

INTRODUCTION

1. SEMANTICS IS CONVENTIONALIZED PRAGMATICS¹

This thesis focuses strongly on the pragmatic foundations of language and on how meaning on a semantic level can be fruitfully built upon pragmatic meaning systems. Syntax is similarly seen as capturing useful generalizations from the semantic level.

Linguistic meaning is based on nonlinguistic experiences. It is important to consider the connection between meaning as it appears in language and in other practices. This connection is modeled in terms of knowledge based on *expectations*, which are weak assumptions about the environment that function as “working hypotheses” – they are kept as long as they are useful and then discarded.

1.1. Approaches to language

The view that I present is in contrast to most traditional research in linguistics and philosophy. There, semantics and syntax are looked at in isolation from pragmatic and extralinguistic phenomena. The *cognitive* representation of language is also overlooked in the traditional accounts.

However, in the last 10–15 years a strong school of *cognitive linguistics* has emerged that bases meaning on conceptualization, and

1. That semantics can be seen as conventionalized pragmatics is proposed by Ronald Langacker (quoted without reference in Givón 1989, who also elaborates the proposal).

stresses the relation of language to our mental representations (Lakoff 1987; Langacker 1986; Gärdenfors 1993).

The argument will be largely consistent with cognitive linguistics. However, with respect to the concept of meaning, I go one step further and base meaning on *prelinguistic* and even *noncognitive* experiences. Especially in an evolutionary setting, it will prove easier to model the connection between prelinguistic and linguistic behavior if one grounds linguistic representations in prelinguistic meaningful activities.^{2,3}

It then becomes important to consider the *biological* foundations of knowledge systems, and a useful distinction will be between the *subjective* and *intersubjective* motives for acquiring knowledge (following Trevarthen 1980:326–327). All organisms have subjective needs for knowledge in some form. There are some things in the world that are inherently meaningful to organisms, for example food and mates. The organism can gather knowledge through its sensory organs to help *predict* where the meaningful stuff is. The subjective motives for knowledge are basically the same for us humans. People, however, also have intersubjective cognitive capabilities that distinguish our cognition from that of lower organisms. The intersubjective motives include to communicate, to seek company, reciprocal give and take, to express confusion if others become incomprehensible, etc. (*ibid.*). The faculties needed for fulfilling the intersubjective motives all depend crucially on forming expectations about others' mental states.

A second focus that is not always clear in cognitive linguistics is on the distinction between systems that represent the world around them as *faithfully* as possible to form a true “mental image” and systems that only represent *default assumptions* and exceptions to

2. In Paper Four I defend a form of “evolutionary essentialism” with respect to meaning. See also von Uexküll (1982) and Jennings (1906).

3. It might seem like a return to the traditional position to consider the connection between concept and reality. However, in my pragmatic approach there is always a human mind between the two.

these defaults. I will call the latter systems *expectation-based*, and maintain that cognitive systems are of this kind.

Expectation-based models emerge now and then in the cognitive sciences, and among the most well-known are the models in terms of *frames* (Minsky 1975) and *scripts* (Schank and Abelson 1977). (See Tannen 1979 for a review in a linguistic context.) However, these models concern the general organization of knowledge, while my model focuses specifically on the relations between expectations, language and meaning.

My reason for choosing expectations as fundamental for my analysis is that expectations give a new starting point for a discussion of linguistic meaning connected to many central concepts in cognitive science, such as induction, inference and affordances. I have not attempted to reduce my reasoning to rigid taxonomies of expectations. My aim is to open the field of linguistic meaning for discussion for researchers from many different disciplines, and such taxonomies tend to harmfully reduce the dimensionality of the field under discussion. However, a very rough classification can be made between (1) expectations about other people and their thinking and (2) expectations about features of things in the environment.

Language has evolved as an intersubjective tool for sharing subjective meaningful experience and extending the meaningful sphere. Language is a reaction to what speakers need to express in the situation, rather than a predefined object that we⁴ can study independently of the situation of use. In this view, the tools that language provides us with cannot be taken for granted, but we must seek their origins in the communicative situations in combination with a gradual conventionalization and decontextualization that proceeds from pragmatics to semantics and further to syntax.

To sum up: if we want to leave the traditional position of meaning as situated in language, then there are *several* interacting stud-

4. A generic reference “we” is used throughout. When I refer to papers with a co-author, I also use “we” to mean the authors.

ies that must be pursued in parallel. It is for example not enough to focus on our mental representations, because as I argue in section 1.5 and Paper Four, meaning in language is based on meaningful activities that lie outside our cognitive representations. If we have no theory about how the mental representations are related to our socio-cultural practices, the task of establishing links between mental representations and language will be very hard. I will next outline one of the components that will be necessary when we want to see how language is related to nonlinguistic action.

1.2. “The obvious goes without saying”

If we consider language to depend crucially on socio-cultural practices, then we, as scientists of language, must be aware of our own place in time. The language that we use is adapted to our environment. Changing the environment, e.g. by introducing new artifacts, will change our discourse as a response to the uncertainty surrounding the new. Introducing electricity in a society will cause a lot of linguistic output concerning the innovation during a period of time, and it will be necessary to distinguish homes and companies with and without electrical installation. But as soon as electricity becomes familiar we will no longer have a need to distinguish electrified from unelectrified.⁵

Or if it is important for you to buy a certain brand of violin strings, you will have to distinguish the good shops from the bad shops, and this distinction can provide the basis for concepts in language. One day when all the shops sell your favorite strings you will not have to make the distinction between the two kinds of shop, and the support for a possible linguistic concept will disappear – we will not be able to talk about the difference.

5. In a larger perspective, albeit outside the scope of this thesis, we must also consider the real-world consequences connected to making obvious phenomena in our environment. If electricity disappears from our discourse because its existence is obvious to our language community, this means also that it will be easier to *introduce new technologies based on electricity*.

In both these cases, we have a real-world event – e.g. your need for strings – that generates a *breakdown* – when you cannot find a string in a shop – that triggers a distinction between two kinds of shop, which can possibly become the foundation for linguistic categorization. But it may as well remain untalked about and never leave the level of our practical knowledge about the world.

1.3. *Expectation-based categorization*

However, you don’t go into any shop to buy your violin strings. Strings are likely to be sold where violins are sold, or at least in shops that have something to do with music. Shops seldom advertise everything they sell, but people anyhow have a fairly accurate knowledge about what they can buy where. This knowledge is based upon *expectations* that we form as a preparation for an uncertain future.

People use surface characteristics to form expectations to suit their needs. In the example, a rough categorization of the shop as a shop for shoes, music, food, etc., will, together with the expectations that we have built up, guide us when we are looking for things that are useful for us.

The kind of knowledge involved in this expectation-based categorization is not certain or true in the same sense as philosophical knowledge. It is much more like *prejudice* in that we use any available surface property to form a whole set of inferred properties that we need for our everyday encounters with reality.

Expectation-based categorization is of course not limited to shops. When we meet people we use easily retrievable knowledge such as sex or age to form expectations about their occupation or interests.

An illustration is the story about the father and his son who suffer a car accident where the father dies and the son is seriously wounded and taken to the hospital. A physician comes to treat the patient, stops and says: “I can’t do this. This kid is my son.”

Most people find this story intriguing, and many give up before finding out that the *female* physician is the *mother* of the kid. There

are very strong expectations associated with the concept “physician” that physicians are most likely to be male.⁶

In my view, the main part of our knowledge consists of expectations that can be taken for granted in most situations, and is probably not coded in a language of thought. Sometimes, however, failed expectations generate breakdowns that surface as expressions in language. In the papers, I model several aspects of this process.⁷

1.4. Dialogue dynamics

Let us think of the set of all our expectations as reaching a certain knowledge level. What is below the surface, we don’t have to talk about.⁸ What we talk about is in some way *above* the surface, and all the time *connected* to our prior common knowledge.⁹ We cannot talk about things that are “up in the air.” Then we must first raise the level of knowledge to make the connection. There is a constant mutual work going on in dialogue to determine where to situate the knowledge level, and this work consists of forming expectations about others’ knowledge level.

6. The expectations are like prejudice also in that they don’t readily adapt to the correct circumstances. Rather, a female physician will, as long as these expectations are in play, receive the reactions of people’s failed expectations: comments, astonishment, etc. If the reactions are strong enough, they will generate *self-fulfilling prophecies* that will maintain the relevance of the expectations (Jones 1977; Jussim 1986).

7. There are several scientific schools associated with this kind of thinking: *prototype theory* (Rosch 1978); the theories of *frames* (Minsky 1975) and *scripts* (Schank and Abelson 1977) which are however concerned with “verbally expressible knowledge” which was common *à l’époque* but limits its relevance for the present work. Further, theories of *prejudice* (Allport 1954/1958; Hayakawa 1939/1949), *presupposition* (Givón 1989) and *self-fulfilling prophecies* (Jones 1977).

8. What is below the surface can be taken for granted as presupposed information. Givón (1989) gives an interesting account of presupposition in terms of *challengeability*.

9. This connection is, as far as I know, not investigated in the literature, but would represent a very central area for future research.

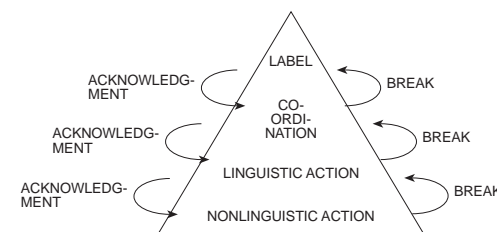


Figure 1. Dialogue dynamics.

When the participants misjudge the level, this will lead to breakdowns in the conversation. If we include the socio-cultural practices in the model, as I have done, we can also treat the nonlinguistic action as continuous with the linguistic discourse.

We see examples of these breakdowns when people of different expertise meet and try to talk to each other. I studied an “expert” instructing a “novice” how to change a string on a violin (Paper Two and Winter 1996). The two subjects couldn’t see each other, and only the novice had a violin on which to perform the actual change. A violin is a fragile thing and the risk of breaking the string is always present. This makes the subjects use more language to complement their activities, to anticipate the breakdowns that could otherwise occur – in any situation of practical activity, there is always the possibility of performing the task without language.

That would of course be the most efficient solution – the novice performs the task without questions. Let us call this the ground level of *action*. See figure 1. When the participants cannot continue because they have come to a crossroads on their mental path, there is a breakdown on the level of nonlinguistic action, and they have to resort to discourse. The most primitive discourse level consists of the expert giving instructions to the novice – we can call this *linguistic action*. This works as long as they can take for granted a lot of things, among them the spatial orientation of the violin. If they disagree on their mental images of the violin they have to make a break at the linguistic action level to *coordinate* their representa-

tions. This could occur, for example, if the expert imagines the novice holding the violin with the scroll pointing to the left, when this is not the actual direction.

Another reason for choosing the violin setting was that the differences in expertise also include differences in *vocabulary*. Specialized violin vocabulary, like *bridge*, *nut*, *scroll* and *tailpiece*, is not commonly known, and if the expert uses such a word, this will lead to another break in the conversation, up to the level of *linguistic labels*. When the new knowledge has been integrated, the interaction proceeds again at the lower level. (See Paper Two.)

In another study I looked at helpline telephone conversations at a software engineering company. (Unpublished results.) In their case, the knowledge integration proceeds in several steps in the software design process, where the *telephone support* is the first step. In these interactions it is often the case that one specific problem is repeated several times, especially after upgrades or due to season changes (administrative software). It is then possible to delimit the problem and provide a *written telefax answer*, the second step in the process. The work of the support staff is in such a case reduced to *recognizing* the problem type. The third step consists of including the information in the telefax messages in the next edition of the *manual*, and the fourth and final step is to try to *change the program* so that this problem is avoided. The knowledge thus becomes more and more integrated and less exposed to treatment in discourse. In this process, I would like to point to the *delimitation* of the problem, which is contained in the second step, as being particularly important. It very much resembles a kind of *concept formation*. This kind of delimitation could provide the ground for *word formation* at the semantic level. (See also Clark 1992.)

1.5. *Meaning as meaningfulness vs. meaning as signification*

A fundamental assumption in this thesis is that the intersubjective knowledge in language is grounded in the kind of subjective meaningful cognitive systems that we share with lower animals. This view of *meaning as meaningfulness* can be contrasted with a view

common to most of linguistics and philosophy. I will call it *meaning as signification*. They are contrasted (polemically) in the following table.

<i>Meaning as meaningfulness</i>	<i>Meaning as signification</i>
language has a foundation in meaningful actions	language has a foundation in referential correspondence between language and world
connections between language and other cognitive faculties	the key to linguistic meaning is found in language; connections between words in language
defeasible knowledge = expectation	truth

Here I will concentrate on meaning as meaningfulness. Every person explores his own sphere of meaningful experience during his life. This exploration is most often done by action – eating, drinking, moving, creating, playing, etc. – and through this action, more and more of the previously unrelated things in the world become related to his own systems of meaning.

A meaningful activity for me might be to eat or play the violin. The activity gives me satisfaction. If I talk about the meaning of a certain word, like “dog,” on the other hand, I will point to a dog or try to explain with other words: “a common pet.” This is meaning as signification. However, if the concept of meaning is to be of any use to us at all, it is no good that I explain the meaning of “dog” if I do not do it up to a point where I reach meaningfulness for you. If your culture has no pets, the explanation “a common pet” will not mean anything to you. All the words that we have in language reflect the underlying socio-cultural practices of our society.

One thing that makes us blind to meaning as meaningfulness is that we as researchers are always present to judge the meaning of the sentences that we analyze. As the semantic interpretation of a sentence in language is always immediately salient to us, we have great difficulty in judging what it would mean to have a system that

uses language but does not interpret it. Harder (1991) notes for example that the grammaticality judgments that form the basis for transformational grammar are always accompanied by a semanticity judgment by the linguist.

In later years, however, much of science has been built on *computer simulation*, where the simulating system only manipulates the symbols without any understanding of the meaning attached. However, if we want to create autonomous systems capable of using language for real, we also have to model a meaning system. A symbol manipulation system without a meaning system will always be dependent on language users for interpretation (Harder 1991; Hutchins 1995:363; Stewart 1996:323).¹⁰

Theories that build upon meaning as signification lack a meaning system, and their value is therefore limited. They are also strongly associated with the practice of studying written language, and it is not likely that oral societies have had the metalinguistic knowledge necessary to make use of theories of meaning as signification. The translation of linguistic concepts into other linguistic concepts – the principle of the dictionary – that these theories represent is of course useful for us literate people, in the same way that a dictionary is.

1.6. *Perspectivism in science*

To give a broader view of how the two perspectives above are related, let us consider an example. A supertanker passing through the Sound is as a real-world event not ambiguous or contradictory in itself. But when we try to study it, or even think of it, we always do that given a *certain perspective*. We tend to consider only one as-

10. There is an inherent circularity built into the study of language and linguistic practices: the advent of (oral) language in the history of mankind is intimately connected to the ability to make artifacts. These artifacts change the ways in which we can interact meaningfully with our environment. Another shift in artifact structure, cognitive structure and linguistic structure alike seems to have taken place with the development of written language.

pect at a time, and it is very hard to get a grip of the event as a whole. One of us might think of the possible environmental consequences, another of the profit made by the oil company, a third of the joy of driving a car fueled by the contents of the tanker, a fourth of the power of the engines or a fifth of the braking distance of the tanker. Associated with each perspective are also differing mental models, which generate different expressions in language, and different evaluations of the event (Andersson 1994). The perspective taken tends to affect the impression of the event as a whole. The moment when I think of all the gas that can take me and my car to exciting places, it is hard to consider the environmental consequences.

Each of these perspectives can be refined to a scientific perspective, but it is unusual to find scientific perspectives that try to take several vantage points and compare the results of these different analyses, at least when it comes to analyses that cover several of the traditional disciplines.¹¹

Thus, for the study of meaning, science has taken one and only one starting point at each time, and tried to approach meaning through that perspective. Meaning as meaningfulness is particularly difficult, since it does not have any specific locus, and probably no independent cognitive representation – it is embodied and embedded in our socio-cultural activities. Furthermore, meaningful activities are not primarily an object of discourse. Eating is for

11. One reason for this is that there seems to be a trade-off between the elegance of the theory and the delimitation of the data to be taken into account: if we for example only accept written sentences as input for a theory of linguistics, which has been common until recently, then our theory will be neat and clean (but perhaps have limited validity if we want to attain a deeper understanding of how language functions). I admit that in the theory that I propose, not only will the theory seem much more dirty than clean and neat syntax, but language users will also be more primitive, more like our ape ancestors, and more dependent on the surrounding context and on ungrounded prejudice. (See Linell 1982 for a discussion of the “written language bias in linguistics.”)

example not dependent on language for its successful outcome (Paper Four).

Meaning as signification exploits the omnipresence of the linguist and builds upon the visible and audible signs of language. It has the merit of putting the searchlight on many linguistic phenomena that it would have been impossible to discover in other ways, and the assumptions inherent in the perspective have been necessary to build up such systems as predicate calculus and grammar.

However, to understand deeper aspects of language use and the relation of language to categorization and cognition in general, meaning as signification is a perspective that is not good enough. (For a general critique, the reader is referred to e.g. Lakoff 1987; Linell 1982; 1996.)

Although I try to adopt a view of language that emphasizes meaningfulness and relation to socio-cultural practices in the present thesis, there is no coherent alternative for the study of meaning that would correspond to a full-blown scientific *theory*. The reason for this is the lack of candidate theories in the current scientific discussion, which has forced me to approach the problem of meaning from several different positions, and much would be achieved if the reader found some coherence in the views that emerge in the different papers. As the papers are written in contrast to different theories, I have also in some papers been forced to accept methodological assumptions that are challenged in other papers in the thesis.

1.7. *Stabilizing structures*

Proponents of traditional linguistics take the three functional realms of syntax, semantics and pragmatics for given and see them as a quasi-stable object of study. Adopting the reverse perspective, trying to build linguistic structures from meaning as meaningfulness and socio-cultural practices, also means taking the constitution of the different levels of pragmatics, semantics and syntax seriously, and considering what are the underlying cognitive pro-

cesses. To do this is of course a giant project, and the outline I give here should be seen as very preliminary.¹²

In the view that I have adopted in this thesis, pragmatics, semantics and (morpho-)syntax emerge as three functional realms with limited autonomy with respect to each other by a process that is perhaps best described as “conventionalization.” Each level has more or less salient characteristics that can function as processing cues for the language users.¹³

Morpho-syntactic conventions For example, word classes signal by common morphology that there are underlying similarities between words in the same word class: verbs look similar because their meanings are similar.¹⁴ Syntactic similarity functions in basically the same way: similar position of certain constituents in the phrase structure tells us that these constituents can have the same underlying semantics, and the syntactic structure in those cases functions as a cognitive processing strategy.

To code information with word order has several advantages. One could say that syntactic information conveyed by word order (and intonation contours) is parasitic on the words themselves – it

12. Some of the influences to this section (that I want to mention and recommend) are: Allwood (n.d.), Andersson (1994), Anward and Linell (1976), Baldwin (1994), Broström (1994), Bullova (1977), Brown (1958/1968), Carey (1985), Chiu, Krauss and Lau (to appear), Clark (1992; 1996), Freyd (1983), Givón (1989; 1995), Hanks (1990; 1996), Harder (1991), Langacker (1987), Markman (1991; 1994), Rommetveit (1985), Steels (1996), Traugott (1989). See also Papers One, Two, Three and Five.

13. Iconicity and isomorphism – structural similarity between morpho-syntax, semantics and pragmatics – have been studied in great detail by Talmy Givón. (See for example Givón 1979; 1984; 1989; 1990; 1995.) My brief overview is only intended to set the stage for the papers in this thesis.

14. The causality of this relation can be questioned. If, in an evolutionary perspective, it is adopted as a processing strategy by language learners that similar structure signals similar meaning, then the reverse will also hold, viz. that surface similarity that has no historical causes will change the meaning of the words. This can lead to the very rapid evolution of language proposed by Deacon (1997) in terms of learnability.

doesn't add to the amount of information, only restructures the words to get the information through. (See Paper Two.)

Semantic conventions The same thinking can be applied to the realm of semantics. One example is the constraints that are proposed for determining the scope of a word. For example, infants seem to use a (possibly innate) cognitive processing strategy that corresponds to the assumption that a newly encountered word corresponds to a whole object rather than to a part or several objects.¹⁵ Thus, we have even weaker surface criteria: the *existence* of a word (a noun) signals underlying properties (the whole object) that are taken into account for language to work more efficiently than if the child were to consider all the *possible* meanings of the word.

Another example is the shareability constraints that we examine in Paper One. We start out from a paper by Jennifer Freyd (1983). The main theme of her paper is that knowledge, because it is shared in a language community, imposes constraints on individual cognitive representations. She argues that the structural properties of individuals' knowledge domains have evolved because "they provide for the most efficient sharing of concepts," and proposes that a dimensional structure with a small number of values on each dimension will be especially "shareable."

This kind of convention is like left- or right-side driving. Without the convention, people drive as they like, and must watch the other cars carefully to avoid collisions. With the convention, the driving is more efficient and the speed can be higher. However, the convention is not without disadvantages: it is for example not possible to take the shortest path to the destination. Such a convention can be considered more semantic than pragmatic, because it builds upon a mutual acceptance.

Pragmatic conventions The pragmatic conventions in turn have no surface criteria of the same kind as the semantic and syntactic

15. Several such constraints have been proposed. (See for example Baldwin 1994; Gelman and Coley 1991; Markman 1994.)

ones. Natural candidates for pragmatic conventions would be the *conversational maxims* proposed by Grice (1975). However, the line of reasoning that Grice follows comes from a philosophical perspective according to which it was thinkable that a communication could exist that would *not* follow the maxim of relation (relevance). However, from an evolutionary perspective it is almost impossible to imagine a communication system that evolves without the relevance principle being built into the system at the most basic level. (See Paper Five and section 2.5.)

Instead, I would propose *causal attribution* as an example of a pragmatic area that could engender conventions capable of semantic strengthening. Attribution theory (Kelley & Michela 1980; Fiske & Taylor 1991) deals with attributing causes to unexpected events.¹⁶ Fiske & Taylor (*ibid.*) illustrates the process with Ralph and Joan who are out dancing, and Ralph is tripping over Joan's feet. The cause that Joan attributes to what happens (herself, Ralph or the circumstances) is determined by inferential processes that are largely nonlinguistic, but could be imagined to become the subject of semantic strengthening: Joan's repeated exposure to partners mistreating her feet could lead her to coin a word "tripper" to succinctly categorize Ralph and others of his ilk. (See Clark 1992.)

The conventionalizations in language all build upon expectations – generalized defeasible knowledge that can be overridden by situational exceptions. Before literacy they were most certainly not made explicit, but have nevertheless acquired a certain stability over time. The greatest stability is found in the syntactic conven-

16. Attribution theory is a very promising area of research that seems to have gone extinct in the early eighties. The cognitive activity of searching for causes of failed expectations, the possibility of differential attribution (to people or other environmental factors) and the mental representation that this activity generates is important to study in the kind of breakdown analysis of the evolution of language and communication systems that I propose in the thesis. The two main kinds of expectations – expectations of other people's mental representations and expectations of environmental factors – can probably be united by a profound attribution theory.

tions, to a lesser degree in the semantic, and even less in the pragmatic conventions.

Papers Two and Three model this kind of gradual conventionalization. In Paper Three, we give an example of these processes in the realm of linguistic modality. We trace modality back to social power structure combined with expectations of the attitudes towards the action to be performed.¹⁷ In the case of modals, the process of conventionalization has probably reached an endpoint – it has structural correlates at each level: the pragmatic processes of social power and expectations are lexicalized as words on a semantic level. But these words also have morphological and syntactic properties¹⁸ that can be used as a cue to underlying semantic (and pragmatic) similarities.¹⁹

This can be seen as an endpoint of conventionalized knowledge, when the interactionally based social power becomes entrenched in the morpho-syntax. As I have argued, not all knowledge becomes lexicalized in this way. I believe this field to be very fruitful for further research.

The study of modal verbs thus concentrated on this fairly well delimited lexical group. In the violin study referred to above (Paper Two and Winter 1996), I study a more general setting, and also look at the kind of expectations embedded in the use of linguistic labels. Here the question is whether language users make use of the vocabulary that is available to them, but perhaps not to the listener, or whether they prefer multi-word expressions that they know will be

17. Talmy's (1988) analysis goes along the same lines, but he takes physical force as underlying and as a basis for extensions to different domains, for example causality and modality (Paper Three).

18. The so-called "NICE" properties and others (Palmer 1979). Among the morphological properties are No *-s* form for 3rd person singular (**mays*), Absence of non-finite forms (No infinitive, past or present participle), and among the syntactic No cooccurrence (**He may will come*). (Paper Three section 1.2)

19. One exception is *have to* which has a modal meaning, but lacks the morpho-syntactic properties of modals.

understood. It turns out that the experts sometimes introduce words from the specialized violin vocabulary, but in other cases use multi-word expressions to designate the same thing. This shows a trade-off between the present interaction and possible future interactions: if only the present interaction is considered, it is often more economical to use multi-word expressions that are easy to understand, rather than a specialized word that is likely to provoke a shift to the communicative level of dealing with the *meaning of the word*.

In this way, the knowledge contained in the linguistic labels will sometimes be passed on to a bigger community, but sometimes it will remain isolated. The existence of a linguistic label in a certain linguistic community signals the importance of the concept that it denotes.

The knowledge lexicalized at the syntactic level is harder to analyze than the semantic and pragmatic knowledge. It is for example much more obvious that 'soon' is related to expectations than that expectations are one of the main structuring principles of modals. A correlate to this is that syntax, which is conventionalized at the highest level, will be the most "obvious" part in language. We are very unlikely to start discussing the syntactic features of language during the change of a violin string.

2. NOTES ON THE PAPERS

Now that I have given a broad overview of the problem area, I would like to introduce the papers briefly, to give the context of each paper and the research tradition in which it is written. These notes are intended to be read either in connection with the corresponding paper, or all in a row as summaries.

2.1. Paper One – *Evolving Social Constraints on Individual Conceptual Representations*

This paper is the most recent in the thesis, written in 1998 together with Peter Gärdenfors, and a shorter version was presented at

the 2nd International Conference on the Evolution of Language, London, in April 1998. The present version has been submitted to the proceedings of that conference.

The paper deals with a form of micro-evolution in language: what happens with the individual's conceptual representation when it is shared in a language community. According to Freyd (1983), communication is most efficient if cognitive representations form a grid with discrete values on few dimensions. We start out from Freyd's results and show in what setting (referential communication) this applies, and what cognitive capabilities are needed for this form of conceptual evolution to work.

Several different areas are loosely connected to each other, but are united by the situation that is analyzed – the setting of referential communication. As an illustration, let us consider what is needed for “me” to ask “you” to fetch a red ball in the living room.

In the example above, the noun “ball” represents an *abstraction* that has evolved in communicative practices in socio-cultural contexts where a ball is something important for us to talk about. The abstraction is grounded in prelinguistic categorization and exploits our ability to perceive *covarying properties*. The existence of such a word “ball” *apparently*²⁰ makes our communicative games more efficient.

The word “red” also builds upon a prelinguistic conceptual apparatus, but of a different kind from the nouns. Instead of focusing on a multitude of covarying dimensions, adjectives like “red” focus on single dimensions. We also need to be able to perceive red as a salient property, and furthermore it is necessary that the distinction between red and non-red objects is useful for us.²¹ (See Paper Four.)

20. This is the “apparently” of evolutionary contexts. The evolution of something specific makes us believe that this specific thing has some advantages, but this, I guess, is mostly because of the lack of alternatives!

21. In the case of a red ball, we are likely to have colored the ball intentionally to exploit the saliency of red.

The difference in level of abstraction also represents a difference in level of interaction. We interact with things on the level of nouns, i.e. with *all* its properties at a time, rather than with single dimensions.

All referential communication builds upon the possibility to distinguish the intended referent efficiently. The distinction must be as good as to assure communicative efficiency, but it is not necessary to distinguish for example color, size or weight of the ball in the living room if there is only one. On the other hand, the cognitive task of computing the level of specification may be so hard that it is easier to overspecify the reference.

A major concern for us in this kind of evolutionary study is to model the evolution of language as a process that develops gradually, with the communicative outcome always being assured, and with individuals of different stages of linguistic evolution being able to communicate with each other, so that it is not necessary to assume immediate shifts in whole populations.

2.2. *Paper Two – Dialogue Dynamics, Violin Strings, and the Pragmatics–Semantics Continuum*

This paper grew out of an empirical study of the dialogue produced by an expert subject who instructed a novice in how to change a string on a violin. The project was originally presented in Winter (1996) where the focus was on the expectation strategies used by the participants. In the paper included in this thesis, I focus on a model of how different kinds of utterances function as a response to breakdowns in the task of changing the string. (See section 1.4 above.) The paper has been submitted to *Pragmatics and Cognition*.

Here, I present the most unrestrained exposure of my view of language, built upon the firm conviction that linguistic structure is a response to the breakdowns that occur in the everyday actions that we perform together in society, rather than a fixed syntactic structure that is intended to be used for describing the world, which is the function of language that emerges from the tradition

of philosophy and linguistics. In my focus on language as a response to breakdowns, I side with artifact researchers like Petroski (1992/1994) who, according to his dictum “Form follows failure,” sees the form of artifacts as a response to breakdowns in everyday activities.²²

Apart from areas of interest in common with artifact research, the model presented here contains several elements that lie far beyond the limits of classical linguistics, and even mainstream cognitive science. One example is to see the task that is performed, in my case the violin string change, as walking along a mental road. The subjects only see a part of the road at a time, and when the task comes to a point where several continuations are possible, this corresponds to a fork or crossroads. This metaphor explains much of what occurs in the dialogues. It is only the novice that has access to the violin, and thus has another perspective than the expert. The expert on the other hand has the knowledge of what will take place, and must form expectations about where on the mental road the novice is for the moment. The main model of the dynamics of this experiment is presented in section 1.4 above.

In this paper as in Paper One, a main aim is to model the processes whereby our linguistic tools – words and expressions – come into being. In the metaphor above, we can say that words will be useful if they allow us to point in different directions at relevant forks on the mental road. Words are not coined in isolation, but responses to uncertainty in socio-cultural practices.

The paper proposes three different kinds of responses to different kinds of breakdowns, which I have called *instructions*, *coordinations*, and *labels*. Instructions are given, mostly by the expert to the novice, to get the other to choose a certain mental path rather than another; coordination phrases are used when expert and novice have differing mental images of where on the mental path they are, as a response to a breakdown on the level of instructions; label

22. It is worth noting again that language and artifacts seem to have emerged at roughly the same time in human cultural evolution.

utterances finally concern what words are used in the dialogues, as a response to a breakdown on either of the other levels.

It is argued that this model ties together two of the main areas of the thesis: the continuum between pragmatics and semantics and what can be taken for granted in discourse. The higher levels of coordination and label utterances represent a breakdown in what can be taken for granted, and at the same time these higher levels represent a position closer to the determination of semantic conventions rather than pragmatic ones.

2.3. Paper Three – Linguistic Modality as Expressions of Social Power

This paper is a contribution to a special issue of *Nordic Journal of Linguistics* on Cognitive Linguistics. It was written in 1994, which makes it the oldest in the thesis. It is intended for a linguistic audience and thus more “traditional” than the other papers. The adaptation to more traditional linguistics means that we make different theoretical assumptions than in the other chapters, in particular concerning the possibility to assess the hearer’s attitudes towards a certain event or action (Section 3.3).

Our model builds upon earlier analyses of linguistic modality in terms of *force dynamics*.²³ Talmy considers force to be one of the underlying structuring principles of language on a par with gender or number, and shows elegantly how a great variety of linguistic surface phenomena receive a unified explanation with the aid of force dynamics, among them modality and causality. Talmy considers the coding of physical force to extend to the social domain by metaphoric mapping.

In contrast to Talmy, we see the *social power* structure as fundamental for organizing the modal verbs. “The one in power” in a communicative setting has, above all, the power of determining the

23. Talmy (e.g.1988) and Sweetser (e.g.1990). See footnote to section 1.3 in the paper for references. It seems that Talmy’s contribution has a focus on the force dynamics and Sweetser’s on the metaphorical aspects of the process, and I will make a rough division of the credits along this line.

perspective on the situation at hand, and the “obedient” has to conform to the will of the one in power. A modal verb, like *can* or *may*, depends for its use on the relation between the speaker and the hearer with respect to their relative social power and their respective attitude to the situation at hand. For example, in a situation where “I” want to leave but feel that “you” are in power, I can utter “May I go now?,” while I would not do that in a setting where I had the power to decide for myself. In the corresponding situation where I did *not* want to leave, no linguistic output would be produced at all. Thus, both social power and attitude constitute relevance criteria for the modal utterances. In fact, it is not the attitudes in themselves that are operative in the linguistic contexts, but rather the *expectations* that the obedient has of the attitude of the one in power – which is needed to take the perspective of the one in power.

More complicated situations arise with modals like *must*, since it is necessary to consider a *third* power that is located outside the situation of communication, and thus not subject to negotiation. If I say “I must go now,” I declare myself as obedient in relation to a power that is stronger than both of “us.”

The kind of modality that I have exemplified here is called *deontic modality* and refers to the social interaction and originally to the *obligations* in the situation. Traditionally, linguistic and philosophical analyses of modality have however started out from another form of modality, called *epistemic modality*, that refers to the knowledge state of the interlocutors. If I say “He must be there now, because I saw his car,” this does not mean that something forces him to be there, but rather that the proposition that he is there is likely to be true, because of the fact that I saw his car. Sweetser (1990) describes this as a metaphorical mapping from the real world to the “epistemic world,” but in our model, we follow Traugott (1989), who sees phenomena like these as “pragmatic strengthenings.” Although “pragmatic strengthening” is a rather vague theoretical concept, I believe that this concept is easier to fit together with the focus on pragmatics, semantics and syntax as

progressive conventionalizations of each other (see above) than a metaphorical account would be.

Many languages have developed epistemic modality from deontic, using the same word forms for both deontic and epistemic. From a cognitive point of view, the development of epistemic modality corresponds to viewing *evidence* as a power in its own right, rather than related to personal experience and social relations.²⁴

Paper Three is typical of the general approach of the thesis in that it focuses on the nonlinguistic factors in the situation and formulates a model of what utterances one can expect given these factors, in this case the social power structure and expectations about attitudes to the relevant actions. In section 1.7 I exemplified phenomena that corresponded to different degrees of conventionalization on the pragmatic, semantic and morpho-syntactic levels. Modal verbs represent a conventionalization at the highest level, and it is in fact interesting that it is possible at all to perform the kind of decomposition in terms of pragmatic factors – power and expectations of attitudes – that we do in this paper, since the internal forces on each level – pragmatics, semantics, syntax – are rather strong.

2.4. Paper Four – Evolution, Categorization and Values

While the first three papers focus on the linguistic realization of meaning, Paper Four is a result of my curiosity about what meaning might be before it is lexicalized in language. The paper was written as a reaction against two research traditions that have exercised a great influence on my work – cognitive linguistics and constructivism – and the same critique applies to both these traditions: it is not enough to focus only on mental representations when studying meaning and cognitive processes. It is also necessary to consider the constraints imposed by the “real world.” This is

24. This change could be induced by *literacy*. See Luria (1974/1976), and for more general accounts Scribner and Cole (1981), Olson (1993) and Ong (1982).

especially important in an evolutionary context. Evolution can hardly be imagined to be promoted by cognitive representations alone, but needs the physical constraints to build up selective pressure.

I am seriously in debt to Annika Wallin, Per Johansson and Christian Balkenius for many of the ideas in the paper, and much of the incentive for writing the paper came from the discussions at the conference “New Trends in Cognitive Science – Does Representation Need Reality?” in Vienna, May 1997. The paper has been submitted to *Evolution and Cognition*.

The focus in the paper is on how meaning is built up for living organisms, from things that are inherently meaningful for the organism, such as food, mates and shelter, to associations of these with previously meaningless things. The function of our senses is important in this connection. What is taken for granted by people who lack scientific schooling is the connection between our senses and what we perceive, but on closer inspection, we must separate the salient stimuli that the senses detect from what is behind the appearances, i.e. what is meaningful for us.

To give an example: our ears detect frequency variations in air pressure that we call sound. However, the sound is not useful for us in itself. Rather, the reason that we have developed ears is that the frequency variations point to distinctions in other domains that have proved useful in the course of evolution.

In everyday language we tend to mix the sensory impressions with the real-world consequences. For example, we use the same word “hurt” for both the sensation of pain (“it hurts”) and the physiological process of injury (“he is hurt”).

The physical entities that are useful for us I have called *values* in the paper. Together they constitute all our life processes – eating, mating, sleeping, etc. – in a *value loop* that we cannot escape from without dying. We must respect our meals!²⁵

In these “values” I found a firm foundation for meaning that I believe can be used for building up what is considered as meaning in language. A possible research program for a new semantic theo-

ry can be built around the question “What perspective can we take that includes both values and linguistic meaning?”

A first step in that direction is taken in the paper. I examine the phenomenon of *covariation* or property clustering. The gist of the argument is that real-world interaction is on the level of *many properties at a time*. When I eat a strawberry, there are several simultaneous processes going on: I see a red object, the strawberry is decomposed in physiological processes, I taste the sweetness and feel the texture and form with hand and mouth. Also, objects are subject to constraints such as physical coherence: if one part of the object moves, the rest usually moves with it. Thus, several properties form a cluster that can be used for cognitive processing, as the following quotation from Givón indicates:

Inference from clustering of categorial properties:

(a) “Individual members of a natural category do not share only a single criterial property. Rather, they most often share many properties, which are thus the *definitional core* of their categorial membership.”

(b) “Therefore, if known members of a group exhibit properties A, B, C etc., and if a sample sub-group also exhibits property Z (to a statistically significant degree), then it is *highly likely* that the rest – untested – members also exhibit property Z.” (Givón 1989:276)

As we argue in Paper One, what has been lexicalized in language as nouns builds upon the clustering of properties in several dimensions at a time (and adjectives, in contrast, on single dimensions).

There also seem to exist neurological processes in the visual cortex that react to complex properties, where the decomposition of

25. Values have been curiously absent from the scientific debate, with very few exceptions, such as von Uexküll (1982) and Jennings (1906). One reason for this might be that we normally do not question the values, and that they are not of a fundamentally cognitive nature, and that we therefore have no specific expressions for them. They lie as a bottom line of what we must take for granted.

the stimuli into simpler stimuli does not provoke the same response. (See Tanaka 1993 and section 3.4 in Paper Four.)

If we consider the inherently meaningful values as the foundation of cognition and action, it becomes natural to consider several interacting dimensions as a complex unit of perception. The whole sensory potential is present at the same time.

Science, however, as I have argued above, tends to take one perspective at a time when examining the processes involved. There are very few tools developed for this kind of analysis where several dimensions are modeled simultaneously. However, computer simulation is rapidly changing the field, and I look forward to simulation models of meaning systems. (See Casti 1997; Harder 1991; Stewart & Cohen 1997; Paper Five.)

2.5. Paper Five – Explorations in Synthetic Pragmatics

The last paper in the thesis deals with the formal dynamics of a process that can be called lexicalization. It was written together with Christian Balkenius for a conference “New Trends in Cognitive Science – Does Representation Need Reality?” in Vienna, May 1997, where it was presented. It was published in the Proceedings.

We have made a computer simulation of a simple language game, which is informally illustrated as follows:

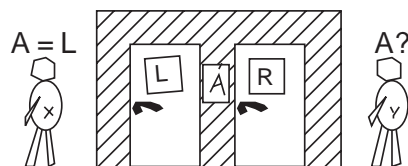


Figure 2. The language game.

A person comes to a place where he knows that a reward is placed behind one of two doors. He looks behind one of the doors, and let us say he finds the reward.²⁶ To be nice to his friend, he writes a note saying “A” (or “B”) and puts it between the doors.

His friend comes along, finds the note, and wonders what “A” might mean. He follows any weak preferences he may have, chooses a door, opens it, and if he finds what he wants, strengthens the preference that “A” indicates that door and not the other. To help the first person, he returns the service of putting a note between the doors. The first person comes by again, and so they continue. When the game is repeated, the matching of doors and labels will (hopefully) stabilize, and we get a common language with a small lexicon of two words and two meanings.

The simulations illustrate the stabilization of a lexicon, and we also show how both the agents contribute to the process. We show results from the simple game described above, and also the more complicated cases where the reward is moved with a certain probability. If the reward stays behind one of the doors, communication is of limited use. Also, if the place changes very often, it is no use to report the change, because the probability that the location changes again is too high.

Finally, we show that when a cost is added to the communication, it is preferable only to communicate when expectations are not met, concerning where the reward is located.

In section 1 above, I presented language as a gradual conventionalization from pragmatics to semantics to syntax, where each level has a certain autonomy. It is this autonomy in the process of lexicalization that we intend to model in the simulations.²⁷

26. It is important to note that the reward does not in itself influence the success or behavior of the agents. In a more “evolutionary” version the rewards could mean, for example, increased fitness.

27. Some of the papers at the 2nd International Conference on the Evolution of Language in London, April 1998, addressed similar questions, e.g. the contributions by Simon Kirby and Ted Briscoe: if we get interesting dynamics by considering only the formal properties, then it is worth investigating this, so that we do not believe that the dynamics come from the content properties.

ACKNOWLEDGMENTS

Two of the papers are published. Please quote as follows:

Paper Three:

Winter, S. & Gärdenfors, P. 1995. "Linguistic Modality as Expressions of Social Power." *Nordic Journal of Linguistics* 18 (2): 137–166.

Paper Five:

Balkenius, C. & Winter, S. 1997. "Explorations in Synthetic Pragmatics." In A. Riegler & M. Peschl (eds.), *New Trends in Cognitive Science –97 "Does Representation Need Reality?"* Vienna, Austrian Society of Cognitive Science, ASoCS Technical Report 97-01, 100–107.

Five men have provided more inspiration than anyone else to my work. I dedicate this thesis to them. They are:

Peter Gärdenfors
Christian Balkenius
Tom Andersson
Per Johansson
Talmy Givón

I also want to express my gratitude to some other people and institutions:

¶ My colleagues and often friends at the Cognitive Science Department: Annika Wallin, David de León, Henrik Gedenryd, Agneta Gulz, Paul Hemeren, Jana Holšánová, Sofia and Linus Broström, Lukas Böök, Janne Morén, Lars Kopp, Lars Hall, Robert Pallbo, Micke Johannesson, Måns Holgersson.

¶ People that have given inspiration and comments: Per Linell, Jens Allwood, Johan Asplund, Björn Larsson, Jean-Jacques Berthout, Bengt Sigurd, Lars-Åke Henningsson, Claudie Péret, Alf Hornborg, Wallace Chafe, Ronald Langacker, Dan Sperber, Dare Baldwin, Dan-E. Nilsson, Rebecca Schweder, Wlodek Rabinowicz.

¶ Talmy Givón, Russell Tomlin, Colette Craig and the Ortega-Haboud family for receiving me in Eugene, Oregon, for a one-month stay.

¶ People on the Internet, most of whom I never met, who kindly provided papers, theses and references: Susan Gelman, Geneviève Patthey-Chavez, Thomas Pechmann, Linda B. Smith, Ralph Miller, Robert Krauss, Justin Marshall, Stevan Harnad, Esther Goody, Jennifer Freyd.

¶ The Swedish Council for Research in the Humanities and Social Sciences (HSFR), Lund University, Lundbergska IDO-fonden, Dagny och Eilert Ekvalls premie- och stipendiefond and Fil. dr Uno Otterstedts fond, for funding; Scandinavian PC Systems AB in Växjö for valuable help.

¶ Alan Crozier for proofreading. Henrik Gedenryd and Magnus Haake for help with the layout and the cover.

¶ And last but perhaps most my dear friends and my family.

