# Empirical cognitive semantics: Some thoughts

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**Abstract**
The transformation of a discipline from an art to a science involves at least three steps: First, the discipline must adopt the protocols and practices of empirical research; second, it must adapt those protocols to its object of research and, in the process of doing so, operationalize its theoretical concepts (i.e., redefine them in terms that allow them to be measured objectively and reliably); third, it must relegate to the metaphysical level all concepts that resist such a redefinition until an operationalization has been found. This paper sketches out the current progress of cognitive semantics along this three-step process and discusses different definitions of the notion *meaning* – meaning as concept, as proposition, as reference and as context of use – and their potential for operationalization. It is argued that while the field as a whole still seems hesitant about the future direction of the discipline, there is a range of interesting methods that are available for transforming cognitive semantics into empirical cognitive semantics.

Keywords: methodology, meaning, operationalization, philosophy of science

## 1. Introduction

A discipline attempting to transform itself from an art to a science must take at least three steps, each of which will irrevocably and fundamentally change the basic outlook of the research community and each of which will therefore alienate a significant proportion of its members.[1]

The first step consists in adopting the protocols of empirical research and the techniques to put them into practice. In the case of cognitive semantics (or of Cognitive Linguistics more generally), the protocols and techniques will be those already adopted by empirically-oriented researchers in psycholinguistics, corpus linguistics, and, arguably, discourse analysis.

The second step consists in adapting these protocols and techniques to the object of research specific to the discipline in question. The task for researchers during this phase is to redefine all of the discipline's theoretical concepts in terms of a set of *operations* that must be performed to identify

and measure the phenomena behind these concepts. This process of operationalization is a difficult undertaking even in the physical domain; it is all the more difficult for disciplines dealing with intangibles such as linguistic meaning.

The third, and perhaps most painful step does not involve *adding* something to the discipline in question, but in taking something away. It consists in giving up those theoretical concepts that resist definition in the second step, as well as those research questions that are dependent on these concepts. In cognitive semantics, this may well mean giving up those central theoretical concepts that define the field. The concepts in question may not have to be given up permanently, of course, as an operational definition could become available at a later point in time. The question must therefore be answered, what place the concepts in question can be given within the discipline until that point.

While individual researchers in the field of Cognitive Linguistics have been working on the second of these three steps for some time now (the contributions in the current volume document some of these attempts, as do, for example, some of the contributions in Kristiansen *et al*. 2006, Gries and Stefanowitsch 2006, Stefanowitsch and Gries 2006, Gonzales-Marques *et al*. 2007, Zeschel 2008, and Brdar *et al*. forthc.). But the field as a whole is currently, at best, taking the first of these steps – slowly, hesitantly, and certainly not in unison.

This paper is intended as a contribution to this process. In the first section, I will briefly sketch out the first of the three steps mentioned above, i.e. the way in which, from my perspective, empirical methods entered the field of Cognitive Linguistics and how they are currently evolving. In the second section, I will then turn in more detail to the second step, that of operationalization, and discuss the problems that this step involves for the cognitively-oriented study of meaning. In the concluding section I will briefly return to the consequences that the third step mentioned above, that of discarding notions that cannot be operationalized, has for cognitive semantics.

## 2. Methods in cognitive semantics

None of the authors who are, rightly or wrongly, regarded as having initiated the field of Cognitive Linguistics are empirical researchers. Most of them were originally trained in a framework whose primary method con-

sists in (syntactic) argumentation on the basis of acceptability judgments on constructed examples; a framework, moreover, that was built around the assumption that linguistic analysis of any kind provided a direct window into the human mind. It is not surprising, therefore, that all these authors developed extensive theories about various aspects of human cognition based on fairly traditional linguistic argumentation. Langacker is perhaps most explicit about this. He refers to his *Foundations of Cognitive Grammar* as "an exercise in speculative psychology" and he summarizes his analytical procedure as follows:

> I have adhered rather strictly, in developing my proposals, to the dictates of both psychological plausibility and linguistic necessity; I have relied almost exclusively on seemingly indisputable cognitive abilities (e.g. the ability to compare two events and register a discrepancy between them), and I invoke them for linguistic constructs that must somehow be be accommodated in any comprehensive and explicit analysis (Langacker 1987: 6).

Other authors are less up-front about the speculative nature of their work, but the complete absence of systematically collected empirical data in their writings speaks for itself.[2]

The fact that the key claims of Cognitive Linguistics are claims about human cognition rather than about language (or at least claims about language *in the context of* cognition) made it inevitable, however, that *someone* would come along and subject these claims to empirical analysis. From the early 1990s onward, a number of second-generation cognitive linguists with a background in psychology began to introduce experimental methods in Cognitive Linguistics research (Gibbs 1994 and the earlier studies he summarizes there can be regarded as a milestone in this regard), and from the mid-to-late 1990s, researchers began adding corpus-methods to the Cognitive Linguistics toolbox (with Geeraerts *et al*. 1994 and Geeraerts 1997 as an important – perhaps the crucial – step on the way).

I will leave extensive discussion of the current state of empirical methodology in Cognitive Linguistics to others for now (cf. Tummers *et al*. 2005 for an extensive discussion of the current state of cognitive corpus linguistics, see also Stefanowitsch, in press) and selectively discuss their potential to study "meaning" in the next two sections. First, let me briefly dwell on some general problems of empirical methodology in Cognitive Linguistics.

The introduction of experimental and corpus-based methods into a field with very different methodological traditions is a dramatic – perhaps even catastrophic – occurrence. It seems to me that two general reactions can be

discerned within the Cognitive Linguistics community: denial and overenthusiastic acceptance. The denial is reflected in the fact that many prominent members of the Cognitive Linguistics community remain unconvinced that empirical research is more than a convenient add-on, when it confirms widely-held assumptions, or a nuisance, when it calls these assumptions into doubt (at the expense of weakening my argument, I will refrain from naming specific examples of this attitude here, as my intention is not to criticize particular researchers but to observe the prevalence of a general attitude). The overenthusiastic acceptance is reflected in the fact that empirical methods are adopted by researchers with little or no background in the philosophy of science, the nuts and bolts of research design or the statistical methods necessary to make sense of empirical results (again, I will refrain from singling out individual researchers).

Both indifference and overenthusiastic acceptance make it difficult to establish empirical thought as a valid addition to the Cognitive Linguistics discourse. The fact that many researchers apply empirical methods incompletely, incorrectly and without attention to established protocols of scientific research produces results that are trivial, at best, and highly misleading, at worst. It thus reinforces the impression that empirical methods have no genuine insights to add to theory building in Cognitive Linguistics.

Let me now turn to the question of operationalization to see whether this impression is justified in principle and how it might be remedied.

## 3. Cognitive semantics and operational definitions

### 3.1. Operationalization

The adaptation of a set of research methods (protocols, procedures and tools) to a new discipline may seem to be a minor technical issue, but it is, in fact, the most drastic development that a field of research can undergo. The reason is that these research methods cannot be used directly to measure the concepts used within the discipline to describe and explain its object of study. Instead, the concepts themselves must be redefined in terms of operations involving these research methods. This process of operationalization fundamentally changes the nature of the concepts in question. Percy Bridgman, one of the main proponents of operationalism, discusses these consequences using the concept *length*:

> We evidently know what we mean by length if we can tell what the length of any and every object is, and for the physicist nothing more is required. To find the length of an object, we have to perform certain physical operations. The concept of length is therefore fixed when the operations by which length is measured are fixed: that is, the concept of length involves as much as and nothing more than the set of operations by which length is determined. *In general, we mean by any concept nothing more than a set of operations; the concept is synonymous with a corresponding set of operations*. (Bridgman 1991[1927]: 5, my emphasis).

Under this view, which is sometimes referred to as 'strict' operationalism, length is no longer regarded as a property of the world that is measured by a specific procedure involving devices like rulers, tape measures, laser rangefinders, ultra-high frequency transmitters, etc. Instead, length is simply the *result* of such a procedure. The procedures differ, of course: a ruler must be placed in physical contact to the thing whose length it is supposed to measure, UHF transmitters produce signals that must be triangulated in order to produce a measure of distance, etc. Also, different ways of using the same device may yield different results. Note that under a strict operational view, there no longer *is* just one notion of *length*. Instead, there are now at least four such notions: $length_{\text{RULER}}$, $length_{\text{TAPEMEASURE}}$, $length_{\text{RANGEFINDER}}$, and $length_{\text{UHF}}$, and their relationship to each other and to the pre-operationalization notion *length* has become a highly complex issue in its own right.

This sounds problematic enough, but there is an additional problem that emerges as soon as we leave the physical domain, which we will clearly be forced to do in the study of language, as there are relatively few properties of language that can be physically measured. Acoustic properties of the speech signal come to mind, and perhaps also articulatory mechanisms by which the speech signal is produced. But as soon as we move beyond the speech signal itself, things become less clear.

Bridgman's example is quite suitable to demonstrating this (although length may not among the most relevant phenomena in cognitive semantics, it does play an important part, for example, in the study of information structure). We could physically measure the length of (part of) a given utterance in milliseconds, for example by recording it on magnetic tape and then using the acoustic signal to trigger an appropriately wired stopwatch. This would give us a definition of length as $length_{\text{MS STOPWATCH}}$, which would be dependent on the accuracy of the triggering device and the stopwatch itself. Or we could physically measure it by recording it digitally on

a computer and then deriving its length from the segment of the data file that represents the signal. This would give us the measure $length_{\text{MS DIGITAL}}$, which would be dependent on the accuracy of the computer, the resolution of the digital file, etc. The difference between these two methods corresponds to the difference between $length_{\text{RULER}}$ and $length_{\text{RANGEFINDER}}$. The additional problem emerges if we want to measure the length of the same utterance in terms of theoretically relevant units such as *number of phonemes* ($length_{\text{PHONEMIC}}$), *number of graphemes* ($length_{\text{GRAPHEMIC}}$), *number of morphemes* ($length_{\text{MORPHEMIC}}$), number of syllables ($length_{\text{SYLLABIC}}$), *number of words* ($length_{\text{LEXEMIC}}$), etc. The first problem is that none of these can be regarded self-evidently to the "correct" way of measuring the length of an utterance. These measures may produce conflicting results such that A may be longer than B according to one of these measures and B longer than A according to another. The researcher must therefore decide which of these new notions of "length" is plausibly relevant in the context of their investigation. The second problem is that even once we decide on one of these notions of length, the process of measuring it is highly complex. To measure $length_{\text{PHONEMIC}}$, for example, we need something fundamentally different from a tape recorder and a watch, namely, agreed-upon and replicable procedures for determining what counts as a phoneme in a given language, for identifying phoneme boundaries in actual words and utterances, and for counting the segments in between the boundaries. Each of these procedures is highly theory dependent.

This does not constitute an insurmountable obstacle from the perspective of operationalism – even 'strict' operationalism is not limited to physical measuring devices:

> If the concept is physical, as of length, the operations are actual physical operations, namely, those by which length is measured; or if the concept is mental, as of mathematical continuity, the operations are mental operations, namely those by which we determine whether a given aggregate of magnitudes is continuous. It is not intended to imply that there is a hard and fast division between physical and mental concepts, or that one kind of concept does not always contain an element of the other; this classification of concept is not important for our future considerations. (Bridgman 1991[1927]: 5).

Although Bridgman is thinking of mathematics when he talks about "mental operations", it is clear that the nature of the "mental operations" involved in the operationalization of some phenomenon may extend beyond mathematics, as long as they are reliably replicable. In our example, structural phonemic analysis would be a mental operation that can be suffi-

ciently explicitly described to be replicable, and hence, it can form part of the definition of the *length*$_{\text{PHONEMIC}}$ of an utterance.

## 3.2. Four kinds of meaning

Although *length* is an important concept in linguistics and the problem of coming up with a useful operationalization is a real one (and one that has not been solved conclusively), it is almost trivial compared to the problems that a truly empirical semantics would face in operationalizing its core theoretical concepts.

The problem that will be discussed in the remainder of this paper is the first one facing the discipline: that of defining the notion *meaning* itself. Broadly speaking, there are four ways in which the term meaning has been defined in the Cognitive Linguistics literature: (i) meaning as concept, (ii) meaning as proposition, (iii) meaning as reference and (iv) meaning as context of use. I will discuss each of these definitions in turn, not in terms of which of them best reflects a cognitive approach to semantics, although this is certainly a question that should be central to a cognitive semantics research program, but in terms of how they can be defined operationally. At first glance, all of them seem difficult, perhaps impossible, to operationalize, but in fact, there are methods in linguistics that can be, and have been, used to measure, and hence to operationalize, the phenomena captured by these definitions.

### *3.2.1. Meaning as concept*

The dominant notion of meaning in Cognitive Linguistics is captured by the following quotation from Langacker's *Foundations of Grammar*, but similar notions underlie work by Lakoff (1987), Fauconnier (1995), and others:

> I take it as self-evident that meaning is a cognitive phenomenon and must eventually be analyzed as such. Cognitive grammar therefore equates meaning with conceptualization (explicated as cognitive processing). In doing so, it conflicts with major traditions of semantic theory ... in particular with the many varieties of formal semantics based on truth-conditions, as well as the newer "situation semantics" ... (Langacker 1987: 5)

Langacker takes a fairly abstract perspective on conceptualization/cognitive processing; he takes great care to point out that a concept in his theory is

not to be regarded as a "mental picture" (Langacker 1987: 97) and although he makes heavy use of analogies to visual processing throughout his work, it is clear that these really are meant to be just that – analogies –, and that it is the abstract structure of these analogies that he is interested in.

It is a central tenet of Cognitive Linguistics that language should be viewed, first and foremost, as a cognitive/conceptual phenomenon. With his view of meaning, Langacker simply takes the implications of this tenet to their logical conclusion. In doing so, however, he engages in a far-reaching definitional act: he is not merely saying that conceptualization exists, that it is relevant to language or that it is useful in explicating the pre-scientific notion *meaning*; instead, he is saying that the word *meaning* should be understood to refer exclusively to "conceptualization (explicated as cognitive processing)". He also explicitly rejects all other definitions of the term: while he would not, presumably, deny that truth conditions (whether applied to possible worlds or to situations) exist (i.e., that they can be stated by a human observer), he states quite unambiguously that they are irrelevant to an explication of the term *meaning*.

The idea that cognitive processing is relevant to the scientific investigation of language is no longer particularly controversial: most (perhaps all) psycholinguistic approaches to language involve an attempt to measure "cognitive processing" and there is, by now, a large number of standard experimental protocols suitable for this task. These protocols themselves can be regarded as operational definitions of whatever aspect of cognitive processing they are meant to measure. They often involve measuring reaction times, for example in the context of priming experiments or self-paced reading/listening tasks. Thus, they define *cognitive processing* as "what happens in a speaker's head between the time they perceive a prime or a stimulus and the time that they react", e.g. by pushing a button. The content of this processing activity is not measured but inferred, for example, by comparing reaction times to different kinds of stimuli or to the same stimulus in different contexts.

Clearly this looks like an extremely impoverished definition of processing if you compare it to discussions in the Cognitive Linguistics literature, for example, of "mental spaces" (Fauconnier 1985), "image schemas" and "image schema transformations" (Lakoff 1987) or "construal" (Langacker 1987, 1991), to name just a few. However, by varying stimuli and response types, psycholinguists have used this seemingly simple method to gain a impressively deep knowledge about many aspects of cognitive processing,

ranging from the time course of lexical access to the way in which syntactic ambiguities are resolved during parsing.

A number of researchers have applied these standard protocols to research issues of interest to cognitive linguists, such as the structure of lexical categories (e.g. Rosch and Mervis 1975), metaphor (Kemper 1989), metonymy (Gerrig 1989) or indirect speech acts (Gibbs 1986), and their work has been extended in many directions in Cognitive Linguistics.

There is one strand of research in the field of Cognitive Linguistics that can be more closely related to the Langackerian definition of meaning: the work on "simulation semantics". Simulation semantics is characterized as follows:

> The study of how different aspects of language contribute to the construction of mental imagery, and the corresponding theory of linguistic meaning as linguistic specifications of what and how to simulate in response to language, is known as simulation semantics. (Bergen 2007: 278)

The definition of meaning as "specifications of what and how to simulate" sounds like a reformulation of Langacker's notion of conceptualization in terms that are more amenable to operationalization – essentially, all that is now needed is a set of procedures to measure mental simulation. The set of procedures actually used by proponents of simulation semantics is constrained additionally by the assumption that simulation is embodied, i.e. that it makes use of perceptual and motor circuitry in the brain:

> As for the actual mechanisms underlying language processing on this embodied view, understanding a piece of language is hypothesized to entail performing mental perceptual and motor simulations of its content ... This implies that the meanings of words and of their grammatical configurations are precisely the contributions those linguistic elements make to the construction of mental simulations (Bergen 2007: 278)

Measurements for mental simulation thus include neuro-imaging techniques in addition to psycholinguistic techniques; all these techniques are employed in a way that is suitable to measuring the activation of particular motor or perceptual circuits in the brain in reaction to linguistic stimuli (see the overview in Bergen 2007).

Simulation semantics is not the only way to operationalize a definition of meaning as "conceptualization (explicated as cognitive processing)", but it shows in an exemplary manner the steps necessary to turn theoretical notions into measurements. First, the pre-scientific notion *meaning* is redefined as *cognitive processing*; this brings it into the domain of the poten-

tially measurable, but it does not yet constitute an operational definition. Next, *cognitive processing* is explicated as *mental simulation*, with the assumption that simulation in response to language uses the same neural structures also used in perceiving and acting in the world. Other explications of *cognitive processing* might do without this assumption (see next section), but making this assumption paves the way for the final step: *mental simulation* is measured, for example, by observing blood flow in one particular area of the brain (neuroimaging) or by priming experiments (psycholinguistics). From the point of view or scientific modeling, these measurements now constitute a definition of *meaning*, and each way of measuring is its own definition (*meaning*$_{\text{NEURAL ACTIVATION}}$, *meaning*$_{\text{PRIMING}}$, etc.).

I am not aware of any corpus-linguistic operationalizations of Langacker's notion of meaning as cognitive processing, nor is it clear to me what such an operationalization might look like. This is not to say that corpus linguistics cannot contribute to the study of conceptualization in Langacker's sense, but it can only do so much more indirectly than the psycholinguistic methods discussed above (much like off-line psycholinguistic techniques like sorting tasks/similarity judgments, acceptability judgments, etc.). The logic behind such studies is always the same: the researcher observes some linguistic or language-related behavior and postulates a set of cognitive processes that are consistent with this result. This may happen in the context of inductive studies, where the result is observed first and the cognitive processes are hypothesized afterwards, or in the context of deductive studies, where the researcher predicts a particular result based on a theoretical model of cognitive processing. Note that this logic is not fundamentally different from the one behind the reaction-time studies discussed above. Off-line studies, amongst which corpus studies may be counted, generally differ from on-line studies in that the subjects' behavior (in this case, their language production) is more complex and temporally further removed from the cognitive processes that presumably gave rise to them. In the case of corpus studies, the (verbal) behavior of subjects is, in addition, produced in natural, uncontrolled settings. Realistically, such results can therefore only distinguish relatively broad classes of theoretical models, nowhere near the resolution necessary to address many of the detailed proposals found in the Cognitive Linguistics literature; crucially, in the context of the present discussion, they can serve as operationalizations of *cognitive processing* only to the extent that the operations necessary to get from these results to a statement about the cognitive process that produced (or contributed to) these results is laid out in sufficient detail to be

reliably replicable. On the whole, corpus linguists are remarkably lax in laying out such operations explicitly, given their rigorous attention to other aspects of scientific research (such as, for example, the statistical modeling of their results). Studies that take important steps towards remedying this are, for example, Wulff (2003, 2009).

### *3.2.2. Meaning as proposition*

Langacker's rejection of truth conditional semantics and situation semantics, widely shared among cognitive linguists, presumably extends to all propositional approaches to meaning. However, if we interpret the term 'cognitive semantics' a little more broadly, there are researchers within this research program who explicitly adopt a propositional view of meaning. Among those, Wierzbicka's Natural Semantic Metalanguage (NSM) is perhaps the most notable. NSM posits the existence of "universal conceptual primitives" that are combined according to the rules of a "universal syntax of meaning" (Wierzbicka 1996: 20) and both are located quite explicitly in the human mind:

> the theory posits the existence not only of an innate and universal "lexicon of human thoughts", but also of an innate and universal "syntax of human thoughts". Taken together, these two hypotheses amount to positing something that can be called "a language of thought", or *lingua mentalis* ... (Wierzbicka 1996: 20).

There are other authors in Cognitive Linguistics that make use of propositional notation systems (for example, Talmy 2000), but as far as I can tell they do not commit themselves to the claim that meaning actually is propositional in nature.

NSM is a radical redefinition of the pre-scientific notion *meaning*, but it is not, of course, an operational definition – universal conceptual primitives and a universal syntax of meaning are purely theoretical notions and no explicit and replicable method exists by which they could be measured. Wierzbicka sees herself as an empirical researcher, but her description of her method is limited to statements like "conceptual primitives can be found through in-depth analysis of any natural language" (Wierzbicka 1996: 13). Her actual method consists in explicating her intuitions about the meaning of words and constructions in terms of the conceptual primitives she has posited *a priori* – there is nothing in this procedure that could serve as a basis for an operational definition.

There have been attempts to explicate the (primitive) elements from which NSM's propositional structures are built up: Goddard (2001) has attempted to redefine the notion *semantic primitive* in terms of "lexical universals" – meanings that are lexified in all languages. Clearly such an approach requires additional steps to count as an actual operationalization (for example, a language-independent procedure for determining whether a particular word has a particular meaning in a given language). Goddard's own work does not offer anything approaching such procedures, but by redefining semantic primitives as lexical universals he has taken a crucial step in bringing them into the domain of the empirically testable. As in the case of the research on mental simulation discussed in the preceding section, however, he has also fundamentally changed the ontological and epistemological status of the notion he set out to define.

It may be worthwhile, in the context of feature-based and/or propositional definitions of meaning to recall early psycholinguistic attempts to identify semantic features, for example, by sorting tasks (e.g. Miller 1969) as well as early work on the propositional nature of text representation (cf. Kintsch 1974). The problem with such approaches is that they must be able to distinguish feature-based/propositional representations from representations based on mental simulation (see preceding section). For example, Miller (1969) shows that words that arguably share semantic features are grouped together in sorting tasks. However, the same effect would emerge if subjects mentally simulated the actions referred to by these verbs and then grouped them on shared aspects of these simulations. Similarly, Kintsch and Keenan (1973) show that reading rates and retention of sentences depend on the number of propositions attributed to these sentences. However, two sentences to which we can plausibly attribute different numbers of propositions presumably also differ with respect to the complexity of the simulations they trigger, which means the latter could provide an alternative explanation. Still, it does not seem inconceivable to devise experiments to distinguish between propositional and simulated representations, and therefore both $meaning_{\text{SIMULATION}}$ and $meaning_{\text{PROPOSITION}}$ can be regarded as potentially plausible operational definitions within cognitive semantics.

### *3.2.3. Meaning as reference*

Given the strong focus on concepts and conceptualization found in Cognitive Linguistics, it is perhaps not surprising that the real-world aspect of meaning (Frege's *reference*) has not received much attention in the field, either in its own right or as a means of measuring conceptualization (although a few examples, such as Lehrer 1982 and Schmid 1983 can be found; also, arguably, one could classify some of the literature on semantic networks, such as Lindner 1982 and Geeraerts 1983 as reference-oriented).

The general rarity of the meaning-as-reference approach is somewhat surprising, since some of the foundational studies in cognitive semantics rely heavily on naming and classification tasks which directly measure the referential range of words (cf. the early work on prototypes [Rosch 1973, Rosch and Mervis 1975, Rosch *et al*. 1976], on variation in referential boundaries [Labov 1973], on color categorization [Berlin and Kay 1969], to name just a few). These studies are usually careful to point out that they are not measuring real-world reference, but reference within a model of the world that filtered through species-specific perceptual processes (cf. the discussion in Rosch *et al*. 1978: 28ff.). Still, the fact remains that they define the meaning of words via properties of their referents, for example, when Rosch *et al*.

> demonstrat[e] that in taxonomies of common concrete nouns in English based on class inclusion, basic objects are the most inclusive categories whose members: (a) possess significant numbers of attributes in common, (b) have motor programs which are similar to one another, (c) have similar shapes, and (d) can be identified from averaged shapes of members of the class (Rosch *et al*. 1976: 382).

There is even a corpus-linguistic operationalization of the referential theory of meaning, pioneered by (and, as far as I can tell, limited to) Geeraerts *et al*. (1994, cf. also Geeraerts 1997). Geeraerts and his colleagues study the semantic development of the loanword *legging(s)* in Dutch by searching for images of leg wear whose description includes the word *legging(s)* in women's magazines and mail-order catalogues published between 1988 and 1991. By classifying the depicted leg wear in terms of length, tightness, the presence of a crease, material, function and sex of intended wearer and then counting the frequency of these features and tracking this frequency across time, they are able to identify a prototypical referent for the word as well as changes in what speakers of Dutch considered to be such a prototype.

Like the naming and classification tasks used by psycholinguists, Geeraerts' method is so simple and elegant that one might have expected it to be adopted widely as one of the central methods in prototype semantics, not just in the context of diachronic research questions but also for determining the synchronic structure of lexical categories. The constraint pointed out above for psycholinguistic uses of referents also holds for the corpus-linguistic version, but within this constraint, *referential range* is such a straightforward operationalization of *meaning* that it hardly needs justification. That it has not been used more widely in prototype research and other areas of cognitive semantics is unlikely to be due to theoretically motivated reservations; it is more likely that practical considerations make it unattractive: collecting suitable samples of images with descriptions is very time-consuming. If this is the reason, then perhaps the wide availability of semantically tagged images through image search engines such as Google Images or Yahoo! Images and photo sharing sites like Picasa and Flickr will inspire a new wave of reference-based research in cognitive semantics.

Referential definitions of meaning, whether one bases them on experimental elicitation or on naturally occurring usage data, are obviously limited to the study of words (and other units of linguistic structure) that refer to perceptible entities and situations, but this is largely a practical limitation. For such units, $meaning_{\text{REFERENCE}}$ is such an obvious way of operationalizing meaning that the relatively minor role it plays in current cognitive semantics is rather surprising.

### *3.2.4. Meaning as context of use*

There are traditions in linguistics that look for the meaning of a linguistic expression in the contexts in which they are used. Generally speaking, Wittgenstein's idea that "the meaning of a word is its use in the language" (Wittgenstein, *Philosophical Investigations*, Sect. 43) can be seen as the most general statement of this position, another one would be the assumption in Conversation Analysis that meaning is negotiated by speakers in linguistic interaction and that one can analyze meaning by analyzing clues in the interactional context (for example, by observing how speakers hold each other "accountable" for particular interpretations of what is said).

What I have in mind more specifically, though, is the idea that the meaning of a word is reflected in the *linguistic* contexts in which it occurs frequently. As far as I know, none of the leading theoreticians in Cognitive

Linguistics have paid much attention to this idea; but the assumption that the meaning of a word can be read off from other words that it frequently occurs with is quite common in corpus linguistics. It goes back at least to Firth, who argued that we can "know a word by the company it keeps":

> [A] text in such established usage may contain sentences such as 'Don't be such an ass!', 'You silly ass!', 'What an ass he is!' In these examples, the word *ass* is in familiar and habitual company, commonly collocated *with you silly-, he is a silly-, don't be such an-*. You shall know a word by the company it keeps! One of the meanings of *ass* is its habitual collocation with such other words as those above quoted (Firth 1957: 11).

Firth's example shows that he takes "linguistic context" to include not just collocates (i.e., words) but also complex expressions (i.e., what has been called patterns in Pattern Grammar, cf. Hunston and Francis 1999; or collostructions in Collostructional Analysis, cf. Stefanowitsch and Gries 2003). Firth's example is concerned with distinguishing between different senses of a word, and this is one of the most frequent applications to which Firth's method has been put (another is differentiating the meaning of near-synonyms, cf. e.g. Kennedy 1991, Church *et al*. 1991, Stefanowitsch and Gries 2003, Gries and Stefanowitsch 2004).

A number of researchers, beginning with Atkins (1987), have recently taken up Firth's idea of identifying for a given word some well-defined set of lexical or lexico-grammatical co-occurrence patterns and using that set to determine the meaning of that word in general (cf. e.g. Stubbs' [1995] notion of a "semantic profile" or Lowe's [1997] "distributional profiles") or to distinguish different senses of the word in question (cf. Hanks' [1996, 1997] notion of a "behavioral profile").

Researchers differ in how much and what type of information they include in their co-occurrence profiles. Typically, they restrict themselves to formal (morphological and syntactic) properties of the context, but Gries' (2006) explicitly cognitive linguistic and rigorously quantified variant (for which he uses Hanks' term *behavioral profile*) also includes semantic properties of the words themselves (e.g. different verb senses, the process type of verbs, the animacy of subjects and objects, etc., cf. also Gries and Divjak 2009; this vol.).

As far as I can tell, all of the researchers cited here assume that co-occurrence profiles *reflect* the meaning (or different senses) of a word, but none of them suggest that these profiles *are* the meaning of that word (as Firth did). This seems to be a small step conceptually, though, and it would turn the notion of a co-occurrence profile into an operational definition of

meaning. Of course, in order to use co-occurrence profiles of any kind as operational definitions for *meaning*, they must exclude semantic information and be strictly limited to formal contextual features (as in Janda and Solovyev's [2009] "constructional profiles").

"Meaning as context of use" is an interesting operational definition of meaning in that it provides a link between a well-established corpus-linguistic research tradition and Langacker's idea that linguistic representations emerge from linguistic usage. It is also the only possible genuinely corpus-based definition of meaning. Of course, as with the other operational definitions discussed here, it changes the meaning of the every-day word *meaning* quite radically. This raises the question how all these different definitions are related to each other, a question to which I will turn in the next subsection.

### 3.3. Theory and operationalization

If the field of cognitive semantics were to adopt operationalism along the lines sketched out above, the notion *meaning* would be replaced by notions like *meaning*$_{\text{MENTAL SIMULATION}}$, *meaning*$_{\text{COOCCURRENCE PROFILE}}$, *meaning*$_{\text{LEXICAL UNIVERSALS}}$, and *meaning*$_{\text{REFERENCE}}$. Actually, even this is a simplification, as each of these notions would in turn be replaced by specific operational procedures: mental simulation can be measured in different ways and each of them would constitute an operational definition in its own right, giving us, for example, *meaning*$_{\text{MENTAL SIMULATION-FMRI}}$, and *meaning*$_{\text{MENTAL SIMULATION-PRIMING}}$; similarly, each specific suggestion as to how co-occurrence profiles should be gathered and what information should be included in them would give us a different operational definition (e.g. *meaning*$_{\text{PROFILE-CONSTRUCTIONAL}}$, *meaning*$_{\text{PROFILE-BEHAVIORAL-HANKS}}$, *meaning*$_{\text{PROFILE-BEHAVIORAL-GRIES}}$, etc.); a referential view could give us *meaning*$_{\text{REFERENCE-PICTURE NAMING}}$, meaning$_{\text{REFERENCE-CATALOGUE}}$, etc., and so on.

Faced with this multitude of specific definitions which replace what was traditionally thought of as a unified, if extremely ill-defined, theoretical notion, we could ask ourselves how we should think of their relationship to each other. There are two possible answers to this question, a moderate one and a radical one.

The moderate answer is that operational definitions cannot be all there is to a discipline, and that the operational definitions must be held together by the overarching notion that inspired them in the first place. In the case of

empirical cognitive semantics, researchers would continue to assume that there is such a phenomenon as meaning that is separate from the various operational definitions and that every operational definition is simply an attempt to capture (some aspect of) this phenomenon.

This answer is initially attractive for several reasons. First, strict operationalism has often been criticized as being irreconcilable with scientific progress, as every change in an operational procedure would have to be treated as a change of the object of study (Boyd 1991: 9). Thus, no procedure could ever be improved. Second, it has been pointed out that in actual practice, researchers *do* "treat the new procedures as improvements or extensions of the old ones", and thus behave

> exactly as they should if the new laboratory procedures were improved or extended procedures for measuring, detecting, or otherwise assessing a previously studied unobservable feature of the world. (Boyd 1991: 9, cf. also Boyd 2008).

In other words, scientists do not seem to adhere to operationalism, but instead seem to treat operational definitions as proxies for something else, something that cannot be measured at all. Third, we seem to have direct access to that something in the case of semantics: our own conscious experience of what it feels like to understand language. This experience itself cannot be measured, but we may recognize intuitively that different operational definitions correspond to it more or less closely (I certainly do). However, the fact that an answer is subjectively attractive or that it avoids certain difficult issues in bringing together scientific practice and the philosophy of science does not necessarily make it a good answer.

The second, radical answer to the question of how the different operational definitions are related to each other is simply, that this remains to be demonstrated empirically. This answer accepts that there is no a priori reason to believe that the various operational definitions are related to some common, unmeasurable phenomenon. The task of the semanticist is to look for correlations between the phenomena measured by the different operational procedures and to posit causal relationships where such correlations are found. These causal relationships would be the core of a model of semantics. This model would be unlikely to correspond particularly closely to our conscious experience of understanding language, but whether or not a scientific theory matches our conscious experience of the object of study is not a measure of quality. As for the problem of changing operational procedures, I think it is fair to say that critics of strict operationalism overstate

the issue. There is a difference between improving the accuracy of a measurement, switching to a different measuring procedure that plausibly measures the same thing, and switching to a different procedure that measures something else, and this difference can be demonstrated conceptually and empirically by comparing a new procedure directly to an old one (which is routinely done when operational procedures are changed).

The two answers are not mutually exclusive: it is possible to treat the relationship between different operational definitions for what used to be called "meaning" as an empirical issue (i.e., to look for correlations and causal relations) and, at the same time, continue a sort of metaphysical discourse about some unmeasurable phenomenon in the real world (the structure of language, the mind of a speaker, etc.) that potentially unites all of these measurements. In a sense, this combined practice is close to what empirical cognitive semanticists are already doing, so it would seem to be a reasonable first step.

## 4. Concluding remarks

While empirical work in cognitive semantics addresses a wide range of issues that are relevant to a "cognitive semantics", it seems clear that no attempt has yet been made to formulate a comprehensive model of cognitive semantics in such a way that it can be operationalized along the lines of one or more of the approaches sketched out above.

No doubt this is partly due to the fact that empirically oriented researchers in cognitive semantics are still at the beginning of the second of the three steps mentioned in the introduction. However, it is also due to the fact that the specific theories of cognitive semantics that currently exist in the field are both too general and too specific to be amenable to operationalization. They are too general in that they make claims far beyond anything that could ever be tested empirically, and that thus largely belong to what Popper refers to as *metaphysics* (note that this use of the term diverges from the philosophical mainstream). They are too specific in that they apply these ideas to phenomena at a level of detail where they would be difficult to test even if they were in principle testable.

Current cognitive linguistic theories of meaning have played an important role in the formation of the discipline. They have sketched out new ways to look at meaning (or rediscovered forgotten ones) and have thus inspired, and continue to inspire, empirical researchers such as the contri-

butors to the present volume and others cited above. They should be recognized as the corner stones of the emerging discipline of empirical cognitive semantics, but we should be careful to keep them out of scientific models of meaning in human languages and human minds.

This does not mean that we have to abandon them altogether – we could argue, with Popper (1959: 16), that it might be useful to keep them around, not because discussing them can be expected to advance directly our understanding of the object of study, but because even unfounded speculation will occasionally advance novel ideas that may inspire additional operationalizations as the cycle of hypothesis testing (cf. Geeraerts, this vol.) continues to move the scientific debate in the field forward.

However, keeping these theories around should not be mistaken as an escape route for researchers unwilling to dirty their hands by delving into empirical data; if every currently non-empirical author in the field were to move their interests exclusively to contributing to metaphysical debates of semantics, the discipline of Cognitive Linguistics would become so top-heavy that it would be certain to topple, especially as it is unlikely that all of them, or even the majority, would have much to contribute to metaphysical debates.

Instead, the relegation of much of the current theoretical discourse in cognitive semantics to the metaphysical level should inspire a growing number of researchers to confine themselves to the research questions addressable by the currently available methods and techniques and to take up the task of extending these methods and techniques as far as possible. This would have two consequences.

First, Cognitive Linguistics will move away from its original axioms and become, in many areas of research, indistinguishable from other approaches to the same areas. This has already happened in areas like applied linguistics, corpus-linguistics and sociolinguistics. The main feature that still makes work in these areas "cognitive" is the self-classification of the researchers in question, and, perhaps, a more explicit discussion of how the results of their research relates to human conceptualization and cognitive processing (although non-cognitive researchers in these fields do, in many cases, recognize the cognitive implications of their work quite explicitly, see, for example, Hoey 2005). Second, cognitive semantics might ultimately have to shift its focus away from some of the research questions that are currently central to it, as it becomes clear that they are forever beyond operationalization and measurement.

Cognitive semantics, in other words, will first become empirical cognitive semantics (the present volume contributes to this process), and then simply empirical semantics. From the inside perspective of the current Cognitive Linguistics community this may be undesirable, as it seems to rob the discipline of its unique selling point. But from the perspective of a future science of empirical semantics, the shedding of the adjective *cognitive* is a minor loss, and it may even be a decisive step in the emancipation of the discipline from its tradition as an exercise in speculative psychology. To the extent that semantics is a cognitive phenomenon, the results of empirical semantics will show this with or without the label *cognitive*.

## Notes

1. This paper is loosely based on an impromptu talk I delivered at the workshop on Empirical Cognitive Semantics at the 10th International Cognitive Linguistics Conference in Kraków. I would like to thank the participants of this workshop, especially Daniel Wiechmann and Dirk Geeraerts, for their stimulating discussion, and Juliana Goschler for her comments on an early draft of this paper. Finally, I would like to thank the organizer and editor of the present volume, Kerstin Fischer, for her comments and her angelic patience in waiting for me to finish the paper. None of them are responsible for my unfinished ideas, premature claims and eclectic and incomplete references to the literature.
2. The indifference towards empirical methods is also reflected in current Cognitive Linguistics textbooks: Ungerer and Schmid (1996, 2006) and Croft and Cruse (2004) do not contain any references to empirical methods at all; Lee (2002) limits its empirical remarks, rather idiosyncratically, to a short chapter on discourse analysis; Evans and Green (2006) introduce introspection as the sole methodology of the discipline and claim that it is a "'window' to the underlying system" (Evans and Green 2006: 17). This indifference is all the more surprising as some of these authors are clearly aware of the existence of, and need for, empirical methods: Schmid and Lee make extensive use of corpus linguistic data in their own research and Evans has collaborated with a number of psycholinguists.

## References


Atkins, Beryl T.
1987 Semantic-ID tags: Corpus evidence for dictionary senses. In *The Uses of Large Text Databases. Proceedings of the Third Annual Conference of the New OED Centre.* University of Waterloo, Canada, 17–36.

Bergen, Benjamin
2007 Experimental methods for simulation semantics. In *Methods in Cognitive Linguistics*, Monica Gonzalez-Marquez, Irene Mittleberg, Seanna Coulson and Michael J. Spivey (eds.), 277–301. Amsterdam / Philadelphia: John Benjamins.

Berlin, Brent and Paul Kay
1969 *Basic Color Terms. Their universality and evolution*. Berkeley: University of California Press.

Boyd, Richard
1991 Confirmation, semantics, and the interpretation of scientific theories. In *The Philosophy of Science,* Richard Boyd, Philip Gasper and J.D. Trout (eds.), 5–35. Cambridge, MA: MIT Press.
2008 Scientific realism. In *The Stanford Encyclopedia of Philosophy* (Fall 2008 Edition), Edward N. Zaltaed. (ed.). Online at plato.stanford.edu/archives/fall2008/entries/scientific-realism/ (accessed 9th February, 2009).

Brdar, Mario, Milena Žic Fuchs and Stefan Th. Gries (eds.)
forthc. *Expanding Cognitive Linguistic Horizons*. Amsterdam / Philadelphia: John Benjamins.

Bridgman, Percy W.
1991 The operational character of scientific concepts. In *The Philosophy of Science,* Richard Boyd, Philip Gasper and J.D. Trout (eds.), 57–69. Cambridge: MA: MIT Press. [Originally Chapter 1 of Percy Bridgman (1927), *The Logic of Modern Physics*, New York: MacMillan.]

Church, Kenneth W., Patrick Hanks, Donald Hindle and William Gale
1991 Using statistics in lexical analysis. In *Lexical Acquisition: Using online resources to build a lexicon,* Uri Zernik (ed.), 115–164. Mawah, NJ: Erlbaum.

Croft, William and Alan Cruse
2004 *Cognitive Linguistics*. Cambridge: Cambridge University Press.

Evans, Vyvyan and Melanie Green
2006 *Cognitive Linguistics. An introduction*. Edinburgh: Edinburgh University Press.

Fauconnier, Gilles
1985 *Mental Spaces. Aspects of meaning construction in natural language*. Cambridge, MA: MIT Press.
Firth, John R.
1957 A synopsis of linguistic theory 1930–1955. In *Studies in Linguistic Analysis*. (Special ed. *Transactions of the Philological Society*), J. R. Firth (ed.), 1–32. Oxford: Basil Blackwell.
Geeraerts, Dirk
1983 Prototype theory and diachronic semantics. A case study. *Indogermanische Forschungen* 88: 1–32.
1997 *Diachronic Prototype Semantics. A contribution to historical lexicology*. Oxford: Clarendon Press.
this vol. The doctor and the semantician.
Geeraerts, Dirk, Stefan Grondelaers and Peter Bakema
1994 *The Structure of Lexical Variation. Meaning, naming, and context.* Berlin / New York: Mouton de Gruyter.
Gerrig, Richard J.
1989 The time-course of sense creation. *Memory and Cognition* 17: 194–207.
Gibbs, Raymond W., Jr.
1986 What makes some indirect speech acts conventional. *Journal of Memory and Language* 25: 181–196.
1994 *The Poetics of Mind. Figurative thought, language, and understanding*. Cambridge: Cambridge University Press.
Goddard, Cliff
2001 Lexico-semantic universals: A critical overview. *Linguistic Typology* 5(1): 1–66.
Gonzalez-Marquez, Monica, Irene Mittelberg, Seana Coulson and Michael J. Spivey (eds.)
2007 *Methods in Cognitive Linguistics*. Amsterdam / Philadelphia: John Benjamins.
Gries, Stefan Th.
2006 Corpus-based methods and Cognitive Semantics: The many meanings of *to run*. In *Corpora in Cognitive Linguistics. Corpus-based approaches to syntax and lexis*, Stefan Th. Gries and Anatol Stefanowitsch (eds.), 57–99. Berlin / New York: Mouton de Gruyter.
Gries, Stefan Th. and Dagmar Divjak
2009 Behavioral profiles: A corpus-based approach to Cognitive Semantic analysis. In *New Directions in Cognitive Linguistics,* Vyvyan Evans and Stephanie S. Pourcel (eds.), 57–75. Amsterdam / Philadelphia: John Benjamins.

this vol. Quantitative approaches in usage-based Cognitive Semantics: Myths, erroneous assumptions, and a proposal.

Gries, Stefan Th. and Anatol Stefanowitsch
2004 Extending collostructional analysis: A corpus-based perspective on 'alternations'. *International Journal of Corpus Linguistics* 9(1): 97–129.

Hanks, Patrick
1996 Contextual dependency and lexical sets. *International Journal of Corpus Linguistics* 1(1): 75–98.
1997 Lexical sets: relevance and probability. In *Translation and Meaning*, *Part 4*, Barbara Lewandowska-Tomaszczyk and Marcel Thelen (eds.), 19–139. Maastricht: Hogeschool Maastricht, School of Translation and Interpreting.

Hoey, Michael
2005 *Lexical Priming. A new theory of words and language*. London: Routledge.

Hunston, Susan and Gil Francis
1999 *Pattern Grammar. A corpus-driven approach to the lexical grammar of English*. Amsterdam / Philadelphia: John Benjamins.

Janda, Laura A. and Valery D. Solovyev
2009 What constructional profiles reveal about synonymy: A case study of Russian words for SADNESS and HAPPINESS. *Cognitive Linguistics* 20(2): 367–393.

Kemper, Susan
1989 Priming the comprehension of metaphors. *Metaphor and Symbolic Activity* 4: 1–17.

Kennedy, Graeme
1991 *Between* and *through*: The company they keep and the functions they serve. In *English Corpus Linguistics,* Karin Aijmer and Bengt Altenberg (eds.), 95–110. London: Longman.

Kintsch, Walter
1974 *The Representation of Meaning in Memory*. Hillsdale: Erlbaum.

Kintsch, Walter and Janice Keenan
1973 Reading rate and retention as a function of the number of propositions in the base structure of sentences. *Cognitive Psychology* 5: 257–274.

Kristiansen, Gitte, Michel Achard, René Dirven and Francisco José Ruiz de Mendoza Ibáñez (eds.)
2006 *Cognitive Linguistics. Current applications and future perspectives*. Berlin / New York: Mouton de Gruyter.

Labov, William
1973 The boundaries of words and their meanings. In *New Ways of Analyzing Variation in English,* Charles Bailey and Roger Shuy (eds.), 340–373. Washington: Georgetown University Press.
Lakoff, George
1987 *Women, Fire, and Dangerous Things. What categories reveal about the mind.* Chicago: The University of Chicago Press.
Langacker, Ronald W.
1987 *Foundations of Cognitive Grammar*. Vol. 1. *Theoretical prerequisites*. Stanford, CA: Stanford University Press.
1991 *Foundations of Cognitive Grammar*. Vol. 2. *Descriptive application*. Stanford, CA: Stanford University Press.
Lee, David
2002 *Cognitive Linguistics. An introduction*. Oxford: Oxford University Press.
Lehrer, Adriene
1982 *Wine and Conversation*. Bloomington: Indiana University Press.
Lindner, Susan J.
1982 What goes up doesn't necessarily come down: The ins and outs of opposites. In *Papers from the Eighteenth Regional Meeting of the Chicago Linguistic Society*, 305-323. Chicago: Chicago Linguistic Society.
Lowe, Will
1997 Meaning and the mental lexicon. In *Fifteenth International Joint Conference on Artificial Intelligence*, *Proceedings.* Vol. 1. Martha E. Pollack (ed.), 1092–1098. San Francisco: Morgan Kaufman.
Miller, George A.
1969 A psychological method to investigate verbal concepts. *Journal of Mathematical Psychology* 6: 169–191.
Popper, Karl
1959 *The Logic of Scientific Discovery*. London: Hutchinson & Co.
Rosch, Eleanor
1973 Natural categories. *Cognitive Psychology* 4: 328–350.
1978 Principles of categorization. In *Cognition and Categorization*, Eleanor Rosch and Barbara B. Lloyd (eds.), 27–48. Hillsdale: Erlbaum.
Rosch, Eleanor and Carolyn B. Mervis
1975 Family resemblances: Studies in the internal structure of categories. *Cognitive Psychology* 7: 573–605.

Rosch, Eleanor, Carolyn B. Mervis, Wayne D. Gray, David M. Johnson and Penny B. Braem
1976 Basic objects in natural categories. *Cognitive Psychology* 8(3): 382-439.

Sandra, Dominiek and Sally Rice
1995 Network analyses of prepositional meanings: Mirroring whose mind – the linguist's or language user's? *Cognitive Linguistics* 6(1): 89–130.

Schmid, Hans-Jörg
1993 *Cottage and Co., Idea, Start vs. Begin. Die Kategorisierung als Grundprinzip einer differenzierten Bedeutungsbeschreibung*. Tübingen: Niemeyer.

Stefanowitsch, Anatol
in press Cognitive linguistics as a cognitive science. In *Bi-directionality in the Cognitive Sciences. Examining the interdisciplinary potential of cognitive approaches in linguistics and literary studies,* Marcus Callies, Astrid Lohöfer and Wolfram Keller (eds.). Amsterdam / Philadelphia: John Benjamins.

Stefanowitsch, Anatol and Stefan Th. Gries
2003 Collostructions: Investigating the interaction of words and constructions. *International Journal of Corpus Linguistics* 8(2): 209-243.

Stubbs, Michael
1995 Collocations and semantic profiles: On the cause of the trouble with quantitative studies. *Functions of Language* 2(1): 23-55.

Talmy, Leonard
2000 *Toward a Cognitive Semantics.* Vol. 1. *Concept structuring systems.* Vol. 2. *Typology and process in concept structuring*. Cambridge, MA: MIT Press.

Ungerer Friedrich and Hans-Jörg Schmid
1996 *An Introduction to Cognitive Linguistics*. London: Longman.
2006 *An Introduction to Cognitive Linguistics*. Second edition. London: Pearson Longman.

Wittgenstein, Ludwig
1953 *Philosophische Untersuchungen. Philosophical investigations*. Trans. Gertrude E.M. Anscombe. Oxford: Blackwell.

Wierzbicka, Anna
1996 *Semantics: Primes and universals*. Oxford: Oxford University Press.

Wulff, Stefanie
2003 A multifactorial corpus analysis of adjective order in English. *International Journal of Corpus Linguistics* 8(2): 245–82.
2009 *Rethinking Idiomaticity. A usage-based approach*. London / New York: Continuum.

Zeschel, Arne (ed.)
2008 *Usage-based approaches to language processing and representation*. (Special ed. *Cognitive Linguistics* 19). Berlin / New York: Mouton de Gruyter.