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Structural empiricist Cognitive Grammar

ABSTRACT

The article sketches a structural empiricism approach to Ronald Langacker's Cognitive Grammar (CG). In philosophy of science, structural empiricism is a view on the goals of science and adopting this approach helps to solve important problems in methodology of CG and linguistics by and large. The article analyses three such problems. The first one is the evidence required for certain theoretical postulates of CG. From the structural empiricist perspective, purely theoretical concepts postulated by CG do not require evidence apart from the overall empirical adequacy of the theory. The second problem is the usefulness of diagrams used by Langacker as illustrations accompanying his analyses. On the syntactic view of scientific theories (compatible with structural empiricism), carefully designed diagrams can be mathematically rigorous formalizations of theoretical claims. The third problem is the legitimacy of constructed expressions in linguistic theorizing. In structural empiricism, constructed expressions can be treated similarly to idealizations in natural sciences, i.e. a cognitive grammarian may use them fruitfully for model-making without committing herself to the belief in their authenticity.

Keywords
Cognitive Grammar, structural empiricism, philosophy of science

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1. Introduction

Many linguists rightly believe that the question of whether linguistics is a "real" science is sterile. The reason for this is not the shape or research practices in modern linguistics, but the general feeling in philosophy of science

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that the so-called demarcation problem, an attempt to provide a list of necessary and sufficient properties distinguishing science from non-science, cannot be solved in a satisfactory way. It is difficult to say whether linguistics is a science, because it is hard to specify what "standard" science is, so no solid reference point is available. Nonetheless, even if linguistics is not a "hard" science, we can still learn something from our colleagues in natural science departments by examining their practices and their solutions to epistemic and methodological problems. We do not need to do this for purely "idealistic" reasons, for example in order to decide whether linguistics "deserves" the honorary title of a natural science. We can do this for more opportunistic reasons: to see whether a philosophical account of practices in natural sciences can help us solve the problems we find in our discipline. In this spirit, this article offers an interpretation of Ronald Langacker's Cognitive Grammar (henceforth CG, cf. e.g. Langacker 1987, Langacker 2008) along the lines of structural empiricism, a vision of science proposed by the philosopher Bas van Fraassen. More specifically, the aim of the article is to show how viewing Cognitive Grammar through the lens of structural empiricism can help inform the debates on practical epistemic and methodological issues of the theory. It is open to debate whether similar conclusions are valid for other theories within Cognitive Linguistics. Given the multitude and diversity of the theories, a comprehensive philosophical discussion spanning the entire field would require a much larger publication. This is one of the reasons why the thematic scope of the article is limited specifically to Ronald Langacker's Cognitive Grammar.

The first issue concerns the problem of evidence required for certain postulates made by Cognitive Grammar (and any other linguistic theory, for that matter). This problem is addressed straightforwardly in structural empiricism, which is the view that accepting a theory requires only the belief in the theory's empirical adequacy rather than explicit evidence for every part of the theory. The second problem pertains to the role of diagrams in Ronald Langacker's works. I partly disagree with Langacker that diagrams perform a merely heuristic role and I defend a stronger view: at least some of the diagrams are fully-fledged, mathematically rigorous expressions of underlying theoretical models.

The final issue is more general and not limited to Cognitive Grammar. This is the problem of sources of data used for theory-making in linguistics, especially of the legitimacy of expressions constructed specifically for the purpose of theorizing. It appears that CG relies on constructed expressions to a large extent, so even though the problem is wider in scope, it applies to Langacker's theory as well. My argument has two parts. Firstly, I investigate the alethic modal character of constructed expressions. Secondly, by drawing an analogy to research practices in natural sciences, I defend the usefulness of constructed examples within the framework of structural empiricist linguistics. I do not analyze in detail the specifics of Cognitive Grammar and some familiarity with the theory on the part of the reader is assumed.

To the best of my knowledge, Ronald Langacker does not identify himself as a structural empiricist. In my view, some of his claims can be easily and meaningfully interpreted along the lines of this approach, but it must be emphasized that these interpretations are my own and may not enjoy Langacker's endorsement. This is particularly worth remembering in the parts of the article where the conclusions are more radical than those Langacker seems to support (particularly in Section 4). Moreover, the conclusions of this article are not restricted to Cognitive Grammar, at least not in principle. The line of argumentation is in most parts fairly general and may be applied to other theories outside cognitive linguistics as broadly understood. I will, however, investigate the issues as they stand in CG and focus on the solutions proposed by Ronald Langacker (especially in Sections 3 and 4), partly because of my personal interest in this theory and the fact that I first came to be aware of them in the context of CG, and partly because a comprehensive discussion of other theories would require a much longer treatment.

2. *Whence structural empiricism?*

In the context of linguistics, the perennial conflict between two major views in epistemology, rationalism and empiricism, is evoked by Randy Harris in *The Linguistics Wars* (1993). While admitting that any slogan-like summaries of these complex views are bound to be grossly simplified, Harris tentatively defines them in the following way:

> Empiricism: most knowledge is acquired through the senses.
> Rationalism: most knowledge is not acquired through the senses. (Harris 1993: 66)

The author mentions the two views in the context of "the linguistics wars" between Bloomfieldian structuralists (sympathetic to empiricism) and early Chomskyan generativists (siding with rationalism). Leonard Bloomfield explicitly embraced the then-popular version of empiricism proposed by a group of philosophers of science known as logical positivists (*cf.* Bloomfield 1938). Yet Bloomfield chose his allies poorly: logical positivism was heavily criticized from at least the 1930s and by the late 1950s it was clear that their version of empiricism was untenable for a number of reasons. The collapse of logical positivism left Bloomfield without much support from philosophy of science and helped the Chomskyan revolution of the 1950s and the 1960s.

Logical positivists' empiricism, which Bloomfield found so inspiring, is "the second wave" of modern empiricism after John Locke's, David Hume's, and George Berkeley's "first wave" originating in the 18th century. The "first-wave" empiricism was, as Harris notes, a theory about the source of knowledge. The "second-wave" empiricism of logical positivists was an attempt at providing solid foundations for scientific knowledge, largely by regimenting the language of scientific theories. The current "third-wave" empiricism, proposed and developed from the 1980s by the philosopher Bas van Fraassen, is a view on the goals of science. The third-wave empiricists have learned the lesson from the failure of logical positivists: the latest formulation of the stance is free from the problems riddling Bloomfield's approach and, as I will show, may serve as philosophical background for discussions about modern linguistics.

The third wave begins with van Fraassen's *The Scientific Image* (1980), where the philosopher advocates the view called constructive empiricism. There is a wide agreement in philosophy of science that scientific theories talk about both observable and unobservable phenomena. To take a handful of obvious examples, trees, humans, and linguistic expressions in the form of acoustic utterances and inscriptions are observable, while electrons, electromagnetic fields, entropy, and cognitive domains are not. Most philosophers agree that science aims at accounting for observable phenomena (with a possible caveat for idealized objects discussed in more detail in Section 5), but the status and role of unobservable and purely theoretical entities is much more dubious.

The two opposing views are epistemological realism and instrumentalism. Epistemological realists argue that the goal of science is to produce a true picture of the world, that is, a true picture of both the observable and the unobservable. A realist physicist, if she accepts modern physics as a successful theory, believes that electrons and electromagnetic fields exist and that they have the properties ascribed to them by modern physics. Analogically, a realist cognitive grammarian, if she believes that CG is a successful theory, would likewise believe that cognitive domains exist and that they have the properties ascribed to them by CG. An instrumentalist, in turn, claims that a goal of science is to correctly account only for the observable phenomena and unobservable theoretical phenomena are merely "useful fictions" for making accurate predictions and classifications. An instrumental physicist would believe that modern physics correctly describes observable phenomena (including phenomena produced in laboratory equipment, like measurement results), but electrons and electromagnetic fields are not real. Analogically, an instrumentalist cognitive grammarian would claim that CG correctly describes linguistic expressions, but cognitive domains do not exist: they are merely tools for producing correct descriptions of expressions. More specifically, instrumentalists believe that the unobservable theoretical entities postulated by science are not construed literally, i.e. they are not constructed in such a way that they putatively correspond to entities in the real world. For an instrumentalist, when theoretical concepts like electron or cognitive domain are postulated, they are not meant to have any counterpart in the real world, but are intended as part of the conceptual machinery yielding correct predictions or descriptions of the observable world. Strictly speaking, on the instrumentalist reading theoretical entities are not false, because they do not bear a proper relationship to extra-theoretical reality. Electrons and cognitive domains are more similar to tools, like hammers and screwdrivers, than logical propositions; they may be useful or useless, but not true or false.

Van Fraassen's constructive empiricism from *The Scientific Image* is a middle path between the two extremes. It shares the realist conviction that theoretical entities are construed literally (i.e. they may correspond to something in the extra-theoretical reality), but rejects the realist claim that the goal of science is to produce a true picture of the world (i.e. of both the observable and the unobservable phenomena). Van Fraassen is closer to instrumentalism in this respect, stipulating that "[science] aims to give us theories which are empirically adequate; and acceptance of a theory involves as belief only that it is empirically adequate" (van Fraassen 1980: 12) and elaborates:

> The idea of a literally true account has two aspects: the language is to be literally construed; and so construed, the account is true. This divides the anti-realists into two sorts. The first sort holds that science is or aims to be true, properly (but not literally) construed. The second holds that the language of science should be literally construed, but its theories need not be true to be good. The anti-realism I shall advocate belongs to the second sort. (van Fraassen 1980: 10)

An empirically adequate theory is essentially a theory offering a correct description of observable phenomena. More technically, "[to] present a theory is to specify a family of structures, its models; and secondly, to specify certain parts of those models (the empirical substructures) as candidates for the direct representation of observable phenomena" (van Fraassen 1980: 64). Figure 1 is a schematic sketch of a scientific model (for the sake of clarity labels have been added to the theoretical entities constituting the model). The cloud on the left of the dotted vertical line stands for appearances, i.e. the aspect of observable phenomena available to our senses. The elements on the right of the dotted line constitute a model, featuring an empirical substructure isomorphic to appearances.

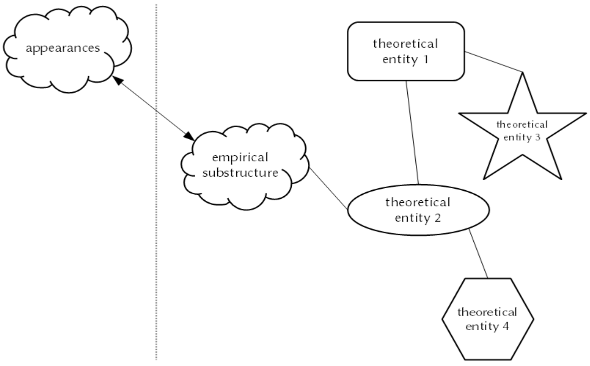


Figure 1. A scientific model (adapted from Monton & Mohler 2014: n.p.)

In order to clarify the notion of empirical adequacy, in *Scientific Representation* (2008) van Fraassen updated constructive empiricism with scientific structuralism, and structural empiricism was born. The key tenets of structural empiricism are:

> I. Science represents the empirical phenomena as embeddable in certain abstract structures (theoretical models).
> II. Those abstract structures are describable only up to structural isomorphism. (van Fraassen 2008: 238)

He adds:

> In the empiricist version, the structuralist slogan is clearly and substantially qualified. It does not take reliance on theory for us to know many things about water – about observable phenomena in general – and so the slogan must be read as meaning, at best, that all we know through science is structure. Nor does the formulation as I. and II. imply that there is in nature, or in the phenomena, a form/content or structure/quality distinction to be drawn. (van Fraassen 2008: 238)

Thus, structural empiricism is the view that the aim of science is to produce empirically adequate theories and an empirically adequate theory is one whose models are structurally isomorphic to observable phenomena.[1]

Structuralism in philosophy of science should not be confused with the structuralism of Ferdinand de Saussure (cf. Saussure 1966 [1916]). Despite

1 Isomorphism is, in fact, a very strong requirement demanding structural identity between two configurations. Ronald Giere proposes a less restrictive version of adequacy, demanding mere structural similarity between a model and its target phenomenon (cf. Giere 1999, ch. 7, Giere 2006).

the fact that both de Saussure and structuralist philosophers of science emphasize the importance of structure understood as a configuration of relations, philosophical structuralism does not entail linguistic structuralism. The most obvious difference between the two is that de Saussure proposed a structuralist understanding of a language: he defined a language (*langue*) as a system with the structure constituted by relationships between signs. Philosophers of van Fraassen's ilk propose a structuralist understanding of a scientific theory: they claim that what scientific models are capable of capturing is the structure of the target entity. A linguist embracing philosophical structuralism is not bound to believe that a language is a Saussurean system of signs; in fact, she may embrace any understanding or definition of language. She merely holds that the models of linguistic phenomena reflect the structure of linguistic phenomena, whatever these phenomena may be in the extra-theoretical reality.

Viewed through the lens of structural empiricism, Cognitive Grammar is therefore a family of models of a linguistic system. Like any other scientific theory, it features theoretical entities and processes (cognitive domains, constructional schemas, compositional paths, subjectification, etc.) and empirical substructures isomorphic (in a weaker version: similar) to appearances of observable phenomena. It is somewhat unclear what should count as observable phenomena in linguistics. However, interesting and fundamental as the problem may be, it is also largely independent of the main topics of this article. For our purposes, I will adopt a broad and intuitive understanding of observables, which includes primarily linguistic expressions spoken, written, or signed, as well as replicable intuitions of speakers concerning linguistic data (e.g. judgments about grammaticality, acceptability, or semantic anomalies). This understanding is not without problems. For example, intuitions of speakers are not publicly observable in any typical sense. One solution to the problem is to extend the notion of observation so that it embraces introspection; another is to treat only the reports about intuitions as observables; yet another is to emphasize the importance of replicability of observation rather than public access to the phenomenon under observation. Each solution has its advantages and disadvantages, but a more detailed treatment of this topic is beyond the scope of this article. The aforementioned provisional understanding of observables including linguistic expressions and speakers' intuitions will suffice throughout the remainder of the article.

3. *Evidence for theoretical entities*

Nominal Structure in Cognitive Linguistics (Langacker 2016), a record of a series of lectures given in 2014, features the following exchange between Ronald Langacker and a person from the audience:

> Question: In the beginning of your talk you talked about *this rock* as an instance of grouping. Is there any evidence coming from language psychology that it's really something that is done?
>
> [Ronald W. Langacker]: Well, surely the answer is no (...) There's no motivation for people to take up this challenge. All I'm telling you is a pretty story–but it's a coherent story and everything fits. And given that so many nouns are transparently group nouns, which is part of the story, it lends credence to the total story.
>
> (...)
>
> This is my attempt to say what that story might be, but I can't claim that it's empirical in any kind of experimental sense. (Langacker 2016: 99-100)

On the observable/unobservable spectrum, grouping would have to be classified as an unobservable phenomenon. We do not observe the process of mental or perceptual grouping in a way we observe physical processes through sense organs. Neither extending the notion of observation to include introspection would help; we do not have a conscious introspective experience of our perceptual mechanisms gradually forming a concept or a percept of a group from previously ungrouped objects. Viewed in this light, the question from the audience is essentially a question about evidence, probably experimental confirmation, for a theoretical phenomenon postulated in CG. Langacker's answer is very much in the spirit of structural empiricism. Firstly, the author rhetorically refers to theory as a story, which is compatible with the constructivist proclivities of Fraassenian empiricists, emphasized by the term from *The Scientific Image: constructive empiricism*. A theory is a family of models and models are artificial constructs designed for specific aims rather than pieces of knowledge discovered in observation or experimentation. Secondly, a structural empiricist insists that acceptance of a theory depends on how well the theory accounts for observable phenomena (i.e. how well its empirical substructure "fits" the observables phenomena) and not on how well the theoretical parts of the theory are supported by evidence. This is entirely consonant with Langacker's answers quoted above. In a structural empiricist interpretation of Cognitive Grammar, the theoretical parts of the story do not require additional evidence other than the empirical adequacy and coherence of the overall theory.

This point is subtle and requires a few words of clarification. Firstly, it does not automatically follow from the structural empiricist reading of CG that mental grouping is not a suitable subject for scientific inquiry. Perhaps in some fields of science, for instance in the psychology of perception, the process of mental grouping has a more prominent role and is more than a theoretical concept accounting for observable phenomena. In such a case, scientists may have enough motivation to look for experimental evidence that the process really takes place. This, however, is not the case in Cognitive Grammar in the sense that the lack of experimental evidence for mental grouping does not lead to the failure of the theory as a whole. After all CG is a theory of language intended to correctly account for linguistic phenomena and not a theory of perception intended to account for whether mental grouping actually happens.

Secondly, it is worth noting that the original formulation of constructive empiricism is silent about the beliefs concerning theoretical entities, as evidenced in the following quote "science aims to give us theories which are empirically adequate; and acceptance of a theory involves a belief only that it is empirically adequate" (van Fraassen 1980: 12). Effectively, this silence results in a voluntaristic epistemology, laid out especially in *The Empirical Stance* (van Fraassen 2002). Constructive and structural empiricism leaves much freedom with respect to beliefs about theoretical entities, although the view is sometimes misunderstood as involving normative guidelines on what scientists should believe in. Effectively, a structural empiricist cognitive grammarian may hold a wide range of beliefs about theoretical phenomena like mental grouping and cognitive domains, for example:

- she may believe that the phenomena exist and CG presents their true picture;
- she may believe that the phenomena exist, but CG does not present their true picture;
- she may believe that the phenomena are construed literally, but they do not really exist and function as useful fictions in CG;
- she may believe that the phenomena are construed literally, but she believes that it does not matter whether CG presents their true picture as long as CG is empirically adequate;
- she may not have any particular beliefs about the status of theoretical phenomena.

Since acceptance of a theory involves only the belief that the theory is empirically adequate the acceptance does not enforce the choice of any of the above beliefs. Even the last option from the list, not having any particular beliefs, is available, since philosophical unreflectivity is not necessarily a vice in a practicing researcher. Perhaps somewhat surprisingly, the first option is available as well, because commitment to empirical adequacy does not preclude the belief in the truth about theoretical entities for reasons other than strictly scientific. Nancy Cartwright aptly explains this subtlety of Fraassenian empiricism:

> Van Fraassen, we should note, does not tell us we should not believe in what theory says about the unobservable. He merely says that that is not the proper, or, I take it, 'justified' attitude. But there is no suggestion that an attitude that is not justified is wrong or is to be avoided or is opposed

> to rationality. Failing to have a justification for an attitude is in no way the same as having a justification for rejecting that attitude. There is vast space for choice. And choice is a good thing. What is important (at least if we wish not to be self-deceived) is not to conflate the beliefs and concerns we choose by ourselves with those that we are supported in. (Cartwright 2007: 41)

4. "Those diagrams"[2]

Another issue that can be clarified within the structural empiricist framework is the function of diagrams in Ronald Langacker's works. The author notices some misconceptions surrounding the diagrams and explains his approach in the passage worth quoting *in extenso*:

> From the frequent use of quasi-pictorial diagrams, some critics of CG have leaped to the incorrect conclusion that semantic structure is claimed to be entirely visual or spatial in nature. A related misconception is that CG can only deal with visuospatial notions. On the contrary, the essential constructs proposed for semantic description (e.g. various kinds of prominence) are applicable to any cognitive domain and independent of any particular mode of presentation. (…) The actual intent of these diagrams is rather more modest: to allow certain facets of conceptual organization to be represented in a format that is both user-friendly and explicit enough to serve as a basis for semantic and grammatical analysis. (Langacker 2008: 12)

A structuralist approach to the diagrams does not only dispel the misconceptions mentioned in the passage, but also affords a stronger defense than the one proposed by the author.

Structural empiricism is at home with the so-called semantic approach to scientific theory, proposed originally by Patrick Suppes (cf. Suppes 1960). The semantic view is usually contrasted with the older syntactic view:

> The syntactic picture of a theory identifies it with a body of theorems, stated in one particular language chosen for the expression of that theory. This should be contrasted with the alternative of presenting a theory in the first instance by identifying a class of structures as its models. In this second, semantic, approach *the language used to express the theory is neither basic nor unique; the same class of structures could well be described in radically different ways, each with its own limitations*. The models occupy centre stage. (van Fraassen 1980: 44; my emphasis – HK)

The emphasized part in the above passage is crucial for our purposes. In the semantic approach, no single formalization or notational convention (called "language" by van Fraassen) has priority over another and all of them

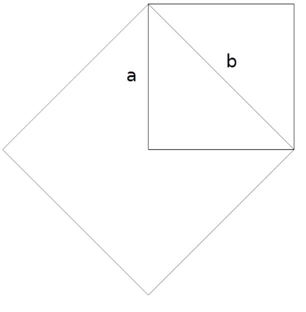
2 The title alludes to Langacker's section title (cf. Langacker 2008: 9).

have inherent strengths and limitations. This also applies to formal sciences like mathematics, as Feyerabend (2011: 82) demonstrates taking the Pythagorean theorem as an example. The most familiar modern formulation of the theorem is algebraic:

$$b^2 = 2a^2$$

for the isosceles right triangle. An advantage of this formulation is compactness and a disadvantage is abstractness: in order to understand the notation, one needs to understand how *a* and *b* correspond to the elements of the triangle, how the operations of multiplication and exponentiation work, and how multiplication and exponentiation are conventionally written in the above formula. The algebraic formulation describes symbolically certain geometric relations that holds for every isosceles right triangle. In order to illustrate this relation, one can exhibit an object in which the relation holds, for example a picture of the geometric objects in Figure 2.

Figure 2. Visual rendering of the Pythagorean theorem (adapted from Feyerabend 2011: 82)



The picture is not, strictly speaking, equivalent to the algebraic notation, because the relations expressed in the notation hold for all isosceles right triangles, not only to the one in Figure 2. The picture merely presents an entity that satisfies the relations expressed by the algebraic formula. The significant advantage of the picture is that the relations are more "visible," albeit not without some exercise of imagination: if one projects the upper-right half of the smaller square inside the larger square, the two halves of the smaller square occupy a half of the larger square. Thus, after the projection is completed it is clear that the field of the larger square is twice as large as the field of the smaller square. No prior knowledge of the conventions of algebraic notation and the axioms of mathematics is needed to grasp the relation. The algebraic notation and the picture in Figure 2 are not equivalent in all respects, for instance the algebraic notation is general, covering all isosceles right triangles, and the picture is specific, it shows relations of this particular configuration only. Nevertheless, the two notations are equivalent with respect to the capacity of expressing the relation described by the Pythagorean theorem. In the semantic approach to a scientific theory, none of the styles of formalization is more basic unless the meaning of "basic" is further qualified. The content of a scientific theory can be expressed in a symbolic propositional description or by providing an object (i.e. a model) of which the statements are true (cf. van Fraassen 1980: 41-44).

In the context of CG, Langacker touches upon the problem of alternative formalizations *Cognitive Grammar. A Basic Introduction* (2008: 9-12), where he defends legitimacy of diagrams in comparison to more "propositional" format of representation. While arguing for general usefulness of diagrams, Langacker is characteristically cautious. For example, he claims that "[while] even the most carefully drafted [diagrams] fall considerably short of mathematical rigor, the process of producing them forces the analyst to examine myriad details that are commonly ignored in semantic and grammatical descriptions", the diagrams "do not amount to a mathematically respectable formalization," and they are "heuristic in nature" (all three quotations from Langacker (2008: 10)).

I agree with Langacker that his diagrams are heuristic in nature, but the same is true for all models expressed in all formal languages. All models are constructions whose aim is to facilitate our understanding of the target. Strictly speaking, Figure 2 does not depict the relations of the sides of the isosceles right triangle (these relations are abstract, so they cannot be depicted graphically); it merely offers a picture of geometric figures that exhibits these relations. However, the relations are not the symbols $b^2 = 2a^2$ either; the formula merely describes properties of the relations by means of an algebraic formula. In this sense, both the picture and the formula express selected properties of the isosceles right triangle in their own terms. I will use the term *structural profile* to refer to a configuration of relations singled out for the purpose of description and representation in a model. We are now in a position to define equivalence of models expressed in different formalisms more technically: models expressed in different notations are semantically and epistemically equivalent when they express the same structural profile of the target object. Conversely, if two models do not express the same structural profile, the models are not semantically and epistemically equivalent.

As already mentioned, semantics of notations should be distinguished from pragmatics, i.e. the usefulness for a particular purpose. Semantically equivalent notations may differ considerably, for instance, with respect to simplicity, elegance, intuitiveness, or amenability for arithmetic operations. These pragmatic virtues invest notations with the heuristic value and consequently the value of each notation may be different. Yet the difference in the heuristic value does not automatically render one notation more basic or more fundamental than the other. For example, Figure 2 is a more intuitive expression of the Pythagorean theorem, while the algebraic notation is more amenable to arithmetical calculations, but neither is more basic in some absolute sense, and both are heuristic in one way or another. In other words, no style of formalization is more "default," rational, or scientifically respectable in and of itself, although some styles may aspire to intellectual sophistication more than others.

At first glance, there is a tension between van Fraassen's empirical adequacy (i.e. isomorphism between appearances and the empirical substructure of a model) and the semantic approach to theories. If models are expressible in different languages, many types of things can function as models: Frigg & Hartman (2017) enumerate physical and fictional objects, set-theoretical structures, descriptions, and equations as entities traditionally referred to as models, and add models with gerrymandered ontologies. Giere (1999: ch. 7) is stricter with terminology and seems to reserve the term *model* for an abstract set-theoretical object defined by (but not identical with) diagrams, descriptions, equations, etc. Giere has good reasons for regimenting terminology, but I will adopt the polysemous, although somewhat messy, terminology of Frigg and Hartmann, since it appears to be closer to the understanding of the term *model* in ordinary language.

Since the items of Frigg & Hartmann's list are ontologically different, how can they be isomorphic to each other? How can an frictionless pendulum, a purely fictional object, serve as a model of an actual physical pendulum? How can a diagram used in CG serve as a model of a conceptual structure? Van Fraassen's answer in *Scientific Representation* (2008) is that isomorphism between objects of different ontologies may hold, because models reflect the structural profiles of their targets, and the profile is an abstract and broadly mathematical notion that is not inherently bound to any particular physical or conceptual object. The fact that structure is broadly mathematical does not mean that it is immediately amenable to arithmetic calculations, but that it is a configuration of relations describable in terms of mathematical set theory. It should be noted that van Fraassen does not reduce all knowledge to mathematics, even broadly understood. He merely claims that "all scientific representation is at heart mathematical. [Structural empiricism] is a view not of what nature is like but of what science is" (van Fraassen 2008: 239). A good scientific model is therefore an object that expresses a structural profile of its target. In the unregimented terminology used in this article, the structural profile of the Pythagorean theorem, the algebraic notation, and Figure 2 all count as models, even though the structural profile is a model of a special kind: it is an abstract entity constituting the core of the theory embeddable in other models. For this reason, objects of different ontologies may function as models by virtue of having the same structural profile as their targets. For instance, a fictional frictionless pendulum may serve as a model of a physical pendulum, because the objects share the same configurations of relations, which is to say that they are mathematically equivalent in some important and relevant respects.

On this view, Langacker's diagrams are effective models of conceptual phenomena to the extent to which the diagrams represent structural profiles of the conceptual phenomena. Since (under a structuralist reading) a structural profile is a set-theoretical object, a diagram is a mathematical representation in the broad sense and it is mathematically rigorous to the extent to which it correctly depicts (some relevant aspect of) the structural profile intended for depicting. It is also semantically, but not necessarily pragmatically, equivalent to other conventions of formalization. Let us illustrate this with an example.

In "The function of trees" Langacker (2017) discusses various ways of visualizing dependency relations between the head and its dependent in *that cute girl with freckles*. A model of dependency should express information about: 1) the relata, 2) the asymmetry of the relation, and 3) the prominence of *girl* as the overall head of the expression. The structural profile could be described verbally resulting in a somewhat laborious collection of sentences:

- *Girl* is the overall head of the expression *that cute girl with freckles*.
- There is a dependency relation between *that* and *girl*; *that* is dependent on *girl*.
- There is a dependency relation between *girl* and *with freckles*; *with freckles* is dependent on *girl*.
- ...

Alternatively, a quasi-predicate-logical notation can be devised for the same purpose, for example:

- H(*girl*, *that cute girl with freckles*)
- D(*girl*, *that*)
- D(*girl*, D(*with*, *freckles*))
- ...

where H(*a*, *b*) element stands for *a* being the head for *b* and each D(*a*, *b*) element stands for a dependency relation in which *b* is dependent on *a*. The propositional descriptions of this sort are analogs of the algebraic formulation of the Pythagorean theorem: they are verbal or symbolic characterizations of the structural profile. Yet instead of offering a description, an object instantiating the structural profile can be offered, for example the dependency tree in Figure 3.

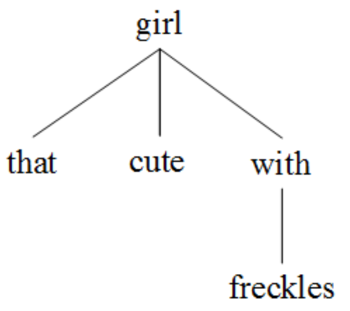


Figure 3. Dependency tree for that cute girl with freckles (adapted from Langacker 2017: 74)

The dependency tree shows the same structural information as the descriptions: the relata are placed at the end of the lines, prominence of *girl* is signaled by vertical organization of the items (the head is the highest element in the hierarchy), and the vertical organization logically entails asymmetry of the relation (by necessity, one element cannot be above and below another element at the same time, so the vertical alignment entails that the relationship works in one direction only). The dependency tree expresses the structural profile not by describing it, but by exhibiting the profile in its structure; in other words, the relations in the structural profile are the relations holding between the elements of the tree. Langacker also proposes the following diagram illustrating dependency relations:

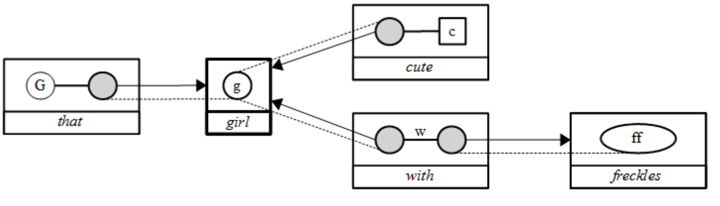


Figure 4. Dependency diagram for that cute girl with freckles (adapted from Langacker 2017: 81)

The diagram in Figure 4 is richer is structural details, because it presents information about the grounding relation (in the box with *that*) and about internal semantic structure of words (circle for singular noun, ellipse for plural noun, etc.). Due to this surplus information, the diagram is not a strict semantic equivalent of the dependency tree, and the propositional descriptions. However, the dependency tree is still embeddable into the diagram, because all relations expressed by the dependency tree are present in the diagram: participants of the relation appear at the end of arrows, the directionality of arrows signals asymmetry of dependency relation, and *girl* is marked as the head with the heavy-line box. Langacker explicitly states that "[it] is readily seen that Figure [3] is equivalent to [4] apart from its greater detail"[3] (Langacker 2017: 81).

To summarize, under the structural empiricist interpretation, Cognitive Grammar is a family of models of a linguistic system. In the most abstract sense, the models of CG are essentially a collection of set-theoretical models (structural profiles) intended to be isomorphic to the structural profile of the linguistic system. These set-theoretical models can be described by means of propositional descriptions or manifested in concrete objects, like diagrams. Obviously, the structural profile of the entire linguistic system cannot be depicted in a single diagram due to practical limitations of the medium and the complexity of the linguistic system, but portions of the system's structure can be depicted for the purpose of the analysis at hand. In order to decipher the relevant structure from the diagram, familiarity with diagram's visual conventions and practice are needed, but this is true for every format of representation used in science. Under the structuralist reading, diagrams are mathematically rigorous in the sense that a properly designed diagram is a manifestation of a set-theoretical structure captured by Cognitive Grammar. A diagram may be designed unrigorously, when the author fails to depict the relation intended for depicting or uses visual conventions inconsistently, but the visual format itself is not inherently unrigorous.

5. Sources of data

The problem of legitimate sources of data for linguistic analysis is not specific to CG and it is not discussed directly in mainstream philosophy of science. Therefore, we are now departing slightly from Cognitive Grammar and structural empiricism proper into wider waters of methodological and philosophical debates. In linguistics, the discussion on what counts as legitimate data is long and complex, so it is not possible to provide a comprehensive summary[4] or decisive cut-and-dry conclusions in this article. Instead, I will attempt to examine how certain ideas of structural empiricism and other constructivist stances inform the debate in linguistics and lend some support to the methods of data collection used in CG. In particular, I will focus on the role of idealizations in scientific model-making.

By doing this, I depart slightly from the way in which sources of data are traditionally discussed by linguists. While my argument does contribute to previous discussions in the community of linguists, instead of arguing for merits and demerits of constructed expressions as sources of data, I will point out the connections to a larger philosophical debate about idealizations.

3 Obviously, Langacker's statement presupposes familiarity with CG formalisms and practice in using them. To an untrained eye, the correspondence may not be readily visible.

4 For an overview, see Scholz, Pelletier, & Pullum (2016: 3).

The key question here is "How is it possible to learn something about the actual state of affairs by examining counterfactual states of affairs?" Neither here, nor anywhere else in the article do I wish to prescribe certain research practices or claim that the use of idealizations warrants scientificness (it does not). My intention is rather to make inroads into the epistemic role of constructed expressions in the context of the epistemic role of counterfactuals in other sciences.

A convenient starting point is one of the tightly intertangled threads of the debate on methodology in linguistics: should linguists rely exclusively on actual attested data (typically derived from corpora) or should expressions constructed for the purpose of linguistic theorizing be admitted as legitimate data? Halliday & Matthiessen are enthusiasts of authentic data from corpora:

> What people actually say is very different from what they think they say; and even more different from what they think they ought to say (…) Similarly, what people say or understand under experimental conditions is very different from what they say or understand in real life (…) The difference is less marked in writing, although it is still there (…) But it is in speech that authenticity becomes critical. (Halliday & Matthiessen 2004: 34)

In cognitive linguistics, similar views are expressed, among others, by Barlow & Kemmer:

> [T]he primary object of study is the language people actually produce and understand. Language in use is the best evidence we have for determining the nature and specific organization of linguistic systems. Thus, an ideal usage-based analysis is one that emerges from observation of such bodies of usage data, called corpora (…) Because the linguistic system is so closely tied to usage, it follows that theories of language should be grounded in an observation of data from actual uses of language. (Barlow & Kemmer 2002: xv)

The authors note that "[speaker] intuitions about constructed examples are an invaluable tool, provided that such data are treated with all appropriate care," but promptly add that "even with such judicious use, intuitions about constructed data cannot be treated as the sole, or even primary, source of evidence as to the nature and properties of the linguistic system" (both quotations from Barlow & Kemmer 2002: xv).

Arguments for the use of authentic data are often made against generative linguists and their supposed overreliance on constructed expressions. Generativists reply:

> More than five decades of research in generative linguistics have shown that the standard generative methodology of hypothesis formation and empirical verification via judgment elicitation can lead to a veritable gold-

> mine of linguistic discovery and explanation. In many cases it has yielded good, replicable results, ones that could not as easily have been obtained by using other data-gathering methods, such as corpus-based research (...) [Consider] the fact that parasitic gap constructions (...) are exceedingly rare in corpora (...) [These] distributional phenomena would have been entirely impossible to distill via any non-introspective, non-elicitation based data gathering method. (den Dikken et al. 2007: 336)

The linguistic material analyzed in many of Langacker's texts appears to be either constructed or at least picked in order to illustrate points under analysis. For this reason, the analyses can be easily attacked on the grounds that they are somehow unreliable due to the inauthenticity of data. Consider the following sentences used in *Cognitive Grammar. A Basic Introduction* (Langacker 2008: 87) illustrating predictions made on the basis of semantic descriptions:

(1) (a) *The clock is {sitting / standing / lying} on the table.*
(b) *The {vase / ?pen / ?football / ?*watermelon /*mat /*peach} is standing on the table.*

According to the author, the choice of the verb in (1a) depends on the shape of the clock construed metaphorically in terms of the human body, while the oddity of some nouns in sentence (1b) results from the incompatibility between the semantic characterizations of *stand* (implying vertical orientation) and nouns which are typically at rest in horizontal position. Since Langacker does not provide any attested source, let us suppose that the sentences are constructed or cherry-picked. This suspicion is particularly strong for the anomalous nouns in (1b); since the author admits that sentences like **The peach is standing on the table* is atypical, it is unlikely to be produced in real-life circumstances. If the argumentation of proponents of authentic data is brought to its logical conclusion, sentences of this sort should not be admitted as valid material for analysis. More generous proponents of authentic data may turn the blind eye on (1a), as it does not look overly exotic and is likely to the produced in natural conversation, but (1b) is less likely to be authentic; less generous ones may balk at the very idea that potential authenticity of data can be evaluated through armchair speculation.

What strategies are available for defending the use of constructed sentences, like the ones in (1a) and (1b) (assuming they are constructed after all)? One strategy consists in pointing out that the very distinction between authentic/actual and artificial/constructed data is somewhat strained. It is quite obvious that an overwhelming majority of actually produced expressions have never been recorded in any form, so it can hardly be argued that an expression does not count as authentic simply because its use cannot be attested. I will not resort to this strategy for two reasons. Firstly, the argument formulated like this is a caricature: I presume that even the most sanguine opponents of constructed data would not seriously equate the authentic with the attested. Instead, what they defend (if I understand correctly) is caution and prudence in data collecting. It would be absurd to claim that an expression in (1a) has never been produced just because it is not attested, yet since (1a) is not attested, there is no way of knowing whether it was actually produced. Thus, it is more cautious and prudent to rely exclusively on attested expressions, which are certainly authentic.

Secondly, and more importantly, I will not resort to this strategy, because I defend the view that even inauthentic expressions may be useful in the study of language. As a preliminary step, I will strengthen the argument of the proponents of authentic data by focusing on non-occurrent expressions, rather than the merely unattested ones. I will define non-occurrent expressions as expressions that have never been produced. Obviously, for purely practical reasons, we can never know for sure whether an expression is non-occurrent. To help our imagination, let us envision a linguistic version of Laplace's demon, a supernatural being who hears and sees every expression produced in natural circumstances by every person in every language since the dawn of speech, and collects all these expressions in a corpus ("natural circumstances" excludes expressions concocted by linguists for purely theoretical purposes). Then, a non-occurrent expression is simply one that is not in Laplace's demon's corpus. This little thought experiment strengthens the case for the proponents of authentic data, since now a linguist who wishes to analyze non-occurrent expressions cannot argue that possibly the expressions are merely unattested rather than inauthentic. Given the Laplace's demon's corpus, we know for sure that the expressions have never been produced in a real-life circumstances. Let us now turn to the main part of my argument.

Non-occurrence of certain linguistic expressions as defined in the previous paragraph is one of several kinds of counterfactuality (i.e. non-actuality). Counterfactual situations and scenarios may differ in terms of modal[5] strength. To borrow Marc Lange's (2016) examples, no mother has ever managed to distribute evenly 23 strawberries among 3 children (without cutting any) and no one has ever managed to untie the trefoil knot.[6] Situations of equal distribution of 23 strawberries among 3 children and untying the trefoil knot are non-actual, because they are prevented by the formal (broadly mathematical) properties of the number 23 and the trefoil knot respectively. In other words, due to these formal properties, it is inconceivable how 23

5 Here, I use the word *modal* in the alethic sense, i.e. referring to the notions of possibility, necessity, actuality, and the like.

6 In knot theory, a trefoil knot is the simplest nontrivial knot. Cutting or ripping apart does not count as untying. More technically, untying a knot is an operation where only Reidemeister moves, as defined in knot theory, are permitted.

strawberries could be distributed equally among 3 children (without cutting any) and how the trefoil knot could be untied. Inconceivability of a scenario implies *logical impossibility*. Hence, the equal distribution of strawberries and untying the trefoil knot are counterfactual due to logical impossibility, i.e. the impossibility of imagining a coherent scenario in which the tasks could be completed successfully.

Other scenarios are counterfactual in different ways. For example, no one has ever managed to produce a frictionless pendulum, or an isolated system (a physical system that does not exchange heat and work with its environment) featured in the second law of thermodynamics, or a perfect fluid (a fluid with no viscosity and no heat conduction). Frictionless pendulums, isolated systems, and perfect fluids are counterfactual, because it is impossible to produce them in practice: no physical object can be thermically insulated in such a way that is exchanges no heat at all with its environment and even a pendulum swinging in perfect vacuum (hence experiencing no friction from air) would be affected by the friction at the pivot. Nonetheless, these objects are conceivable, i.e. one can imagine a logically coherent scenario in which these objects are in working order. Conceivability combined with "in practice" impossibility typically implies *natural impossibility*, when a conceivable scenario is ruled out by laws of nature.[7]

Finally, some scenarios are counterfactual because of certain historical circumstances, even though they are logically and naturally possible. No human has ever landed on Mars (as of 2019) and no human has ever seen a living dinosaur, but these scenarios are not ruled out by the laws of logic or nature. Humans simply happened not to live in the days of dinosaurs and the technology enabling travel to Mars happened not to be developed by 2018. Observing a living dinosaur or travel to Mars are impossible, but this impossibility is modally weaker than the logical and the natural type: the scenario is precluded by contingencies of historical developments and not by any fundamental laws of universe. This is the so-called *temporal impossibility* pertaining to what is "impossible now," in given historical circumstances.

Counterfactuality of non-occurrent expressions does not appear to fit into any of the above classes. Sentences in (1a), assuming they are indeed non-occurrent, do not appear to be impossible. Most sentences in (1b) are perhaps unlikely to occur in natural circumstances, but they are not straightforwardly impossible either. In fact, Langacker convincingly argues that they could appear in certain situations:

7 Strictly speaking, it is debatable whether frictionless pendulums and isolated systems are naturally impossible, since laws of physics do not rule them out; what does rule them out are practical difficulties of constructing these objects. Yet this kind of "practical" impossibility is much closer to natural rather than logical or temporal impossibility, so I will conflate natural and practical impossibility for the sake of simplicity.

> [Some sentences in (1b)] are acceptable (…) if we imagine that the pen is standing on end (possible with certain pens) or that the football is on a kicking tee. Because it has rounded ends, a watermelon can only lie on a table unless we concoct a bizarre context (e.g. it might be impaled on a spike) (…) encyclopedic knowledge tells us that mats are sometimes rolled up, and a rolled-up mat could well be stood on end; under this interpretation we can perfectly well describe it as standing. (Langacker 2008: 87)

Even such bizarre expressions as the famous *Colorless green ideas sleep furiously* devised for a purely theoretical purpose by Noam Chomsky does not appear to be impossible in any of the above senses, although perhaps *Furiously sleep ideas green colorless* (both examples from Chomsky 1957: 15) may be ruled temporally impossible in the sense that given the historical development of English, the expression could not have been produced and considered an English expression. Thus, assuming that Langacker's (1a) and (1b), as well as Chomsky's *Colorless green ideas…* are counterfactual in virtue of non-occurrence (they are absent from Laplace's demon's corpus), their counterfactuality does not belong with logical, natural, and temporal impossibility. In fact, despite their non-occurrence, all of the sentences appear possible, even if not all of them are very likely to be produced in real-life situations. A non-occurrent possibility remains counterfactual, but it is modally weaker than any kind of impossibility. In sum, various kinds of counterfactuality form a modal scale arranged from the strongest logical impossibility to the weakest non-occurrence:

logical impossibility > natural impossibility > temporal impossibility > non-occurrence

Many linguists seem to embrace the conviction that linguistics should study only actual, real-life events of language use, which do not belong anywhere on the above counterfactuality scale. However, this conviction overlooks the fact that many useful scientific models involve clearly counterfactual scenarios.[8] The already mentioned frictionless pendulums, isolated systems, and perfect liquids are examples of naturally impossible objects. Their role is not merely heuristic or pedagogical; some of them are at the very heart of theories in natural science. For instance, the first and the second law of thermodynamics describe the behavior of a thermodynamically isolated system, which is a naturally impossible fiction performing an important epistemic role despite the fact that its counterfactuality is modally stronger than the mere non-occurrence of constructed sentences.

8 Of course, an enthusiast of authentic data may simply reject the usefulness of counterfactual scenarios in science by claiming that linguists, as opposed to natural scientists, cannot learn anything from the scenarios. This, however, would require at least demonstrating how the epistemological situation of a linguist differs from the epistemological situation of a natural scientist.

The use of fictional models in natural sciences can be accounted for in philosophical terms. In the framework of structural empiricism, isolated systems, frictionless pendulums, and perfect liquids are treated just like any other theoretical objects, except their theoreticity does not follow from unobservability, as is the case with electrons and electromagnetic fields, but from their fictional character. Since a structural empiricist is not committed to believing in the actual existence of real-world objects corresponding to theoretical concepts, but only to the empirical adequacy of the theory featuring these concepts, the structural empiricist may accept the theory while withholding belief in the actual real-world existence of the objects postulated by the theory. An idealized model may serve as a tool for predicting observable phenomena when predictions derived from the model are adjusted with respect to the factors omitted in the idealization. In physics, a real-life example of this procedure (calculating the properties of an actual signal in an idealized model of an electric amplifier) is described by Nancy Cartwright (1983: 107-112)

In linguistics, an analogical procedure is Noam Chomsky's (1965: 11) analysis of a pair of expressions quoted here as (2a) and (2b). For the sake of discussion let us once again assume that the expressions are constructed and non-occurrent in the sense defined above. This assumption is corroborated by their intended unacceptability in natural circumstances:

(2) (a) I called the man who wrote the book that you told me about up.
(b) the man who the boy who the student recognized pointed out is a friend of mine.

Chomsky uses (2a) and (2b) to illustrate the difference between grammaticalness and acceptability. Essentially, the author argues that (2a) and (2b) are grammatical, because they can be derived from an idealized model of linguistic competence (idealized grammar). When the derivation is adjusted with respect to factors affecting acceptability, (2a) and (2b) are deemed unacceptable. Here, the factors proposed by Chomsky are the principles "Nesting of long and complex elements reduces acceptability" for (2a) and "Repeated nesting [especially self-embedding] contributes to unacceptability" (Chomsky 1965: 12-13). Thus, Chomsky recognizes that an idealized model of linguistic competence alone does not allow for accurate derivations of acceptability judgments. The idealized grammar allows for deriving (2a) and (2b), and predicts their grammaticalness, but, as Chomsky rightly notes, native speakers would not consider these expressions acceptable. It is only after adjusting the idealized derivations with respect to acceptability that more empirically adequate predictions regarding acceptability can be made.

By offering this example, I do not subscribe to Chomsky's analysis, accept his analytic framework, or suggest that the analysis is the state-of-art in generative linguistics. The example is only meant to illustrate that the idealizations in linguistics can be used similarly to idealizations in natural sciences. A structural empiricist linguist does not have to be committed to the belief in the authenticity of sentences (1a), (1b), (2a), and (2b) in order to claim that linguists can learn something interesting from analyzing them. Regardless of whether the sentences are attested, occurrent (actually produced in contexts others than linguistic theorizing) or non-occurrent, they may be treated as parts of a larger theory, whose ultimate goal is to offer an empirically adequate account of observable phenomena. By analogy, a structural empiricist physicist is not committed to the belief in the existence of electrons or isolated systems, or to the belief that unadjusted predictions derived from the theories featuring electrons and isolated systems are correct descriptions of the observable phenomena. Instead, she may be committed to the belief that adjusting the idealized predictions with respect to the factors omitted in the idealization yields more empirically adequate predictions.

By arguing in favor of constructed expressions, I do not attempt to undermine the significance of actual, occurrent, and attested expressions in linguistics. After all, in structural empiricism the key criterion of theory's success is how well the theory accounts for observable phenomena, which includes phenomena observed in real-life circumstances. Rather, my argument is meant to emphasize the importance of idealized and counterfactual phenomena in scientific theorizing. Bluntly speaking, since natural scientists benefit from the use of counterfactual objects, why can't linguists? Non-occurrent expressions can be viewed as valid research material, especially if we bear in mind that the counterfactuality of the expressions is a modally weaker than that of many models fruitfully used in natural sciences. In effect, the discussion in this section is a call for methodological tolerance and pluralism based on appreciation of effective solutions in other sciences.

6. Conclusion

Philosophers of science, and philosophers in general, are often viewed as people confined to ivory towers and divorced from down-to-earth problems of "the real life." This view is not always false. Undoubtedly, a linguist does not have to study philosophy of science to be a good researcher, just like a speaker does not have to study the grammar of her language to use the language fluently. Yet, philosophical theories can be more than intellectual playthings with no real importance for scientific practices.

In this article, I demonstrated how viewing science through the lens of structural empiricism can help to solve concrete problems not only in Cognitive Grammar, by in linguistics by and large. The problem of evidence for theoretical concepts loses most of its force, because a structural empiricist may deny that theoretical concepts require evidence other than empirical adequacy of the theory. This seems to be in tune with Ronald Langacker's answer in the passage from Section 3: a coherent story that explains all (observable) facts is all we need. Objections to diagrams as proper devices of formalizations vanish in the semantic approach to theories, where a model is expressible in many semantically equivalent ways. What philosopher and semioticians are left with is the task of studying how different styles of formalization achieve their epistemic and cognitive efficacy. The problem of sources of data does not receive a straightforward solution, but a better understanding of the role of idealizations in science helps to vindicate expressions constructed for the purpose of linguistic theorizing as valuable material for analysis. These problems are certainly less spectacular than the one (rightly) dismissed by the reviewer in the introductory section: "whether linguistics or any branch of it is entitled to call itself a science." Yet from the point of view of everyday research practice, these smaller problems may be even more important.

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Streszczenie

Gramatyka Kognitywna w ujęciu strukturalistyczno-empirycznym

Artykuł szkicuje strukturalno-empirycystyczne podejście do gramatyki kognitywnej Ronalda W. Langackera. Współczesny empiryzm, określany pierwotnie mianem empiryzmu konstruktywnego, to stanowisko w ramach filozofii nauki rozwijane przez Basa van Fraassena od lat 80. XX wieku. Podstawowe założenie tego stanowiska głosi, że język teorii naukowych konstruowany jest dosłownie – co oznacza, że terminy zawarte w teoriach naukowych mogą odnosić się do obiektów w rzeczywistości pozateoretycznej – lecz warunkiem zaakceptowania teorii nie jest jej prawdziwość, a jedynie adekwatność empiryczna. W tym rozumieniu teoria adekwatna empiryczne prezentuje wierny obraz zjawisk obserwowalnych, w przeciwieństwie to teorii całkowicie prawdziwych, prezentujących wierny obraz zjawisk zarówno obserwowalnych, jak i nieobserwowalnych. Empiryzm rozumiany w ten sposób stoi w sprzeczności zarówno z realizmem epistemologicznym, zgodnie z którym warunkiem akceptacji teorii jest jej całkowita prawdziwość, jak i z instrumentalizmem, zgodnie z którym elementy teorii odnoszące się do zjawisk nieobserwowalnych nie są konstruowane literalnie. Filozoficzny strukturalizm to z kolei przekonanie, że teorie naukowe odzwierciedlają strukturę badanych zjawisk, rozumianą jako sieć relacji, milczą zaś na temat metafizycznej natury elementów powiązanych tymi relacjami.

Proponowanie strukturalno-empirycystycznego ujęcia Langackerowskiej gramatyki kognitywnej nie jest jedynie czczym ćwiczeniem z zakresu filozofii nauki i może przyczyniać się do rozwiązania praktycznych problemów metodologicznych w językoznawstwie. W artykule skupiam się na omówieniu trzech takich problemów.

Pierwszym z nich jest zagadnienie dowodów na istnienie zjawisk, do których odnoszą się terminy teoretyczne, takich jak proces grupowania mentalnego zaproponowany przez Langackera między innymi w celu sformułowania semantycznej definicji rzeczownika. W empiryzmie strukturalnym brak twardych dowodów na istnienie takich zjawisk nie dyskwalifikuje teorii, bowiem jej akceptacja zależy jedynie od adekwatności empirycznej (stopnia, w jakim teoria prawidłowo oddaje zjawiska obserwowalne). Co za tym idzie, strukturalno-empirycystyczny językoznawca pracujący w paradygmacie gramatyki kognitywnej nie jest zobowiązany, by dostarczyć dowód na to, że proces grupowania mentalnego rzeczywiście zachodzi, jeśli teoria postulująca grupowanie mentalne jest empirycznie adekwatna.

Drugim z omawianych problemów jest zagadnienie wykresów stosowanych w publikacjach Langackera. Sam autor odżegnuje się od stwierdzenia, że wykresy są ścisłymi i sformalizowanymi wyrażeniami treści teoretycznych, lecz dla empirysty strukturalnego starannie przygotowany wykres może funkcjonować jako wysoce sformalizowany model teoretyczny. Empiryzm strukturalny wpisuje się w tzw. semantyczne podejście do teorii naukowych, w którym teoria to grupa modeli danego zjawiska opisywalnych przy pomocy różnorakich formalizacji. Podejście semantyczne przeciwstawiane jest starszemu podejściu syntaktycznemu, w którym teoria jest tworem wyrażalnym jedynie w ściśle zaksjomatyzowanym języku formalnym. W ujęciu semantycznym model może być wyrażony quasi-algebraiczną notacją logiczną lub opisem sformułowanym w języku naturalnym, ale również w formalizacji graficznej, na przykład w postaci diagramu. W podejściu strukturalnym notacja logiczna, opis językowy i diagram mogą być równoważnymi „ekspresjami" modelu, jeśli tylko opisują bądź wyrażają tę samą strukturę.

Ostatnim zagadnieniem jest kwestia źródeł danych do analiz językoznawczych, a w szczególności pytanie, czy wyrażenia językowe konstruowane doraźnie na potrzeby takiej analizy stanowią wartościowy materiał badawczy. W podejściu strukturalno-empirycystycznym wyrażenia takie mogą być traktowane jako idealizacje, czyli zjawiska, które wprawdzie nigdy nie zaszły lub zajść nie mogą, lecz mimo to dostarczają naukowcowi ważnych informacji na temat badanego zjawiska. Przykładami idealizacji w naukach ścisłych są układy izolowane termicznie (jedynie do nich odnoszą się prawa termodynamiki) lub wahadła, w których nie występuje tarcie (jedynie w takich wahadłach można zaobserwować prawo zachowania energii). Mimo że w praktyce nie da się zbudować układu izolowane termicznie (to jest takiego, który nie wymienia ciepła ze swoim otoczeniem) ani wahadła, w którym nie występuje tarcie, pomiędzy elementami mechanicznymi, idealizacje są używane nie tylko do celów dydaktycznych, lecz stanowią zasadniczą treść fundamentalnych teorii współczesnej fizyki. Układy izolowane i wahadła, w których nie występuje tarcie to obiekty kontrfaktyczne w dość silnym sensie tego słowa, ponieważ ich istnienie wykluczone jest przez prawa fizyki. W porównaniu z nimi doraźnie konstruowane wyrażenia językowe – zakładając, że rzeczywiście nigdy nie zostały wypowiedziane i napisane w „naturalnych" okolicznościach – są kontrfaktyczne w sensie znacznie słabszym. Jeśli więc obiekty naturalnie niemożliwe mogą pełnić użyteczną rolę w naukach ścisłych, nie należałoby z zasady wykluczać użyteczności zdań skonstruowanych na doraźne potrzeby analizy językoznawczej. Językoznawca pracujący w ramach empiryzmu strukturalnego może potraktować takie wyrażenia jako idealizacje i podejść to nich podobnie jak do obiektów teoretycznych – nie musi więc wierzyć, że „zaistniały" one w naturalnych okolicznościach, a powinien jedynie przyjmować, że teoria, które wyrażenia te opisuje, jest empirycznie adekwatna.