistic analysis of a sign language[1] received a great deal of attention and particularly during the seventies, other researchers began to express interest in the linguistic structure of signs and sign languages (first mainly in the USA, and from the end of the seventies/beginning of the eighties, also in other countries). In the book resulting from the very first European Congress on Sign Language Research[2] Karlsson considers two different approaches to the analysis of sign languages (SL):

> On the one hand, there is the oral language compatibility view. This presupposes that most of SL structure is in principle compatible with ordinary linguistic concepts. On the other hand, there is the SL differential view. This is based on the hypothesis that SL is so unique in structure that its description should not be primarily modelled on oral language analogies. (Karlsson 1984: 149-150)

In the early days of sign linguistics sign languages were still very much considered useful but limited means of communication developed for those who, because of their hearing loss, have difficulties using a 'real' language. In order to prove that sign languages are indeed fully-fledged natural languages, independent of – but on a par with – spoken languages, many researchers felt the need to concentrate on the similarities between spoken and sign languages and adapted an oral language compatibility approach to sign language research. This implies that the underlying identity of spoken and sign languages is emphasised and that it is taken for granted that the 'spoken language tools', i.e. the theories, categories, terminology, etc. developed and used for spoken language research automatically 'fit' sign language research. Characteristics which (seemingly) mark sign languages as 'different' from spoken languages (e.g. the use of space, a high degree of similarity across the grammars of unrelated sign languages, iconicity) were often ignored, minimised or interpreted as comparable to spoken language mechanisms after all (Vermeerbergen 2006). It is from this perspective that the downplaying of the role of iconicity needs to be understood, because, as Johnston (1989) notes:

> [i]t has often been taken as a defining characteristic of languages that the relationship between signifier and signified is completely arbitrary and the 'language-likeness' of non-verbal signifying systems has been judged according to the degree

1. In fact, Stokoe was not the first to study a sign language: seven years earlier the Dutch linguist Tervoort had presented a doctoral dissertation on the use of signs with deaf children. Unfortunately, his (initially unpublished) work remained largely unknown for quite some time. Moreover, he didn't present his research as research on a sign "language".

2. This conference was organised in Brussels in 1982, three years after the very first International Symposium on Sign Language Research (in Skepparholmen, Sweden).

> of this arbitrary relationship. Systems in which the signifiers are highly motivated have been suspect and considered to be pseudo-linguistic. (Johnston 1989: 216)

Whereas probably everyone agrees that iconicity is an undeniable characteristic of signed languages, present at all levels of organisation, the general point of view within an oral language compatibility approach is, according to Johnston (1989: 222), that "the presence of iconicity in sign languages is neither significant in terms of linguistic patterning nor in terms of appropriate analytical concepts or terminology".[3] An important alternative approach is offered by the so-called 'French tradition', spearheaded by Christian Cuxac. Since the start of his work on French Sign Language, situated around 1980, Cuxac has always considered iconicity to be the central organising and structuring principle in sign languages (e.g. Cuxac 1996 and 2000). His approach is a clear example of what Karlsson called the "sign language differential view" on sign language research (see above).

These opposing views have resulted in different approaches to sign language phonology. In the following paragraphs both approaches will be illustrated by means of one sign language phonological paradigm considered "typical" of each approach, i.e. Cuxac's focus on iconicity as structuring principle in sign languages (and his sign language differential approach) and Van der Kooij's Dependency Model (and her oral language compatible approach). Central in the discussion of both models will be the following two questions:

- Does iconicity play a part in the linguistic structure of sign languages and are sign language users aware of it?
- What is the status of the sublexical elements in sign languages? Should they be considered as phonemes or as morphemes?

However, before going into the two models, it is necessary to somewhat expand on processes of iconicity in sign languages. For this exposition Taub's Analogue Building model will prove very useful.

2. The Analogue Building Model of Linguistic Iconicity (Taub 2001)

Taub, explicitly positioning herself in the tradition of cognitive linguistics, defines iconicity as "the existence of a structure-preserving mapping between mental models of linguistic form and meaning" (Taub 2001: 23). The appearance of any similarity between form and meaning in a linguistic sign does not necessarily mean that the perception of the form of that linguistic sign is sufficient for its un-

3. Cf. Johnston (1989: 222–228) for a brief overview of the arguments to support this view as put forward by a number of different authors.

derstanding. In other words, iconic (words and) signs are not always transparent. Research into the transparency of iconic signs in Italian Sign Language, for instance, has clearly shown that not all the iconic signs provided were correctly interpreted by the deaf and hearing informants (Pizzuto and Volterra 2000). This implies that

> we can see the need for a definition of iconicity that takes culture and conceptualization into account. Iconicity is not an objective relationship between image and referent; rather, it is a relationship between our mental models of image and referent. These models are partially motivated by our embodied experiences common to all humans and partially by our experiences in particular cultures and societies. (Taub 2001: 19-20)

The resemblance which we perceive between a referent and a linguistic sign is linked to the structure-preserving similarities between our mental models of the two elements:

> This means that for each entity, we figure out its relevant parts and the relations between the parts: This is the perceived structure of the entity. Then, given the structure of one entity, we look for corresponding structure in the other entity. The more correspondences we can find, the more we believe the two entities resemble each other. (Taub 2001: 22)

The set of correspondences between two elements is called "mapping" in cognitive linguistics and the idea of mapping is fundamental in Taub's Analogue-Building model. The process of analogue building starts with a concept for which a linguistic expression needs to be found:

> For example, the concept "tree" probably contains images from many different sensory modalities: visual images of various tree species and individuals, tactile images of how bark and leaves feel, auditory images (for hearing people) of leaves rustling and branches groaning in the wind, kinaesthetic images of climbing trees or cutting wood, even images of smells and tastes associated with trees. Along with this plethora of sensory images, there is no doubt encyclopaedic information about how trees grow from seeds or cuttings, their life cycles, their uses, and so on. (Taub 2001: 45)

The model consists of three stages and applied to a sign like TREE – the same sign in American Sign Language (ASL) and Flemish Sign Language (VGT) – the three stages can be demonstrated in the following model (Taub 2001: 44):

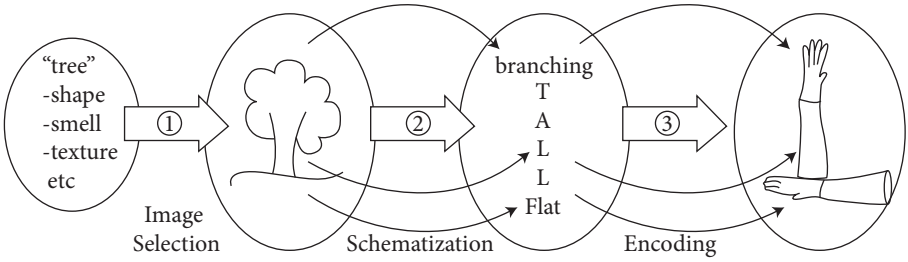


Figure 1. The Analogue Building Model (Taub 2001: 44)

1. *Image selection*: From all the information one sensory image is chosen to reflect the whole concept. Both for ASL and VGT a visual image has been chosen reflecting a tree – with a trunk and branches – that grows on a flat surface.
2. *Schematization*: The image of the tree with a trunk and branches is then schematized into a form that can be represented in a sign language. For the image of the tree that means that there are only three remaining components: a level surface, a long vertical shape departing from that surface and on top of that a complex branching structure.
3. *Encoding*: The last step in the process of analogue building is the "translation" of the scheme into concrete linguistic structures that maintain the characteristics of the image as closely as possible. The result is "an iconic form-meaning pairing" (Taub 2001: 47), i.e. the spread dominant hand reflects the branches of the tree, the upper arm (up until the elbow) the trunk, and the passive hand, which supports the dominant hand, represents the surface of the earth.

Taub further points out that in the encoding process there are two points at which languages can make relatively "arbitrary" choices. First, every (sign) language consists of a series of conventional building blocks to represent schematised images, which Taub (2001: 48) calls "iconic image-schematic items". They stand for a combination of a semantic category (e.g. *flat, large, branching*) and a phonetic form (respectively "horizontal forearm", "upright forearm", "spread hand"). The link between the semantic category and the form is, according to Taub, language specific, because

> [t]he semantic categories are language-specific (though in a broad sense, they may be similar cross-linguistically because of universals in the human perceptual system); the phonetic forms are taken only from the allowable forms of that language; and the language uses only a conventionally established subset of the form-meaning pairs that resemble each other. (Taub 2001: 49)

The second arbitrary choice that sign languages can make in the process of analogue building involves the lexicalisation of iconic image schemata. Certain combinations of form and meaning are being conventionalised in the lexicon of a language. In the case of the sign for TREE the same has happened both in ASL and VGT. Moreover, once a sign (or word) has become conventionalised, it is possible that the users of that language lose sight of the iconic origin of the sign (or word). Furthermore, Taub makes a distinction between pure iconicity and what she calls metaphors:

> Let me give a strict definition of those items which I consider purely iconic. In iconic items, some aspect of the item's physical form (shape, sound, temporal structure, etc.) resembles a concrete sensory image. That is, a linguistic item that involves only iconicity can represent only a concrete, physical referent (...). Thus, ASL tree (...), whose form resembles the shape of a prototypical tree, is purely iconic: Its form directly resembles its meaning. (Taub 2001: 20-21)

In Taub's model, metaphors, contrary to purely iconic items, are characterised by a double mapping (and in this respect they behave differently from metaphors in spoken languages): firstly there is metaphoric mapping from the concrete to the abstract domain, and secondly there is iconic mapping from the concrete source domain to the linguistic domain. The result is "that the target domain is actually presented using an iconic depiction of the source domain" (Taub 2001: 97).

Taub distinguishes different iconic relations between linguistic forms and image schemata in sign languages. In opposition to rather limited opportunities for pure iconicity in spoken languages, sign languages have a vast array of iconic representations at their disposal. The reason for this is fairly straightforward: many referents possess visual and spatial characteristics, while only a small number of referents is related to a specific sound.

> In brief, ASL's iconic devices draw on our perception of hands, arms, and fingers as having overall shapes, locations, and movement; on our ability to "see" the path that a moving object traces out in space; on our knowledge that the signer's body is a human body, like other human bodies in shape and function; on our additional knowledge that animal bodies often resemble human bodies in shape and function; on our ability to recognize the body movements that go along with particular activities; on our perception that body gestures take place over time and in space; and on our knowledge of the movements of signing itself. (Taub 2001: 67)

For sign languages, Taub singles out ten different relations to encode image schemata into linguistic forms in sign languages, which, however, do not compose an exhaustive list: Referent-for-referent: (present) referents refer to themselves; Shape-for-shape; Path-for-path; Body-for-body; Path-for-shape; Space-for-space;

Size-for-size; Number-for-number; Time-for-time; Sign-for-sign. In addition, four relations at the level of image selection can be discerned:

1. pars pro toto;
2. selection of a prototypical member;
3. selection of a typical action associated with the concept;
4. selection of the image of another object which is closely associated with the concept.

Although Taub's model is very elaborate, it still doesn't provide any thorough answers to the questions posed above: *Does iconicity play a part in the linguistic structure of sign languages and are sign language users aware of it?* and *What is the status of the sublexical elements in sign languages? Should they be considered as phonemes or as morphemes?* One of the merits of Van der Kooij's phonological dependency model, which builds on Taub's, is that it manages to take Taub's model one step further and especially focuses on the stage of encoding (see further down). However, before explaining Van der Kooij's model, we would like to expand on Cuxac's theories, who takes a completely different position, and – especially in his earlier work – has claimed that there is no phonological level in sign languages, but that iconicity is the central structuring principle.

3. Iconicity as structuring principle in sign languages

Cuxac (e.g. 1996, 2000, 2004) occupies a special position in sign language research which is mostly dominated by Anglo-American models. He considers iconicity to be the central organising and structuring principle in sign languages and proposes a semiogenetic model that assumes that all sign languages emerge from the same cognitive-communicational process. This process is anchored in a) the practical-perceptual world, b) visual cognition, c) the semiotic intentionality of communication proper to human beings and d) face-to-face discourse interactions (cf. Fusellier-Souza 2006).

At the basis of the creation of 'signs' lies the 'iconisation' of experiences, perceptions, etc. This 'primary iconisation' is the common trunk from which during the evolution of a sign language two sub-branches emerge: (1) *'la branche à visée iconicisatrice'* or *'dire en montrant'* (saying by showing) and (2) *'la branche hors visée iconicisatrice'* or *'dire sans montrer'* (saying without showing). Whereas (2) is roughly equivalent to the use of the established lexicon, (1) implies that a signer makes

visible their real life or imaginary experiences and observations through the use of what is called *'des structures de grande iconicité'* ('highly iconic structures'):

> J'ai appelé structures de 'grande iconicité' les traces structurales résultant de la mise en jeu d'une visée iconicisatrice, lorsque la dimension intentionnelle du 'comme ça' est présente, et ai regroupé fonctionnellement l'ensemble des structures de grande iconicité en opérations dites de 'transfert' (Cuxac 1985). Il s'agit d'opérations cognitives qui permettent de transférer, en les anamorphosant faiblement, des expériences réelles ou imaginaires dans l'univers discursif tridimensionnel appelé 'espace de signation'. (Cuxac 2003: 14-15).

It should be noted here that Cuxac does not imply that there is no iconicity present in the structures resulting from (2), but what's important is the signer's 'illustrative intent' i.e. whether s/he *chooses* "to say by showing" or not. Sallandre (2007) visualises this as follows:

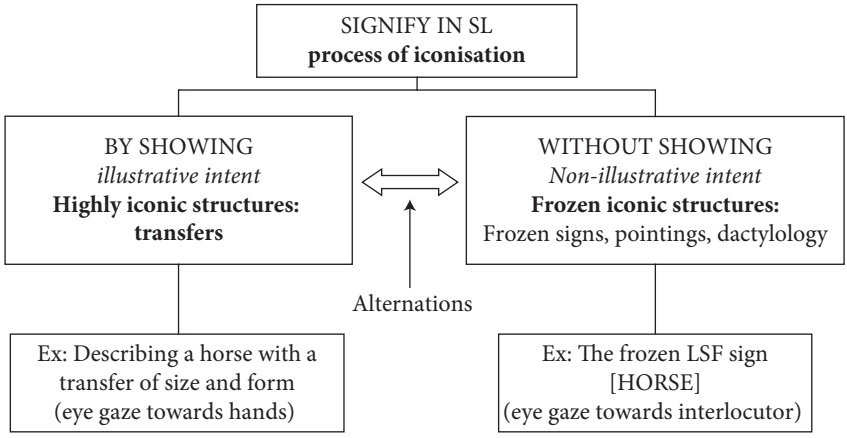


Figure 2. Illustration of Cuxac's (2000) model according to Sallandre (2007)

'Saying by showing' is realised by means of complex structures – or operations – called '*transferts*'.[4] Cuxac distinguishes three basic forms (cf. Vermeerbergen, Leeson and Crasborn 2007):

1. *'Transferts de taille et/ou de forme'* ('transfers of size and/or shape'), allow for the representation of the size and/or shape, in part or whole, of places, objects

4. Cuxac's transfers include structures that have also been discussed outside the French tradition, where instances of *'transferts personnels'* are often referred to as 'role taking', 'role shift' or 'perspective shift' and examples of *'transferts situationnels'* as 'classifier constructions'. Cuxac (2000) explains how these more traditional interpretations differ from the ones suggested by the author.

and persons. An example from Flemish Sign Language is where a signer traces the shape of the hearts present on the wall of Hansel and Gretel's *ginger bread house* by means of her two index fingers (Demey 2005: 428).

2. *'Transferts situationnels'* ('situational transfers') iconically 'reproduce' a scene which demonstrates the spatial relationship between a character and a stable locative point of reference, typically the movement of a character in relation to a fixed location; the scene is presented as seen from a distance. The example from Flemish Sign Language in the next figure refers to a person approaching a car (Vermeerbergen 1996: 52):

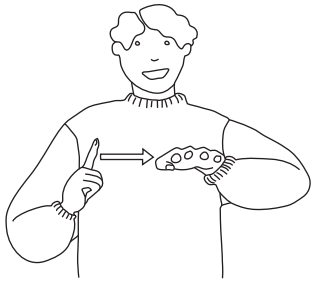


Figure 3. An example of a VGT construction representing a person approaching a car

3. *'Transferts personnels'* ('personal transfers') occur when the signer uses their body to 'represent' the actions or postures of a protagonist in the discourse; the signer 'becomes' the entity or character discussed. An example of such a transfer from VGT shows a signer 'impersonating' a witch by means of her body posture (bending forward and leaning on a walking stick) and facial expression (looking very disturbed) (Demey 2005: 430).

A personal transfer can be combined with a situational transfer to form a '*double transfer*'. In yet other cases the personal transfer is incomplete i.e. the signer does not completely disappear to 'become' a character or entity. This is called a '*semi-transfer*'.[5]

Whereas *'la branche à visée iconicisatrice'* involves the use of transfers, *"la branche hors visée iconicisatrice'* implies the production of lexical (established) signs. Cuxac seems to suggest that almost all lexical signs are derived from (highly) iconic structures. This lexicalisation process entails that the meaning is no longer the sum of the iconic components, but that it becomes a more generic one:

5. For an in-depth discussion of these structures, see Cuxac (1996, 2000) and Sallandre (2003) who presents an elaborate refinement of Cuxac's model, identifying more than twenty different forms of transfer.

> Une fois qu'elles sont stabilisées, le sens de ces formes contrairement aux structures de grande iconicité ne correspond pas à la somme des sens de leurs composants morphémiques: PONT n'est plus "cette forme longiligne mince et plate se déployant en léger arrondi au dessus de... " mais tout simplement un "pont" avec toute sa généricité et ses multiples valeurs signifiées. (Cuxac 2004: 107)

Cuxac compares lexical signs to molecules, made up of 'atoms of meaning': "un signe peut être envisagé comme un conglomérat d'atomes de sens dont seul le regroupement en un signe (une molécule) est linguistiquement attesté" (2000: 145-146). Although most of the atoms are iconic, this need not be the case, but even when they are not, Cuxac considers them to be morphemic (2004: 102). As such, there are various possibilities: some signs exhibit global iconicity and the component parts themselves are iconic morphemes. In other signs, some of the component parts are motivated but not iconic, e.g. the handshape of a lexical sign which is 'borrowed' from the manual alphabet. There are also signs that contain elements that are completely meaningless, and hence non-morphemic. With respect to these signs Cuxac (2004: 104) states: "les éléments paramétriques qui entrent dans la composition d'un signe et qui ne relèvent pas d'une valeur morphémique (...) fonctionnent au titre d'encadrement 'phonétique' nécessaire à la réalisation du signe comme bonne forme". The manual part of a sign always consists of the simultaneous realisation of four parameters (handshape, orientation, location and movement). As such, the non-iconic parameter is necessary in order to obtain a well-formed sign and it conforms to the other parameters. Finally, some signs are comprised entirely of non-iconic, non-morphemic component parts. Cuxac (2000) recognises that such signs pose a problem for his analysis, but he seems to think that, at least in French Sign Language, these signs are exceptional. With respect to Flemish Sign Language, Demey (2005, § 5.6) shows that it contains a good many partly-motivated and arbitrary signs, but of course French Sign Language may behave differently.

Whereas iconicity in highly iconic structures is always preserved, this is not the case in lexical signs, where the iconicity may degenerate over time. However, Cuxac (2000) also formulates "une contrainte de maintien d'iconicité" (2000: 141). This restriction demands that the iconic traces of the process of iconicisation which lies at the origin of the sign need to be maintained as much as possible.

Even if Cuxac is not the only sign linguist to explore iconicity in sign languages, it should be clear from the above that it is indeed possible to distinguish a "spécificité française". Crucial to Cuxac's approach is the radical decision to treat iconicity as the central organising and structuring principle in sign languages. This has led to an all-embracing model of iconic transfer structures which allows the researcher to describe and analyse an important part of the message in a sign language. Furthermore Cuxac's theory extends to the established lexicon. While there

are other researchers who have discussed the iconic value of established signs (Boyes Braem 1981, Brennan 1990, Taub 2001, Van der Kooij 2002), Cuxac is one of the very few to call into question the status of the so-called 'phonological' elements which are at the same time motivated. Cuxac's answers are far-reaching and call for a revision of certain fundamental principles of (sign) linguistics. As such, Cuxac shows himself a true adherent of the "sign language differential view" on sign language research.

4. The Dependency Model: Sign language phonology and iconicity reconciled

Van der Kooij (2002) designed a phonological model for Sign Language of the Netherlands which is in many ways innovative (see Figure 4).

In the figure the formal representation of the Dependency Model is provided; all phonological features in the model, which is based on the principles of Dependency Phonology, are included. It shows that the compositional structures of phonological representations are binary and that those binary structures are headed. The same Dependency Model was used by Demey (2005) to describe Flemish Sign Language.[6]

Typical of the Dependency Model is its strict application of the distinctivity criterion: only meaning distinctive and unpredictable information is taken up in the phonological structures and features. All redundant and predictable forms are captured in phonetic implementation rules. A phonetic implementation rule (PIR) associates an underlying, phonological representation with an allophonic or phonetic realisation. In VGT the default implementation of the Finger Selection feature [one] is the 1-handshape, with a relaxed extended and adducted index, as in Figure (5).

6. For more information about the specific properties of the model, we refer to Van der Kooij (2002) and to Demey (2005) and Demey and Van der Kooij (2008).

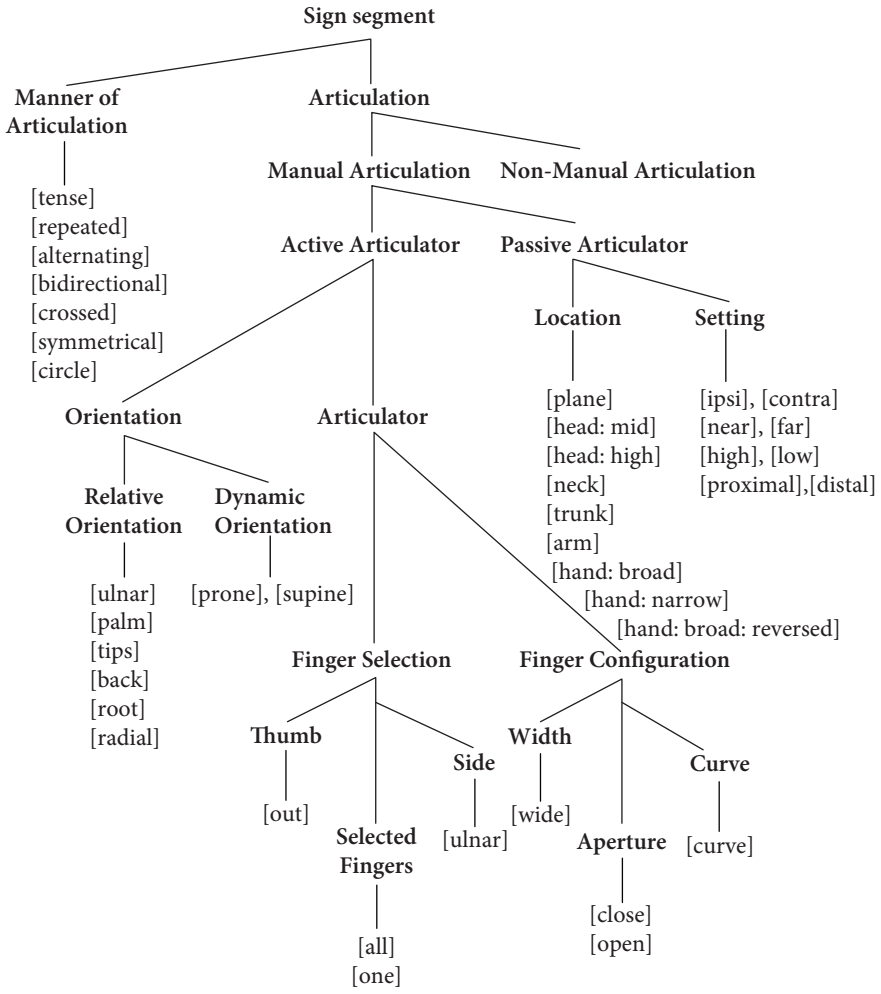


Figure 4. The Dependency Model (Van der Kooij 2002)

Figure 5. 1-handshape

Redundancy or 'allophonic' rules state that a feature will be realised as some 'allophone' or other on the basis of another phonological element. Here we consider two specific allophones of the feature [one], viz. the 1-hand with extended index (Figure 5), or the 1^-hand in which the index is bent at the base joint (Figure 6).

Figure 6. 1^-handshape

In the absence of any feature that affects base joint position, the default implementation of the feature [one] is the 1-handshape with extended index. However, if the fingertip of the index is oriented towards a part of the head or body, [one] is likely to be realised with bent index (cf. for NGT: Crasborn and Van der Kooij 1997, 2003). In other words, in VGT, and presumably in other sign languages as well, the feature [one] is realised as a 1^-handshape, when the orientation feature [tips] and a location feature (on the head, body or the weak hand) are part of the phonological representation. The Phonetic Implementation Rule in this case would be: [one] → 1^ / [tips] and location feature (head or body).

We can illustrate this redundancy rule with the following examples of VGT signs with either a 1- or a 1^-hand:

EVENING WHO

Figure 7. 1-handshape

HOW-LONG PILL

Figure 8. 1^-handshape

In both EVENING and WHO the radial (or thumb) side of the 1-hand is directed towards the face of the signer (to the chin or the cheek). This is represented by the feature [radial] in the Orientation node. Consequently, in both signs the fingers are in a neutral position, i.e. /extended/. In both HOW-LONG and PILL, however, the 1-hand contacts the body or the hand with the tip of the index, thus forcing it to bend at the base joint.

Unique for this phonological model is that it not only uses strict distinctiveness, but that it also explicitly deals with iconicity in the established (conventionalised) lexicon of sign languages. Analogous to phonetic implementation, the model provides the concept of semantic implementation and thus offers a way of integrating the phonological analysis of a sign language and the presence of sublexical iconicity in that language. A Phonetic Implementation Rule associates a phonological object to a specific phonetic form element, given a certain (formational) context; a Semantic Implementation Rule does the same, given a certain form-meaning association. In other words, if some form element makes a lexical contrast by the mere fact that it carries meaning through an analogous association with its denotatum, this meaningful form element is not represented in the phonological system but is seen as a semantically motivated phonetic realisation of a phonological object.

Phonological component X → Form element x / Semantic Property Y

Figure 9. Format of a Semantic Implementation Rule

We can exemplify semantic implementation with VGT signs for feelings and emotional states. Many signs for emotional states are made on the location of the chest, mostly in the heart area, e.g. SCARED, HAPPY, IN-LOVE, SAD etc. This location conforms with the common cultural conception that feelings originate in the

heart.[7] As for the motivated location in SCARED this implies the following implementation rule: the phonological feature [trunk] is realised as a location on the contralateral (i.e. left) part of the chest in case the sign contains a meaning aspect 'emotional state'. This rule can be schematised as:

[trunk] → Contralateral part of the chest / 'Emotional state'

SCARED IN-LOVE

Figure 10. Examples of signs with a semantic implementation rule

Through the instrument of semantic implementation, the Dependency Model enables us to capture the pervasiveness of sublexical iconicity in sign languages. This offers several advantages in comparison to other sign (phonological) models. First, by transferring iconic form elements to the phonetic level, the phonology of sign languages becomes "manageable" (Van der Kooij 2002: 289), i.e. the inventory of phonological features can be strongly reduced. Second, the analogy between phonetic and semantic implementation reflects the competitiveness between phonetic and iconic forces in some contexts or registers. In fast signing, phonetic forces such as ease of articulation may predominate over iconic forces, whereas in neologisms or poetry the iconic motivation of signs will prevail (for an analysis of some neologisms in VGT, cf. below and Demey 2005).

The model put forward in Van der Kooij (2002) does justice to both linguistic theory and the iconicity pervasive at all levels of sign language structure. In this way she approaches iconicity in sign languages from a spoken language compatible view. She bases her analysis on fundamental phonological or – more generally – linguistic principles, such as contrast and maximal simplicity, and attempts to

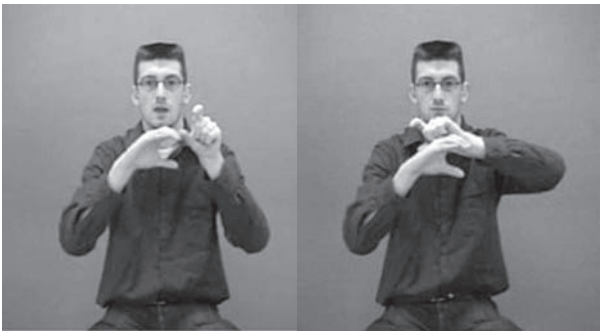
7. Van der Kooij (2002: 32–33) calls the association between the heart location and emotional states a "metaphoric" relation: there is no direct, mimetic representation, but a metaphoric representation. The concept "feelings" is associated with the heart as the host of emotional activities. However, this does not hold for all signs for feelings: the example SCARED which is given here, shows a direct mimetic relation, because it represents the heart beat of a scared person.

incorporate special characteristics of sign languages in her model by adapting existing mechanisms.

5. Proposing an "iconic superstructure"

Most researchers agree that large parts of sign language lexicons originate in gestures and iconicity (cf. Brennan 1990, Cogill-Koez 2000a, b, Cuxac 2000, Frishberg 1975, Johnston and Schembri 1999, Taub 2001, Van der Kooij 2002, Woll 1990). However, only few researchers have addressed the synchronic status of iconic forms in sign languages. Following Wilhelm von Humboldt's philosophy of language (cf. Humboldt 1979), Demey (2005) argues that, even if iconicity is at the origin of sign language forms, sign language is never a pure icon. On the contrary, she considers language to be both "sign"[8] and "icon". Demey (2005) further claims that this is not only applicable to sign languages, but also to spoken languages.

We will clarify this by means of an example of a neologism in VGT, i.e. the sign EARTH'S CRUST. This sign was developed within the framework of a lexical innovation project in Flanders in which new signs were designed by Deaf signers for gaps in the primary and secondary school technical jargon for mathematics, geography and history (Van Herreweghe and Vermeerbergen 2003).



EARTH'S CRUST

Figure 11. a neologism in VGT

8. "Sign" is used in the general linguistic sense here, as 'an arbitrary combination of form and meaning'.

In this sign the weak C-hand[9] refers to the earth (or in fact, the earth mantle which is the layer below the earth's crust) and the strong G-hand refers to the earth's crust.

When forming a new sign the iconic character of a sign language plays an important role but at the same time, the combination of a sign form and a meaning leads to a conventionalisation and arbitrarisation which makes the sign a linguistic form. Following Demey (2005), we identify two stages in the conventionalisation process. First, there is the synchronic or immediate conventionalisation on the basis of the diachronically determined existing systematicity of a language. Every newly formed sign enters into a system of existing forms and meanings and thus it comes both on the form level and on the meaning level into opposition with these already existing signs. In the case of EARTH'S CRUST this means that there are other signs using e.g. the same handshapes (such as the VGT signs GLASS and LEG with C-hand(s) and WORD and WINDOW with G-hand, cf. Figure 12) and that there are other signs referring to the earth.

Second, we identify a diachronic conventionalisation which refers to the changes a new sign undergoes when it becomes more widely used. The sign will adapt to the conventions of that specific language, e.g. the C-hand in EARTH'S CRUST representing the earth might develop into a B-hand[10] which is a more frequently used weak hand in VGT (Demey 2005). This may result in a de-iconisation: whereas the sublexical form-meaning associations are still very strong in the initial use of the sign, these might become increasingly less predominant (cf. the concept of "erosion", Haiman 1985). Form and meaning become more and more arbitrary and the meaning of the conventionalised sign is no longer the sum of its iconic parts, but is more generic. Such signs concord with the principle of duality of patterning: they have become meaningful units that consist of smaller, meaningless elements.

However, this is not the end of the story. Throughout the process of diachronic conventionalisation, part of the iconic qualities of signs remains intact (cf. Cuxac's "contrainte de maintien d'iconicité" (2000: 141); see above). Demey (2005) considers this iconicity as a superstructure which can be more or less prominent according to contextual factors, such as the setting, the text genre, the theme and the individual signer. As for the example of EARTH'S CRUST, this could mean that in a geography class it can be used in an arbitrary way as one concept in relation to other geological concepts, but its iconic value can be activated. By focusing on the width of the opening between thumb and index of the C-hand, the iconic

9. C-hand =  G-hand = 

10. B-hand = 

form-meaning association comes to the forefront and this can be done e.g. in order to explain the varying thickness of the earth's crust across the globe.

GLASS

WORD

Figure 12. Examples of signs with C-hand (GLASS) and with G-hand (WORD)

As has been explained above, Cuxac acknowledges two communicative intents in signers, "saying by showing" and "saying without showing". We can concur with his view, but in contrast to Cuxac's strong sign language differential stance, we want to argue that these two communicative intents exist both in the signed and in the spoken modality. The intent to "show" is not unique for sign languages, but exists in spoken languages as well. For both modalities it can be claimed that when the focus is on imitation and on evoking the way something looks or sounds, the iconic value of the language forms will be at their strongest.

The iconic superstructure in language encompasses much more than just "showing" or "imitating sounds". Many researchers focus on individual signs and mainly on their easily recognisable iconic origins. However, the iconic superstructure does not only exist on the lexical and sublexical level, but also on e.g. the

syntactic or the discourse level (cf. the distinction between "image" and "diagram"). Moreover, according to this concept of iconicity as superstructure, iconicity in language structures is not objectively observable. On the contrary, the language users' intents are crucial, i.e. the intents of the speaker/signer and the interprettation by the interlocutor. This means that in principle every language form or construction has a potential iconic value, on the condition that there is one language user who recognises an iconic form-meaning association.

We want to stress the assertion that utterances with an iconic intent and utterances without "intent of showing" can be composed of exactly the same forms. This implies that there are no separate form reservoirs for iconic and non-iconic utterances, although utterances with an intent to show will probably contain more constructions built ad hoc and exceptional form elements.

Some examples can further illustrate the concept of iconic superstructure and various speaker intentions. When a speaker is speaking about a small dog and s/he wants to stress that it is a very small dog, then s/he does not have to express this by lexical modifiers (e.g., "a very small dog" or "a tiny dog"). S/he can also indicate this by using a high-pitched voice or a specific facial expression, e.g. a facial expression with eyes narrowed and eyebrows frowned. A very big dog will be described with eyes wide open and the adjective "big" can be lengthened to stress it ("a biiiiig dog").

In poetry, iconic effects are often obtained by repeating the same words and/or sounds. A champion in this respect is Alfred, Lord Tennyson.[11] A well-known example can be found in the final lines from "Come Down, O Maid":

> The moan of doves in immemorial elms
> And murmur of innumerable bees.

Here the sound of the doves and the bees is iconicised by the onomatopoeic effect of the repeated /m/-phoneme in 'moan', 'immemorial', 'elms', 'murmur', 'innumerable' (but especially in 'murmur') and the final phonemes in bees /i:z/.

A richer example can be found in the following lines from Tennyson's 'Ulysses':

> The lights begin to twinkle from the rocks:
> The long day wanes: the slow moon climbs: the deep
> Moans round with many voices. Come, my friends,
> 'Tis not too late to seek a newer world.

Here we can find iconicity at various levels. A first is related to metre: a large part of the poem is in iambic pentameters (as can be seen in the first and the last lines

11. We would like to thank Bart Eeckhout for having provided us with these examples and for having pointed out the extensive and complex use of iconicity by Alfred, Lord Tennyson.

in the extract above), i.e. lines containing five feet of stressed plus unstressed syllables resulting in a fairly swift rhythm. However, in "The long day wanes: the slow moon climbs: the deep Moans round with many voices" Tennyson didn't use any iambic pentameters, but made use of spondaic[12] substitutions instead. The fact that there are more stressed, long syllables slows down the pace of the poem reflecting the natural phenomena of the darkness slowly setting in and the moon slowly climbing. At the same time Tennyson made use of intralinear caesuras (conveyed by means of colons), again slowing down the pace of the poem in this line. At the level of sounds, Tennyson extensively used onomatopoeic iconicity, as can be seen in the first line in the extract above: the word 'twinkle' is onomatopoeic, which is at the same time enhanced by assonance on the short /i/-sounds. This can be contrasted with the next one and a half lines where the long vowels and diphthongs create the opposite effect. Moreover Tennyson also played with iconicity at the level of syntax by using enjambment in the second line in the extract above. Because of the parallelism in line two (article – adjective – noun – verb: the long day wanes: the slow moon climbs) the reader expects the word 'deep' at the end of the second line to be an adjective as well, but that is not the case. When continuing with the next line it becomes clear that 'moans' actually is a verb and we nearly have to go back to realise that *deep* here is a noun. The reader is deliberately misguided and becomes confused, again reflecting the natural phenomenon of darkness setting in so that we cannot see clearly anymore.

Both in the examples of the small or big dog and in the extracts of Tennyson's poems there are no changes in the distinctive features and representation of the words. What does change and add meaning, is the way in which the forms are used. The iconic superstructure manifests itself in a specific intonation, in the rhythm, in the tempo of speech, in playing with syntactic structures and in a certain facial expression.

In sign languages too, there are signals indicating that the signer has an iconic intention. Depending on the size of a dog, signers will make a larger or a smaller movement with their hands when forming the sign LARGE. Such variation should not lead to different phonological representations, but can be captured in the semantic implementation rules of Van der Kooij's Dependency Model. Whereas in non-iconic communication the size of the movement in LARGE will conform with the default size (or will be conditioned by phonetic factors), in iconic communication the meanings [very big] or [very small] will determine the realisation of the movement.

The question still remains as to what is the status of the forms in iconic and non-iconic utterances. This brings us to the second of the above-mentioned questions:

12. A spondee is a metrical foot consisting of two long or two stressed syllables.

What is the status of the sublexical elements in sign languages? Should they be considered as phonemes or as morphemes? The discussion of Van der Kooij's Dependency Model showed that meaning plays a role on the sublexical level. On the one hand, many sublexical elements seem to be part of the phonological level, but on the other hand, they are also potentially meaningful and thus seem to have morphemic status.

To bring some clarity to this issue we refer to Johnston and Schembri's theory of the "phonomorphemes" (Johnston and Schembri 1999). In an attempt to delimit the notion "lexeme" within their lexicographic research of Australian Sign Language they come to comparable insights about the relationship phoneme-morpheme-lexeme. They suggest that "all signs are fundamentally multi-morphemic" (1999: 131). The components of a sign are often meaningful in themselves and therefore, they are both phonemes and morphemes, coined by Johnston and Schembri as "phonomorphemes": "By this we simply mean that the minimal identifiable units of the language – handshape, location, orientation, movement and nonmanual features – are the substantive building blocks and are themselves meaningful" (1999: 118). To decide which lexical elements should be part of their sign language dictionary Johnston and Schembri distinguish between "productive signs" and "lexemes". "Productive signs" are newly made combinations of form elements with an iconic character and with a general semantic value or meaning potential. Vermeerbergen (1996, 2006) calls these lexical innovations "sign constructions" and to avoid confusion we will use this term instead. We can exemplify this with our EARTH'S CRUST sign. Before it was coined with this specific meaning, the form "G-hand moving along the fingers of a C-hand" could be used with the general meaning "layer on the surface of a bulbous object". This implies that it could be used to refer to, for instance, a thick layer of sugar on sugar-iced apples, to the golden layer of a magic ball or … to the crust of the earth. A "lexeme" or an established sign on the other hand has a citation form and a more specific meaning than the meaning potential of its components – or even a meaning not related to that meaning potential. Every "sign construction" can be lexicalised and become a "lexeme" (and as such Johnston and Schembri (1999: 116) regard lexemes as a subset of the set of productive signs (or sign constructions)) as in Figure 13.

During the lexicalisation process, however, the lexeme inherits the meaning of every form component and the result is that lexemes are two-sided. On the one hand they are built from discrete, conventional and arbitrary units; on the other hand they also remain generalised componential signs. In other words, lexemes are monomorphemic and their components function as phonemes or phonological features, but this is just a "dormant union of many into one" and therefore Johnston and Schembri prefer to call lexemes "unimorphemic" instead of "monomorphemic" (1999: 132). This dormant union can be broken up so that every component is activated – and in that way the lexemes have become polymorphemic again.

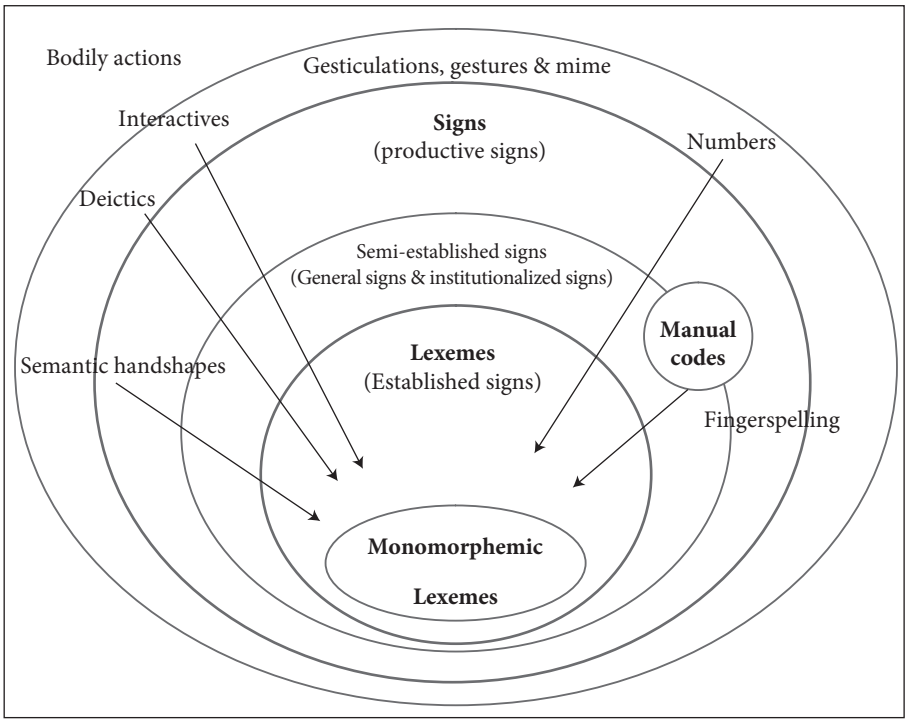


Figure 13. A hierarchy of lexicalisation in sign languages according to Johnston and Schembri (1999) (shading omitted)

In this respect, in sign language texts we can find three kinds of units: unimorphemes, (reiconised) polymorphemes and sign constructions. Indeed, Johnston and Schembri confirm that lexemes are only a subset of the meaningful signs regularly found in any text (1999: 130). Figure 14 below clarifies the different relations between form and meaning in the three units.

The distinction between unimorphemes, re-iconised polymorphemes and sign constructions and their various form-meaning relations indicate some important differences between spoken and signed languages. First, in sign language communication newly coined sign constructions are much more frequent than newly formed words in spoken languages.

Next to the quantitative difference it is striking that the sign constructions are composed of minimal form elements which have phonemic status in lexemes. In the sign constructions these form elements do carry meaning – meaning they extract from their highly iconic character. Thus, in sign constructions the phonemic and morphemic levels seem to coincide. If we disregard borrowing from other

UNIMORPHEME	Form components x, y, z, … One meaning A	X (x, y, z, …) A
RE-ICONISATION from unimorpheme to polymorpheme	X → form components x, y, z, … Meaning components a, b, c, …	X x y z a b c
SIGN CONSTRUCTION	Form components x, y, z, … Meaning components a, b, c, …	x y z a b c

Figure 14. Form-meaning relations in unimorphemes, polymorphemes and sign constructions

languages and look at language-internal mechanisms only, we can see that in most spoken languages new compounds and derivations are mainly formed by using existing morphemes in those languages. Those morphemes are composed of smaller, meaningless form elements. This explains why all kinds of phonotactically possible phoneme combinations which can be made in spoken languages, such as "cliss" and "fropee", are not automatically meaningful (although one does automatically look for an iconic, onomatopoeic relation between form and meaning, cf. Johnston and Schembri 1999: 124).

A second difference is the potential meaning of sublexical form components in the established lexicon. In many cases, lexicalised signs are used as arbitrary form-meaning combinations. A phonological analysis of the components of these signs can reveal the systematic nature of sign forms. Apart from this, however, there is also an iconic superstructure that can remotivate the sublexical form-meaning relations. This superstructure offers the language user the possibility – either productively or receptively – to relate a phonetic form element directly with a meaning.

Nevertheless, as stated before, the *potential* meaningfulness of sublexical form elements does not indicate a modality difference between sign languages and

spoken languages. Iconic – or otherwise motivated – relations between form and meaning can be found in both signed and spoken languages. However, the enormous potentiality of the visual-gestural signal for iconic motivation, and specifically for image iconicity, is a modality consequence.

6. Conclusion

The concept of an iconic superstructure enables us to capture some of sign languages' characteristics which pose specific problems to classical (spoken) linguistic analyses and conceptualisations, such as the role iconicity plays on the synchronic level and the status of phonemes and morphemes. It also offers a way of integrating the at first sight very different role of iconicity in spoken and signed languages. We have shown that the two modalities do not produce differences in kind, but only in degree. In principle, every language element or structure has a potential iconic value, if only a language user projects the superstructure on those forms. Nevertheless, within the realm of image iconicity, the visual-gestural modality does offer more potentiality.

The idea of communicative intent ruling iconicity (Cuxac 1996, 2000, 2004) is appealing, but further research focusing on sign or spoken language use could clarify the way in which communicative intents switch by exploring the possible formal indications of these switches, such as eye gaze, gestures, intonation, stress etc.

The concept of iconic superstructure does not only call for a more sign language differential view in sign linguistics, but also questions the traditional delimitations of general linguistics. The instruments speakers typically possess to step into the iconic superstructure, such as intonation and gestures, are often not considered to be genuine linguistic domains or are only studied in the margins of linguistics. Nevertheless, we believe that they can offer important insights in the various uses of linguistic elements.

With this article we hope to have contributed to an integration of spoken language compatible and sign language differential perspectives on sign languages. We are convinced that a combination of the instruments and methods of general – spoken language based – linguistics with an open eye for the specificity of sign languages as linguistic objects is the most justifiable way to study sign languages.

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Arbitrary structure, cognitive grammar, and the partes orationis

A study in Polish paradigms

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This usage-based study tests the explanatory power of an iconically motivated theory of lexical class. The principle that basic level grammatical categories are motivated by our direct perceptual experience is an integral part of Cognitive Grammar (Langacker 1987, Talmy 2000). However, recent research on English, Dutch, and German (Glynn 2006, 2007) has revealed mixed results in the application of this theory, suggesting that its descriptive power may be restricted to a very abstract level of semantic structure. This investigation focuses on the above question, looking at the class-lexeme productivity of a range of relational classes, such as adverbs and adjectives, in a morphologically rich language. The lexical field is that of 'rain'-'snow' for the West Slavic language Polish. This perceptually based concept should offer a best-case scenario for examining the class-lexeme compositionality with an iconically motivated grammatical category. Despite this, the results show no particular evidence for iconic motivation, throwing weight behind the position that iconic motivation in grammar is at best an abstract tendency with little semantic impact.

1. Introduction: Iconic motivation in cognitive grammar

Cognitive Grammar holds that all formal structure is motivated.[1] What is more, it argues that the basis of grammar is perceptually motivated, that is, fundamentally iconic. A *pars orationis* is argued to be one such iconically motivated conceptual category. In this study, we consider the combinatory possibilities of a lexical concept and various *partes orationis*. Employing a usage-based approach and found data, we examine the productivity of class derivation in the Polish lexical field of

1. I would like to thank Olga Fischer, Willy van Langendonck, Kris van Heuckelon, Daniela Marzo and two anonymous reviewers for their kind help. All shortcomings remain my own.

RAIN – SNOW. We ask if one may account for the irregularities in the grammatical structure with such an iconically motivated grammar.

This study builds on previous work presented in Glynn (2005, 2006, 2007), which examines the iconic tenets of Cognitive Grammar. These studies show that although the theory, as proposed by Langacker (1987) and Talmy (2000), does indeed help explain much of the complexity involved in this well-known issue, it fails to systematically account for the vagaries that result from the interaction of closed class and open class semantics. It is found that although the rich semantic information associated with lexical concepts combines with lexical classes in a reasonably predictable manner, at times, the complexity of lexical semantics overrides the more abstract semantics of lexical class. In such instances, the integration, or semantic compositionality, of a lexical concept and a grammatical category is not felicitous because of lexical semantic features. This is counter to the position of Goldberg (1995), Talmy (2000), and Michaelis and Ruppenhofer (2001), who argue that grammatical semantics typically coerce lexical semantics in compositional structure. However, the counter examples in Glynn (2006, 2007) are still open to alternative explanations where questions such as salience and frequency can be evoked to explain the exceptions to the predictive power of the grammatical model. In this study, we examine examples for which there seem to be no synchronic explanations for the constraints on the possibility of class-lexeme combinations, or in Langacker's (1987) terms, semantic integration. In other words, we see what appear to be purely arbitrary grammatical constraints.

Issues such as lexical licensing and integration-compositionality have recently come to the fore in Cognitive Linguistics (Glynn 2002, 2004a, Michaelis 2003). Indeed, many within the research community, for example Baayen (2003), argue that a radically different approach to such questions must be taken and the idea of probability driven grammars is gaining currency. Although such a step may eventually be informative in language description, it certainly cannot explain creative language use and so theories that attempt to predict grammaticality will always have a place in linguistics. Recent research more than adequately shows the importance of iconicity in grammatical semantics. However, one must be careful not to rely too heavily on what are very abstract notional structures at a close analytical level. We see below the limitations of doing so.

In Section 1, we examine the position of Cognitive Grammar and why iconic motivation is basic to its explanation of lexical class. We then turn to a simple way of testing this hypothesis of Cognitive Grammar. In this Section 2, a lexical field is identified as well as a set of iconically motivated grammatical categories. A perceptually based lexical concept is chosen to offer a best-case scenario for the application of the cognitive theory. Section 3 examines the productivity of the combinatory possibilities of the identified lexemes and lexical classes. Important

limitations to the explanatory power of Cognitive Grammar are identified. Section 4 summarises the investigation and asks questions concerning the possibility of a grammar motivated entirely by our experience of the world.

1.1 The meaning of a lexical class

The existence, and indeed pervasiveness, of iconic motivation in language has been long established in the post-structural and post-formalist schools of linguistic thought (Haiman 1980, Fischer 2004, Van Langendonck 2007, etc.) and we may assume the importance of this phenomenon in any empirical description of language. In general terms, Cognitive Linguistics evokes a model of language that is necessarily and inherently motivated: all form is symbolic. This entails that the use of any formal structure is motivated by its meaning. Such symbolic motivation should not be confused with iconic motivation. However, Cognitive Grammar walks a fine line on this point, positing perceptually motivated symbolic structure. In short, this can be seen as a kind of iconic symbolism.

Normally, the reference of a sign is iconically motivated only if there is a perceptual relationship between the sign and the perceived *Lebenswelt*. How this is related to a grammatical category may not be entirely obvious. As Coseriu (2004 [1972]) rightly points out, a lexical class and a *pars orationis*, or part-of-speech, are two separate phenomena. A lexical class is a category of forms, grouped by formal characteristics, where a *pars orationis* is a semantic or functional category that can be used to group various forms. Although Coseriu's point seems indisputable, the isomorphic motivation that is the basis of the form-meaning pair in Cognitive Grammar, effectively conflates these two different phenomena.[2] By linking the form and the meaning in an isomorphic manner, the lexical class and the *pars orationis* become merely two different perspectives on the same linguistic unit of a given language. The implications of this for the study of iconicity in grammar are important.

In examples such as word order iconicity, of the type *veni, vidi, vici,* it is the form that reflects the perceived world; the formal and tangible order of words. In such instances, the iconic motivation is not only inarguable, it is clearly testable. However, diagrammatic iconicity becomes more difficult to test when we do not speak about a relation between form and reality, but between meaning and reality. This kind of iconicity is argued to be the basis of many grammatical concepts in Cognitive Grammar. For example, the lexical class of noun is not iconic, but the *pars orationis* that denotes 'thing' is argued to be universal due to its basic perceptual value. Langacker (1987) argues that 'things', 'relations', and 'processes' are grammatical concepts that are a direct result of universal experience of the world

2. Kleiber (1993) demonstrates unequivocally the isomorphic tenets of Cognitive Grammar.

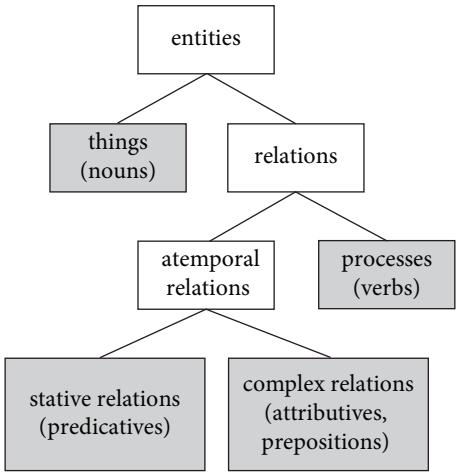

Figure 1. Lexical classes and perceptual categories[3]

and possess an isomorphic relationship with the corresponding lexical classes. In this theory, a basic distinction is held between things and relations. Here, things correspond to nouns and relations divide into temporal and atemporal relations. This distinction, in turn, distinguishes verbal from adjectival, adverbial, and prepositional relations.[4] It is this experiential basis that determines the grammaticality of the forms to which these concepts are ascribed.

In a recent study that challenges the iconic theory of summary and sequential scanning (Broccias and Hollman 2007), the basic lexical classes that designate the perceptual categories are clearly summarised. In Figure 1, the shaded boxes represent perceptual categories that correspond to lexical classes.

In Cognitive Grammar, one speaks of conceptual construal and grammatical profiling. Conceptual construal is the cognitive ability to take a concept and represent it in such a light that certain properties of that concept are foregrounded or backgrounded. One common linguistic structure enabling this is termed grammatical profiling. If we are talking about *partes orationis*, this is the possibility for a language to profile, or represent, different facets of a lexical concept as a noun or a verb or any part-of-speech. It is argued that the integration of the meaning of the *pars orationis* and the lexical concept changes the meaning of the word by highlighting thing-nominal or process-verbal properties of that concept. This semantic change, between what Aristotle termed paronyms, seems self-evident. Coseriu

3. Adapted from Broccias and Hollman (2007).

4. More specific references to his discussion on such matters include Langacker (1987, 189, 203ff.; 1990, 66ff.; 1991, 23ff.). See also Talmy (2000, 23).

(2001 [1966]) succinctly identifies the issue at hand. In describing a lexical field, he stresses that it must capture the structure between fields and also within fields:

> [N]ous visons [...] à la fonction qui distingue le mot *venir* de *dormir*, *oublier*, *chanter* etc. (et aussi de *sommeil*, *oubli*, *chant*, etc.) et qui le fait entrer dans un "champ" où il s'oppose, par exemple, à *marcher*, *aller*, *partir*, *sortir*, *entrer* (et, dans un certain sens, aussi à *marche*, *allée*, *départ*, *sortie*, *entrée*) et non pas des fonctions telles que "présent" "infinitif", "intransitif". E. Coseriu (2001 [1966], 216ff.)

The problems begin when we take into account two of the basic tenets of Cognitive Linguistics. Firstly, the meaning of the *pars orationis* is perceptually motivated by our direct experience of the *Lebenswelt*. Or, as stressed above, the conceptual category is an iconic reflection of a perceived real-world category. Secondly, there is an isomorphic relationship between the meaning of the *pars orationis* and the lexical class. This gives us an iconic motivation for a grammatical category and its conceptual content that is not strictly, imagically or diagrammatically, related to the *Lebenswelt*. Lakoff explains the rationale for this:

> [D]'un point de vue neuronale, il y a des parties du cerveau qui sont plus proches des inputs corporels et d'autres plus éloignées. Ce fait correspond à un autre fait [...] les concepts abstraits sont conceptualisés par le biais de concepts plus proches de l'expérience corporelle, c'est-à-dire, l'expérience sensible... Lakoff (1997, 165)

It is thus that, in Cognitive Grammar, it is argued that the *partes orationis* are natural categories, based in our experience. It is this stance that renders such grammatical categories iconically motiveted. Glynn (2006, 2007) has demonstrated that, although this may be the case, there is clear evidence that this motivation is of a very abstract and 'weak' nature and can be easily overridden by semantic, formal, and extralinguistic concerns. In these studies, it was shown that it was not possible to combine, or integrate, given lexical concepts with certain lexical classes where one would expect it to be possible, assuming an iconically defined *pars orationis*. In such instances, frequency and/or salience of the lexical concepts in question was evoked to explain such irregularities. We need to find examples of this kind of constraint where no such explanations are available. If so, we can convincingly demonstrate that although the grammatical concept in question may be fundamentally iconic, the semantic schema is of such an abstract nature that it serves as little more than a theoretical backdrop to the intricacies of language description.

1.2 Frequency-entrenchment and salience-construal

Entrenchment is a cornerstone of Cognitive Grammar. With no external linguistic system and no internal linguistic competence, entrenchment serves as a theoretical construct designed to offer stability to the object of study. A form-meaning pair is said to be entrenched, and therefore part of the linguistic structure, when it has become automated for speakers. Generalisation about language structure across a speech community is simply a generalisation across the knowledge of the speakers that make up that community. It is argued that entrenchment is principally a result of frequency. This means that we can use relative frequencies of occurrence as an indirect method to make inductions about language structure.

This position, on the importance of frequency, is maintained by Bybee (2007, 315). However, she reminds us of the importance of convention and salience: "[m]y hypothesis is that semantics, and, to some extent, pragmatics and our experience of the world, will determine which elements tend to occur together […] but its repetition is the glue that binds the constituents together". Her reference to one's experience of the world, reminds us that entrenchment is not merely frequency. Indeed as any language learner will know, concrete nouns are learnt before abstract verbs, perhaps not regardless of frequency of exposure, although certainly relative to frequency of exposure. The found data that we use in the case study below can offer us information about the frequency of occurrence, but not the salience of the concept in question. For this second question, we rely on the intuition of native speakers. Let us investigate how both salience and frequency interact with a set of lexemes designating a perceptually salient concept, RAIN-SNOW across the various *partes orationis* in Polish.

2. Polish 'rain' and 'snow'. A lexical field and its parts-of-speech

In order to test the hypothesis that grammatical categories such as lexical class are motivated by our perceptual experience, we employ lexical concepts that denote clear perceptual referents. For these reasons, the vocabulary of precipitation offers a rich domain for investigation. Although the exact difference between different types of rain and snow is obviously beyond the knowledge of most speakers, its

place in our vocabulary as a perceptually determined lexical field is indisputable.[5] By choosing a simple perceptually based concept, we concern ourselves with a best-case scenario for testing the iconic hypothesis for lexical class.

2.1 The lexical field

We consider 20 lexemes and 14 grammatical categories. The lexemes were found using a combination of traditional lexica and thesauri as well as online resources. The field is not intended to be exhaustive, merely sufficiently broad to search for irregularities in lexical grammatical combinations. The lexemes include 5 words for rain, 3 words for snow, 6 words for snowstorm, 3 words for drizzle, and the words for mist or fog, hail, and storm. Table 1 presents the items in question and their glosses in English. The source domain for figurative words is offered and the nominal or verbal root of the lexical category is indicated.

Table 1. Lexical field of 'rain'-'snow' in Polish

lexeme	class	gloss		lexeme		gloss	source
deszcz	noun	rain	lit.	śnieg	noun	snow	
padać	verb	rain	fall	prószyć	verb	powdery snow	sprinkle powder
zacinać	verb	deluge	cut	sypać	verb	gritty snow	sprinkle grit
lać	verb	deluge	gush	zamieć	noun	snowstorm	sweep (zamiatać)
kropić	verb	spitting	drip	zawieja	noun	snowstorm	blow (wiać)
mżawka/ mżyć	noun/ verb	serein	mizzle	zawierucha	noun	snowstorm	be lost (zawieruszyć się)
dżdżawka/ dżdżyć	noun / verb	drizzle	drizzle	zadymka	noun	snowstorm	zadyma- commotion
siąpić	verb	drizzle	drizzle	kurzawa	noun	snowstorm	billow (kurzyć)
mgła/ mglić	noun/ verb	mist / fog		kurniawa	noun	snowstorm	mist/fog
grad	noun	hail	grud- clod	burza	noun	storm	destroy (burzyć)

5. There exists an aggregated system of classifying different precipitation types. The system, METAR (Météorologique Aviation Régulière), breaks down precipitation in three types, liquid, freezing, and frozen precipitation. By way of interest, this is the list of precipitation types from the most liquid to the most solid identified together with their METAR code: drizzle (DZ), rain (RA), freezing drizzle (FZDZ), freezing rain (FZRA), snow (SN), snow pellets (SHGS), snow grains (SG), ice pellets (PL), hail (SHGR), graupel (GS), ice crystals (IC).

Noticeable lacunas include lexemes for English *sleet* and German *Graupel*, which are expressed by *deszcz ze śniegiem*, *deszcz ze gradem*, *śnieg ze deszczem* ('rain with snow', 'rain with hail', 'snow with rain') and *krupa*, *krupnik*, *zimowy grad* ('buckwheat', buckwheat soup', 'wintry hail') respectively. The latter expressions for 'Graupel' are completely lexicalised, but due to the strong figurativity on the one hand and the compound nature on the other, we do not include these items since they necessarily resist inflection. Also noteworthy is the fact that there exists no verbal form for 'hail', only the nominal *grad*. Furthermore, Polish has no lexical distinction between the English *mist*, *fog*, *pea soup*, *Scotch-mist* and *haar*, the Dutch *nevel* and *mist*, or the Russian *туман* (mist) and *мгла* (fog).[6] The Polish *mgła* covers this concept with a single term not unlike German *Nebel*. For 'snow', and especially 'snowstorm', we see a great amount of onomasiological variation. However, it should be noted that two of the snowstorm items are typical of a specific region, the mountains of the south. These terms *kurzawa* and *kurniawa* are often unknown to speakers and when known are considered marked and dialectical in a similar way that *haar* is in English. Two final terms not considered in the study are *kapuśniaczek* and *kapuśniak*, nominals for drizzle, which literally designate 'cabbage soup'. This kind of figurative item cannot be profiled in any other class. The Polish word *burza* 'storm' is added in order to compare its behaviour with the perceptually similar snowstorm.

It is interesting to note that the Polish verbs for 'heavy rain' contrast the Germanic tendency for nominal profilings such as *deluge*, *downpour*, *cloudburst*, *driving rain*, *buffeting rain*, *Platzregen*, *Dauerregen*, and *Schlagregen*. In Polish, note that all the terms are verbal. The lexical diversity is also in contrast to the Russian where only one non-compound item is available *ливень*. However, the lexical richness for snowstorm-blizzard is similar to Russian, which also possesses a wide range of often cognate words, for example, *вьюга*, *метель*, *метелица*, *буран*, *снегопад*, and *пурга*.

It should be noted that the exact difference between the various phenomena is difficult to gauge. For example, few speakers are sure and less would agree over the exact difference between *drizzle*, *mizzle*, *serein*, *Scotch mist*, and *haar*, or between *miezeren*, *motregenen*, *druilen*, and *stofregenen* in Dutch. The Indo-European root of many of these words, **(o)meigh-*, seems to have been productive and much of the variation is likely to be regional rather than semantic.

6. There exists a cognate for the Russian *туман*, but it is restricted to a non-precipitation term, though it can be used as an attributive adjective do describe powdery snow, *tumany śniegu*.

2.2 The lexical classes and grammatical categories

In order for the reader less familiar with Polish grammar to appreciate the morphological richness of the language, we can briefly trace some of its characteristics. Across three declensions, nominals possess three genders, two numbers, and seven cases. We restrict the study to nominative forms assuming that these are the most common. Deverbials are complex and productive in Polish. There are two types of deverbial in Polish, the 'back-formation' deverbial and the derived deverbial. The first form is obtained by taking the infinitive of the verb and 'cutting' off the infinite suffix. The second form is produced by suffixation. Depending on the conjugation and various phonological rules, there are three suffixes, *-anie*, *-enie*, *-cie*. We consider the second of these forms. Adverbs are derived from qualitative adjectives and have no inflections save comparative and superlative forms, which we do not consider.

Polish possesses the usual Slavic perfective-imperfective distinction that interacts with a complex array of preverbs. Verbs possess three tenses in the imperfective and two tenses in the perfective as well as four morphological moods, the indicative, imperative, conditional, and optative. However, we restrict the study to the 3rd person indicative. There exist eighteen prefixes that perfectivise the verb. The study only considers six of the most likely candidates: *u-*, *na-*, *za-*, *pod-*, *w*(*y*)- and *prze-*. To give the reader a general idea of the less figurative uses of these prefixes, we can gloss them with 'by', 'on', 'behind', 'beneath', 'in', and 'before' respectively. It must be stressed that this literal sense rarely helps in understanding the perfective use of the verb, which is often opaquely related to the imperfective form. In this sense, the use is similar to the verb particle construction in Germanic. There are three voices, where the reflexive form is typically considered a voice. We ignore this latter form, though occasionally include the passive, since it is only in the passive voice that some verbs take a RAIN-SNOW reading.

In Slavic languages, there is a rich system of adjectives, adverbs, and participles. Not all possible forms and derivations are considered and only the nominative singular of the adjectives is tested. This is for the practical reason of maintaining a certain degree of simplicity. The forms are explained in the table below, but two important omissions should be mentioned. The participle formation interacts in a reasonably complex way with the passive/active and perfective/imperfective forms. The study is restricted to the active present adjectival gerund and the forms derived from this grammatical category. Lastly, although there is a range of augmentatives and diminutives in Polish, we only consider one augmentative systematically. However, when diminutives are lexicalised, they are also considered. Table 2 summarises the grammatical categories that are examined in the study.

Table 2. Grammatical categories in Polish

Class	Example
Noun	*śnieg* (only nominative checked)
Verb Imperf.	Infinitive, 3rd pers. pres. indic., 3rd pers. past indic., 3rd pers. future indic.
Verb Perfect.	*u-, na-, za-, pod-, w(y)-, prze-*, 3rd pers. past indic, 3rd pers. future indic.
Adjectival Gerund	*sypiący* (relational replacing relative clause, derived from verb)
Adverbial Particple 1	*siąpiąco* (relational describing action, derived from adjective)
Adverbial Particple 2	*zacinając* (relational replacing adverbial clause, derived from adjectival gerund)
Substative Deverbial	*sypanie* (nominal profiling, derived from verb)
Adjective 1	*mglisty*
Adjective 2	*burzowy*
Adverb 1	*mgliście*
Adverb 2	*gradowo*
Augmentative	*śnieżyca*

These grammatical categories are all argued to be symbolic form-meaning pairs in Cognitive Linguistics. More importantly, it is argued that such categories are symbolic representations of perceptual categories, isomorphically linked to our experience of the world. This iconic relationship is not held to be absolute, but to be the basis of the semantic category that these forms represent. We can suppose that if this is the case, then this will be evident, to at least a reasonable degree, in the way these forms combine with lexical concepts. Section 3 tests to see if this is indeed the case.

3. Class-lexeme productivity. Iconic motivation or arbitrary grammar

We can now combine the items of the lexical field with the predetermined grammatical categories. Since we are looking for the limits of creativity, conventional corpora will not suffice. Instead we employ the Google Usenet archive and the World Wide Web. Although using the Internet as a corpus comes with many pitfalls, its sheer size and range of registers represents a perfect medium for this kind of investigation. The procedure is simple: for each of the lexical categories in question, the theoretically possible form is determined using grammars and the knowledge of native speakers. In many instances, it is simply not possible, due to

phonological-morphological reasons, to combine a lexical root with a given grammatical form. Where it is possible to combine a lexeme and a grammatical category, then its various inflections are derived as noted in Table 2. Each of these forms for each of these terms is then queried with the Google search engine. Based on the search results and using commercial web-crawling technology, the first 1000 occurrences for both the Usenet archives and the Word Wide Web are collected and compiled to form a large dataset. Using concordancing programmes, the items can then be searched and examined. For all instances, retrievals are checked for semantic relevance. In many cases, seeding in Google is needed to bias the searches to the relevant topic. This helps reduce the amount of non-relevant occurrences considerably. However, each form must be carefully checked for semantic relevance. In many instances, less than 2000 occurrences are retrieved. In such cases, the data are examined carefully with the aid of native speakers. When there are less than 200 semantically relevant examples, the number of acceptable examples is counted.

Table 3 presents the results of this investigation. The forms tested were derived by consulting traditional grammars but also by asking native speakers to derive imaginable forms based on their personal knowledge. By not only relying on traditional grammars but also speaker intuitions about creative possibilities, we may have a better chance of revealing iconic effects. A wide range of native speakers were consulted from urban and rural areas as well of different ages and educational backgrounds. In the table, an asterisk * indicates an unattested form. Given the size and diversity of the data source, we can be sure this represents a non-conventional form-meaning pair, if indeed it is possible at all. A hash # is used to indicate that the form is found in large numbers, but in non-relevant uses. In these cases, it is not possible to be sure that there are no semantically relevant examples because the numbers of non-relevant examples are too high to complete exhaustive examination. However in such cases, it is unlikely such forms are used to denote precipitation. Interrogation marks are used to indicate rare usage. Two interrogation marks "??" indicate less than 5 occurrences and one "?" indicates less than 50. Although using the Internet as a data source is often criticised because it appears that 'someone, somewhere, has said almost anything', this is a non-valid criticism for two reasons. Firstly, it should actually be considered a positive criterion for the use of this medium, since it accurately represents the chaotic and dynamic nature of language. Secondly, in a theory of language such as Cognitive Linguistics where there is no *langue* or competence, only degrees of conventionalisation and entrenchment, this is precisely the kind of data we need. Relative frequency, stretching from literally hundreds of millions of occurrences through to tens of examples is precisely the kind of data upon which usage-based approaches to language should base their research. Of course, this cannot replace the importance of native speaker judgments in determining what is 'possible' in a given language since no

corpus can provide negative evidence. However, it is precisely in this context that having extremely large quantities of naturally occurring language that corpus research can offer the best generalisations about language.

Nevertheless, the Internet is not a reliable corpus and so the data are all checked with a range of native speakers. This is especially important for the rare uses. For the regional forms, two informants from the southern mountainous regions helped in verifying these examples. However, due to the limited number of speakers of these varieties, the frequency results become less reliable and are not directly comparable to the less regionally specific terms a basis of two informants is not very convincing.

Table 3 reveals a wide range of possible form-meaning pairs for investigation. We focus on the three areas highlighted in different shades of grey. In these three 'parts', we see unusual lexical grammatical combinatory possibilities. In other words, we see words that have similar meaning, combining with grammatical categories in what seems to be an arbitrary fashion. If the grammatical categories are semantically motivated and this motivation is based in our perception of the 'real-world', then there should be perceptually based explanations for these irregularities. We can firstly consider the adverbial participles and the adjectival gerund for the three terms denoting drizzle.

Table 4 presents the three Polish items denoting drizzle, mizzle, or light rain. It also includes the term for mist for purposes of contrast. The first item, *mżyć* is quite common and refers to light drizzle, perhaps similar to the English *serein*, though more commonly used. Although less common, *dżdżyć* is current in standard Polish and also refers to light drizzle. Importantly, in derived forms, Polish speakers consider it 'quite a mouthful'. Obviously, this may affect productivity in certain classes. The third term, *siąpić*, is the most common term for the phenomenon and probably serves as a hyperonym for the other two terms. The fourth item, *mglić*, denotes 'mist' which behaves differently in perceptual terms since it floats rather than falls. Nevertheless, it is a basic RAIN-SNOW term and perceptually comparable. In Table 4, we see the most common word, *siąpić*, is productive in all three of the grammatical categories in question. Examples (1) – (3) are typical of the usage.

(1) a. Pogoda, na którą tak bardzo liczyłam dała się nam we znaki **siąpiąc** i lejąc na przemian, chociaż było kilka słonecznych...
'The weather, on which I counted so much, really pissed us off, drizzling and pouring down, one after the other, even though there were few sunny moments...'

b. Nawet niebo żegnało nas pochmurnie, **siąpiąc** chwilami deszczem.
'Even the sky said goodbye to us being gloomy, from time to time drizzling with rain.'

(2) a. Padał deszcz gruby i drobny, z gradem i ze śniegiem, ulewnie i siąpiąco, ale niemal nieprzerwanie, aż do konca wyprawy.
'Heavy and light rain was falling, with hail and snow, rainstormy and drizzly, but non-stop, till the end of the trip.'

b. U mnie dzisiaj bardzo pochmurno i siąpiąco, a przydał by się porządny deszcz bo...
'At my place, it's cloudy and drizzly, and we need some serious rain, because…'

(3) a. Siąpiący deszcz i chłodny sobotni wieczór sprawiły, że przed sceną w parku Planty, gdzie odbywał się koncert trzech tenorów...
'Drizzly rain and a cold on Saturday evening caused that [empty crowd] in front of the scene in Planty Park, where the 3 tenors…'

b. Dzieńbył paskudny, wręcz parszywy – zimno, siąpiący deszczyk zmieniający się w ulewę.
'The day was awful, really lousy – cold, drizzly rain changing into pouring rain.'

Examples (1) to (3) show how such a lexical concept readily combines with these grammatical categories: serving both predicative and attributive roles. This contrasts completely with the findings for the *dżdżyć*. This term was found to be not at all productive in any of the categories. No instances of **dżdżąco* were found and **dżdżąc* revealed only a couple of instances of word listings, where various online grammars or dictionaries listed theoretically possible forms. The term[??] *dżdżący* revealed two good examples, suggesting that this is perhaps possible given a context sufficiently specific. Although this is in stark contrast to *siąpić*, we may suppose this is due to phonological reasons. Several speakers, when questioned on the forms, commented on the difficulty in pronouncing such derivations. Although it is not surprising that phonological concerns can limit productivity, this very realistic and natural part of language is inadequately accounted for in Cognitive Grammar. Any theory of lexical class, motivated (iconically or not), must recognise that there are phonological constraints on language. Let us now consider the derivations for *mżyć*. The found data follow the predictions of native speaker judgements, that two of the derivations are perfectly natural but that the first adverbial participle, *mżąc*, is impossible. For this form, only two examples of word listing were found. Examples (4) and (5) show how naturally it is used in the other forms.

(4) a. A ze jest dość pochmurno i mżąco, no to cóż jestem nieobecny.:)
'And because it is rather cloudy and drizzly, well, I'm not really with it:)'

Table 3.

Lexeme	Gloss	Noun	Verb imperfective	Verb perfective	Verb perfective	Substantive Deverbial
deszcz	rain n.	deszcz	deszczyć	*nadeszczyć	??zadeszczyć	??deszczenie –
padać	rain v. (fall)	–	padać	#upaść/ #upadać	napadać	padanie/ #upadanie/ #upadnie
upadający	–	–	–	–	–	
zacinać	rain, buffeting/ squalling v. (cut)	#zacinacz / *zacinawa	zacinać	#*zaciąć	#nacinać	zacinanie/ –
lać	rain deluge/ downpour v. (gush)	ulewa	lać	#nalać	#zalać	lanie/ *nalewanie
kropić	rain, spitting v.	–	kropić	nakropić	zakropić	kropienie /#zakropienie
śnieg	snow 1 n.	śnieg	śnieżyć	naśnieżyć	zaśnieżyć	śnieżenie/ #zaśnieżanie
prószyć	snow 2 v. (sprinkle power)	proszek(#)	prószyć	naprószyć	#zaprószyć	prószenie/ #zaprószanie/ ??naprószanie
sypać	snow 3 v. (sprinkle grit)	–	sypać	nasypać	zasypać	sypanie/ zasypywanie/ #nasypywanie
zamieć	blizzard 1 n.	zamieć	*#zamiecać	–	–	zamiecanie /–
zawieja	blizzard 2 n.	zawieja	*zawiejować	–	–	*zawiejanie /–
zawierucha	blizzard 3 n.	zawierucha	#zawieruszyć	–	–	#zawieruszanie / –
zadymka (zadyma)	blizzard 4 n.	zadymka	#zadymiać	–	–	zadymianie /–
kurniawa	blizzard 5 n.	kurniawa	*kurnić	*zakurnić		*kurnienie
kurzawa	blizzard 6 n. (dust)	kurzawa	kurzyć	#nakurzyć	#zakurzyć	#kurzenie
mżawka/ mżyć	light drizzle 1 n. / v.	mżawka	mżyć	–	*zamżyć	mżenie
dżdżyć / dżdżawka (dżdża, dżedża)	drizzle 2 v. / n.	dżdżawka, dżdża, dżedża	dżdżyć	–	*zadżdżyć	dżdżenie
siąpić	heavy drizzle 3 v.	–	siąpić	–	zasiąpić	siąpienie / *zasiąpienie
mgła / mglić	mist n. / v.	mgła	mglić	–	zamglić	mglenie / zamglenie
grad	hail n.	grad	gradzić	zagradzić	*nagradzić	gradzenie
burza	storm n.	burza	#burzyć	#zaburzyć	*naburzyć/ #wyburzyć	#burzenie

Adverbial Particple	Adverbial Particple	Adjectival Gerund	Adjective	Adjective	Adverb	Adverb	Augmentative
*deszcząc	??deszcząco	*deszczący	deszczysty	deszczowy	deszczowo	deszczyście	deszczyca
padając / #upadając	padająco upadająco	padający					
zacinając	zacinająco	zacinający	*zacinacisty	*zacinaniowy	*zacinaniowo	*zacinaniście	*zacinica
lejąc	lejąco	lejący	*lenisty / #leisty	#leniowy	#leniowo	*leniscie	lanica
kropiąc	kropiąco	kropiący	*kropisty	*kropieniowy	*kropieniowo	*kropiście	??kropica
*śnieżąc	*śnieżąco	??śnieżący	?śnieżysty	??śnieżowy	śnieżowo	śnieżyście/ śnieżnie	śnieżyca
#prószając	*prószącо	prószący	#prószysty	??prószowy	#prószowo	?prószyście	prószyca
sypiąc	??sypiąco	sypiący	*sypisty	#sypowy	*sypowo	*sypiście	sypica
#zamiecając	*zamiecająco	*zamiecający	*zamiecisty	zamieciowy	zamieciowo	*zamieciście	–
*zawiejając	zawiejająco*	*zawiejający	*zawieisty	*zawiejowy	zawiejowo	*zawieiście / zawiejiście	–
#zawierus-zając	*zawierus-zająco	#zawierus-zający	*zawierus-zysty	*zawierus-zowy	*zawierus-zowo	??zawierus-zyście	–
#zadymiając	#zadymiająco	#zadymiający	#zadymisty	#zadymowy/ zadymkowy	#zadymowo/ zadymkowo	#zadymiście/ *zadymkieniście	–
*kurniąc	*kurniąco	*kurniący	*kurnisty	*kurnieniowy	*kurnieniowo	*kurniście	–
#kurząc	#kurząco	#kurzący	#kurzysty	??kurzeniowy #kurzowy	*kurzeniowo #kurzowo	??kurzyście	–
??mżąc	mżąco	mżący	mżysty	mżawkowy	mżawkowo	mżyście	?mżawica
??dżdżąc	*dżdżąco	?dżdżący	dżdżysty	*dżdżawkowy/ *dżdżawowy/ ??dżdżowy	*dżdżawkowo/ *dżdżawowo/ ?dżdżowo	dżdżyście	*dżdżawica / *dżdżyca
siąpiąc	siąpiąco	siąpiący	siąpisty	*siąpiowy	*siąpiowo	?siąpiście	siąpawica
??mgląc	*mgląco	??mglący	mglisty	??mgłowy	?mgłowo/ mglisto	mgliście	?mglica
#gradząc	*gradząco	#gradzący	gradzisty	gradowy	gradowo	*gradziście	*gradzica
#burząc	#burząco	*burzący	burzysty	burzowy	burzowo	burzyście	–

Table 4. 'Drizzle' – adverbial participles and gerunds

Lexeme	Verb	Adverbial Participle 1	Adverbial Participle 2	Adjectival Gerund
drizzle 1	mżyć	??mżąc	**mżąco**	**mżący**
drizzle 2	dżdżyć	*dżdżąc	*dżdżąco	??dżdżący
drizzle 3	siąpić	**siąpiąc**	**siąpiąco**	**siąpiący**
mist	mglić	??mgląc	*mgląco	??mglący

b. Wigilia 2006, 6-a rano, okolice Radomia, mgliście, mżąco i pustki na drodze.
Christmas Eve 2006, 6 am, around Radom, foggy, drizzly, and emptiness on the road

(5) a. W Londynie pozostawaliśmy stłoczeni w małym, okropnym domu, dzień za dniem, zatrzymywani we wnętrzu przez mżący deszcz i chłód...
'In London, we were stuck in a small, awful house, day by day, kept inside because of drizzling rain and cold...'

b. Nie zważał na deszcz, mżący bezustannie, zapomniał nawet otworzyć parasola.
'He didn't care about the rain, drizzling constantly, he even forgot to open his umbrella.'

It is for this item, *mżyć*, that we see the most important challenge for an iconically motivated theory of lexical class. When native speakers are asked about the meaning of *mżyć* and *siąpić*, they are unable to clearly distinguish them in phenomenological terms. Speakers consistently repeat that *siąpić* is more common. When asked about why **mżąc* is not possible, responses suggest that this kind of phenomenon is not compatible with the meaning of this grammatical form. At first, this would be in keeping with the kind of motivated theory for grammatical category in question. Speakers seem to understand this adverbial participle as a form that means 'while x happens', where x is the lexical concept in question. Speakers suggest that this is why it is incompatible with *mżyć*. The reasoning is that this kind of phenomenon is too ephemeral to be considered compatible with this category. If we assume that there is a symbolic relation between the grammatical category and 'while x happens', then this could explain the constraint. However, as we saw, this category is perfectly compatible with *siąpić*, which denotes the same phenomenon. Native speakers can offer no explanation for this contrast. One possible explanation might be that although *mżyć* is slightly more common than *siąpić*, the latter is phonologically similar to a range of very common, although semantically unrelated, verbs. In light

of this, one could argue that the more typical form of the lexeme may facilitate derivation. However, that this is affecting the productivity is unlikely since in the following section, *siąpić* resists derivation completely where other verbs are felicitous. Moreover, native judgement consistently suggests that the combination of the concept 'mist' and the adverbial participle, is perfectly acceptable. However, not a single natural language usage was found, demonstrating that it is not a conventionalised form. The stative nature of the phenomenon of mist would suggest it would be a perfect candidate for the 'while x happens' adverbial form. We can assume this is why native speakers accept this combination at an intuitive level, but it does not explain its zero productivity.

Firstly, it must be noted that *mgląc* takes a reflexive form because the verbal root is transitive. This kind of usage is associated with more formal or literary registers, which might explain its under-representation in the Internet examples. However, the contrast between speaker determined acceptability and usage-based data also raises a theoretical question. Remembering that corpus-driven research cannot provide negative evidence, when we have a positive result from native intuition but no positive result in the found data, how should we determine grammaticality? In such situations, one would normally give priority to speaker intuition. However, when we are dealing with a corpus as large as the World Wide Web and the Usenet, it is tempting to claim that we have a non-conventionalised form-meaning pair. In such a situation, we see a basic weakness in the analytical framework of Cognitive Linguistics: it has yet to develop a satisfactory explanation for the relationship between 'entrenched' for the individual and 'conventionalised' for the speech-community. Although the theory places itself between the mentalist and structuralist approaches, it inadequately explains the relationship between what could be termed, *mutatis mutandis*, *langue* and *competence*. Using found data to describe language with a theory based on the individual's knowledge as well as social convention is a difficult affair. Despite the importance of this question, it must be left aside.[7] We base our results on frequency and maintain the working hypothesis that there is valid relationship between this and degree of conventionalisation.

We see two clear descriptive questions. Why is **mżąc* not possible when *siąpiąc* is perfectly acceptable and why is[??] *mgląc* not used when it is deemed to be perfectly acceptable? For **mżąc*, the answer possibly lies in the fact that it possesses a nominal form, where there is none for *siąpić*. This difference suggests that despite the lack of difference between the two phenomena, the two lexical concepts differ in their profiling of that concept, such that one is a more nominal profiling and the

7. Glynn (2004b) offers a more detailed discussion on this theoretical quandary for Cognitive Linguistics, relating it to the theoretical distinctions of *ergon – energeia*, *langue – parole*, and *competence – performance*.

other verbal. Although this explains the constraint of the 'while x happens' adverbial participle on the more nominal concept, it is far from clear how this informs a theory of iconically motivated lexical class. If there is a symbolic relationship between our experience of 'things' and the category of 'noun' and our experience of 'processes' and the category of 'verb', then the motivation for this distinction is not clear in this instance. It must be remembered that native speakers do not describe any phenomenological difference between the two *designata*, save that perhaps one is lighter. It would seem that for some historical or perhaps phonological reason, one lexical category is nominal and the other verbal with no iconic motivation for a difference between the two. One might argue that the heavier form of precipitation, *siąpić*, is more salient as an event and the lighter, less phenomenologically salient *mżyć* is treated nominally due to this difference. However, the following examples offer evidence contrary to this line or argumentation.

Let us now consider the same lexemes, though combined with the simpler adjectival and adverbial forms. Table 5 summarises the productivity and constraints upon the combinations of these lexical concepts – grammatical categories. We see here that the productivity issues for the two lexemes, *mżyć* and *siąpić*, is reversed. For these grammatical categories, it is the more common *siąpić* that does not combine with the adverbial and adjectival classes. To demonstrate the naturalness of these combinations, consider examples (6) – (8).

(6) a. Witajcie w szary i mżawkowy dzień
'Welcome to this grey drizzly day.'
b. Gdy wszedłem do środka, na zewnątrz zaczął padać lekki, mżawkowy deszcz – rzadkość w Pozagrobo.
'When I went inside, outdoors light drizzly rain started to fall – very rare in Pozagrobo.'

Table 5. Drizzle – adjectives and adverbs

Lexeme	Root form	Adjective	Adverb	Adverb
drizzle 1	mżawka/ mżyć	mżawkowy	mżawkowo	mżyście
drizzle 2	dżdżyć / dżdżawka (dżdża, dżedża)	*dżdżawkowy / *dżdżawowy/ ??dżdżowy	*dżdżawkowo / *dżdżawowo/ ??dżdżowo	dżdżyście
drizzle 3	siąpić	*siąpiowy	*siąpiowo	??siąpiście

(7) a. Pozdrawiam mrzawkowo;-)) Widze, ze mi descz uderzyl do glowy, oczywiscie mialo byc mżawkowo;-)) Hmmm nastepnym razem bedziesz deszczowo, moze nie zrobie bledu;-))
'I am sending greetings drizzly;-)) I can see that rain made me crazy, of course it's supposed to be drizzly;-)) Hmmmm, next time it will be rainy, maybe I won't make a mistake;-))
b. U mnie mgliście, szaro, ponuro i mżawkowo. Mam nadzieję, że w ciągu dnia co nieco się odmieni.
'Here, at my place, it's misty, grey, gloomily and drizzly. I hope that during a day it will change.'

(8) a. Fotografia, reporterskie, mgliście i mżyście, czyli weekend w Polsce.
'Photography, report, foggy, and drizzly – that means weekend in Poland.
b. A że było szarawo i mżyście włączyłem przednie halogeny.
'And because it was grey and drizzly, I turned the front halogen.'

It should be clear from these examples that this lexeme combines naturally and comfortably with these grammatical classes. The findings also match native intuition that suggests these forms should be productive. This is in sharp contrast to *dżdżyć* and *siąpić* for which there is very little productivity. Indeed, *siąpić* does not combine with any of these categories and mysteriously, *dżdżyć* combines with only one adjectival form. Example (9) is typical of its usage.

(9) a. Będzie zimno i dżdżyście;-. Będzie piękna pogoda i odległe widoki Jeszcze nigdy w sierpniu na wyjeździe w góry nie miałam złej...
'It will be cold and drizzly;-. It will be beautiful weather with clear views. Never before in August, on a trip in mountains I had such bad...'
b. Tak smętnie i dżdżyście. Dlaczego mnie nikt nie zabrał na Lednicę?
'So sad and miserable and drizzily. Why didn't anybody take me to Lednica.'

However, two forms derived from the shorter root, *dżdżowy* and *dżdżowo*, do appear. The former is found in lists of theoretically possible words, the second occurs in a couple of examples, only one of which is a clear and good example:

(10) Wcześniej było szaro i dżdżowo, teraz z nieba buchnął oślepiający słoneczny stroboskop...
It was grey and drizzly, then from the sky radiated a sunny dazziling strobe-light…

Table 6. Snowstorm – adverb and adjectives

Root noun	Adjective 1	Adjective 2	Adverb 1	Adverb 2
zamieć	*zamiecisty	zamieciowy	?zamieciowo	*zamieciście
zawieja	*zawieisty	*zawiejowy	?zawiejowo	*zawiejiście
zawierucha	*zawieruszysty	*zawieruszowy	*zawieruszowo	??zawieruszyście
zadymka (zadyma)	#zadymisty	#zadymowy / ??zadymkowy	#zadymowo / ?zadymkowo	#zadymiście / *zadymkieniście
kurniawa	*kurnisty	*kurnieniowy	*kurnieniowo	*kurniście
kurzawa	#kurzysty	??kurzeniowy #kurzowy	*kurzeniowo #kurzowo	??kurzyście

Although the nominal bias proposed above may explain why 'dżdżawka' is not felicitous in an adverbial form, it does not explain the constraint on the theoretically possible, yet unattested, **dżdżawkowy,* and the clear limitations on the forms *dżdżowy* and *dżdżowo*. Native speakers confirm these results yet can offer no explanation whatsoever why one form 'sounds' natural and not the other. However, the nominal root for this lexical concept is rare which may explain the relative lack of productivity of derived forms. Nevertheless, the same seemingly arbitrary constraints exist for the more common **siąpiowy*, **siąpiowo*, and[??]*siąpiście*. The reversal of productivity and the fact that here we see the constraints on both adjectival and adverbial forms seems to rule out the salience explanation and indeed paints an entirely arbitrary picture of the relative productivity.

We can now consider one last set of items, this time denoting the stative phenomenon of snowstorm, which is profiled nominally across no less than six lexemes in Polish. Table 6 presents the irregularities in the productivity for this lexical concept for the adjectival and adverbial categories.

The first term, *zamieć*, implies a serious snowstorm and is typical of the formal, even technical, register used in weather reporting. This is contrasted by *zawieja*, which is less formal and denotes a meteorological condition somewhat less severe. The third item, *zawierucha*, is effectively the same as the previous. Some speakers suggest it emphasises windiness of a snowstorm, other speakers insist that this is not the case. Both items are commonly used. The next item, *zadyma*, is the augmentative of *zadymka*, which typically means a fight or a ruckus, but can also be used to refer to a snowstorm. This item seems to denote effectively the same phenomenon as *zawieja* and *zawierucha*, eight educated native speakers of various ages not being able to differentiate it semantically from the previous two. However, it seems to be used less commonly. The final two items, *kurniawa* and *kurzawa*, are regional and this is their main connotation. Firstly, speakers note that they are from

the mountains to the south, and secondly, by extension, since snowstorms are typically wilder in mountainous regions, it is assumed to indicate a fiercer storm.

The general pattern that these forms do not derive in relational classes is predictable and likely to be iconically motivated; a snowstorm is an unlikely concept used to describe other concepts. Although they sometimes do last longer periods of time, an entire day is rare and so the need to speak of a snowstormy day or even afternoon will indeed be rare. This effectively rules out predictive uses and the most common motivation for an attributive use. It is for this reason that these items are nouns, not verbs, going against the trend in Polish and this is surely the reason behind the limitations on these items in relational classes. However, contrary to this 'iconic' logic, there are certain noticeable exceptions where these lexemes are felicitous in relational classes such as adjectives, and even adverbs. Firstly, and most remarkably, is the adjectival form of *zamieć*. Consider example (11).

(11) a. **Zamieciowy** Tour de Spisz. Rankiem pożegnano pieszą zimówkę, która udała się do Zakopanego.
'Blizzardy Tour de Spisz. In the morning, one said goodbye to the walking 'winter trip', which then went to Zakopane.'

b. Dobry śnieżno-**zamieciowy**;)). Robercie:)) o nie ma mowy! balast jest za lekki i sanki wywrotne bardzo...
'Good snowy-blizzardy;)). Robert:)) No way! The ballast is too light and the sled is really turning over...'

We see here the natural usage of a nominal, derived as an adjective, but one where none of the other five terms denoting the same phenomenon form felicitous class-lexeme pairs. The source domain, 'sweep', is similar to other source domains for the same concept, such as 'blow' and 'billow'. The fact that it is somewhat associated with more formal speech and weather reporting surely has no bearing, especially in terms of iconic motivation. The phonology is not remarkably different, and its frequency is similar to the other items. This it would seem is a clear example of arbitrary grammar.

Secondly, we have three of the items taking adverbial derivations. Seeing the nominal origin of the lexemes in question, this is most unpredictable. Consider three examples of the adverbial derivation of *zadymka*.

(12) a. My tez was pozdrawiamy rownie goraco, pomimo, ze u nas snieznie, zadymkowo i zimno.
'We greet you equally warmly, despite it's snowy, snowstormily, and cold.'

b. Fotografia, krajobraz, będzie wiosna. Pozdrawiam zadymkowo, ale cieplutko:)).
'Photography, landscape, there will be spring. I greet you snowstormily but warmly:)).'
c. Pozdrawiam śniegowo-zadymkowo Ja...cki Jak zwykle oboje macie racje. I słońce i cień.
'I greet snowily-snowstormily Ja... cki.As always you both are right. Both sun and shade.'

Although not productive, there being far fewer than 50 examples, it is surprising that this form is at all possible. Not only is it an adverbial relation, it is the least frequent of the non-dialectical forms. Typically, the more frequent forms display more versatility in class derivation. Why is this combination possible, if relatively rare, when the others are not? There was also a single isolated example of the adjectival form, *zadymkowy*:

(13) W dzień styczniowy, mroźny, zadymkowy, na placu przed szkołą...
'On a January, frosty, snowstormy day, in the square in front of the school...'

What explanation can we find for such exceptions save incidental historical reasons? Again, phonology is not the reason since all the items are phonologically similar. The only unique feature of this lexeme is that it may also be derived as an augmentative, but this surely would not evoke any positive bearing on its productivity in relational classes. The source domain of the item is 'commotion' or 'turbulence'. Could the explanation lie in the metaphorical basis of the item? Other source domains include, 'sweep', 'blow', 'billow', and 'be lost'. Although this metaphor differs from the other items, there is no obvious reason why it should affect the productivity in this way.

Importantly, the examples are examples of creative language use. In light of this, the repetition of the verb *powitać*, which means 'to greet' or 'to say hello', could be an idiolectical issue. It is not possible to know with these data, but these examples could result from a single user and so represent idiolectical creativity. However, this lexeme is not an isolated instance, two other lexemes also take, albeit rarely, this adverbial form. Just as for *zadymka*, they are indicated with a single interrogation mark in Table 6 because only a small number of instances were found. Nevertheless, it must again be underlined that despite the size and diversity of the Internet, it represents only the merest fraction of language production and that all these examples are considered perfectly natural by native speakers. As stressed above, the argument that such examples are outside the main of language is clearly ill-founded. Examples (14) and (15) are representative of those found.

(14) a. no to się wpisuję;) pozdrawiam ciepło i biało i zamieciowo... wpisuję się w pierwszy dzien ferii w ktorym mam...
'so I sign in;) I am greeting warmly and white and snowstormily... I sign at the first day of winter holidays when I have....'
b. nawiało zawiało i zima się zrobiła, ładnie bardzo zamieciowo.
'it blew and blew and winter came, pretty very snowstormily.'

(15) a. Dzień dobry zamieciowo, zawiejowo, nieco chlapiasto. Ze wsi o poranku dojechać do miasta można, ale z lekkim opóźnieniem.
'Hello snowstorish, blizzardy, slightly sludgy. From the village in the morning to get to town is possible, but with slight delay.'
b. tegoroczny luty w Polsce jest figlasty... było wiosennie, było zimowo, było zawiejowo, było deszczowo... słowem: dla każdego coś miłego, drogi Podhale:))...
'February this year is tricky...it was springish, it was winterish, it was snowstormish, it was rainy... literally: fun for all, dear Podhale:))'

It should be obvious that although these examples represent somewhat creative language use, they are perfectly natural examples. Why should these nominal concepts be more productive as adverbs than adjectives? Indeed, why should they be possible at all in relational classes? There are perhaps *ad hoc* explanations for some of these combinatory possibilities, but they are surely not based on iconic motivation. It would seem that the quirks of compositionality are too numerous to rely on abstract and schematic hypotheses of universal perceptual categories. Perhaps such a claim is obvious, but in the current literature, it could easily be forgotten that despite the importance of iconicity in grammatical structure, it is but one motivating factor interacting in a complex and multidimensional context of compositionality.

4. Conclusion

From this brief study, it should be clear that the grammaticality and productivity of class-lexeme pairing is a complex question. For even this perceptually based, relatively simple lexical field, we have seen a number of what seem to be arbitrary examples of constraints upon and motivation for compositionality. Although the findings do not discredit the work of Górska (2001, 2002) and Tabakowska (2003), who find motivated explanations for similar phenomena for the same language, they show that even if an iconic basis of *partes orationis* is viable, it certainly cannot explain a great deal the complexity involved in compositionality. The findings presented here more consistently demonstrate the tendencies seen in Glynn (2006,

2007). The lack of productive compositionality for the adjectival and adverbial forms of such semantically similar lexemes, where no issues of frequency or salience can be evoked to explain the variation, seem to unequivocally show the limits of Cognitive Grammar's use of iconic motivation to explain lexical class. Although this does say these categories are not based in our universal human experience, the vagaries of language remain too complex for such abstract and schematic explanations to adequately explain lexeme-class compositionality.

It seems that if an iconic theory of grammar is to be accurate, it needs to integrate other possibilities of motivation for and constraint upon productivity into their descriptive apparatus. Despite the descriptive power of Cognitive Grammar, it currently leaves little place for arbitrary structures, as well as the complexity of lexical concerns, in its model. Bringing such abstract theoretical structures closer to the unpredictable and irregular nature of language is an important next step for Cognitive Grammar. Arguably, a multifactorial usage-based approach to language description is warranted to properly capture such variation.

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