

COULD SIGN-BASED SEMANTICS AND EMBODIED SEMANTICS BENEFIT ONE ANOTHER?

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Abstract: I argue that Duffley's sign-based semantics and embodied semantics may be mutually beneficial if we conceive them as a semantic theory and as a foundational theory, respectively. First, I describe embodied semantics as a research program that conceives the foundations of meaning in terms of embodied simulation. Afterwards, I draw attention to three points (the analysis of FOR, verbs of positive and negative recall, and causative verbs) where Duffley's semantics could find support in such a foundational theory. Finally, I suggest that two pressing challenges currently on the agenda of embodied semantics (abstract language and sentence-level simulations) could be met by Duffley's theory.

1. Introduction

Contemporary theories of linguistic meaning can be sorted into two broad categories: *semantic theories*, whose main goal is to specify the meanings of the units of a given language (morphemes, words, expressions, sentences), and *foundational theories*, that undertake the task of clarifying the reasons (or facts) in virtue of which a certain unit comes to have this or that meaning (Lewis, 1970, p. 163; Kaplan, 1989, p. 573-574; Stalnaker, 1997, p. 535). Arguably, if the meaning of a given unit is somehow related to the reasons of why it conveys that meaning, then “the shape of a correct semantic theory places constraints on the correct foundational theory of meaning, and vice versa” (Speaks, 2021, s/p). On the other hand, however, there is plenty of room for skepticism: one can deny that there is any correct semantic theory, or hold that the prospects for a foundational theory of meaning are not promising, or stick with a semantic theory without endorsing or even looking for a foundational account.

In *Linguistic Meaning Meets Linguistic Form*, Duffley (2020) offers a semantic approach that is based on the linguistic sign itself. His primary focus is the meaning of challenging signs such as ‘for’, ‘any’, ‘dare’ and ‘need’, as well as constructions with aspectual and causative verbs, verbs of positive and negative recall, wh-words and full-verb inversion, among others. A comprehensive account of the reasons whereby these signs and constructions have such semantic values seems beyond the scope of his analysis. Near the end of the book, however, Duffley makes a sympathetic nod towards a tradition widely known as “embodied semantics”. He not only highlights the fruitfulness of research based on “the hypothesis that language involves embodied cognition” (p. 194), but also suggests an embodied reading of one of Langacker’s key ideas, according to which “the foundational relation on which all human language is based is the

association between a mind-engendered meaning and a bodily produced sign” (p. 194). While reading this page, I found myself wondering: is embodied semantics coming into the picture as yet another contrasting semantic theory? In the light of some remarks at the end of chapter 4, where Duffley insists that “linguistic semantics cannot be reduced to perceptual psychology, nor can cognition be reduced to perception or abstraction to metaphor” (p. 187), the answer could be ‘yes’. Nevertheless, I would like to propose that Duffley’s sign-based semantics and embodied semantics may be mutually beneficial if we conceive them as a semantic theory and as a foundational theory, respectively. As I see it, my proposal does not contradict what Duffley says in the passage just quoted nor the sign-based approach as a whole. On the contrary, it is mutually beneficial — or so I’m about to argue.

The task at hand is thus three-fold: first, I will describe embodied semantics as a research program that conceives the foundations of meaning in terms of embodied simulation. Afterwards, I’ll draw attention to three points where Duffley’s sign-based semantics could find support in embodied simulation: in the analysis of FOR, verbs of positive and negative recall, and causative verbs. Finally, I am going to suggest that a couple of pressing challenges that are currently on the agenda of embodied semantics (abstract language and sentence-level simulations) could be met by Duffley’s theory.

2. Embodied simulation as a foundational theory of meaning

Embodied cognitive science is motivated by the idea that cognition depends quite decisively on extracranial bodily processes. Although with different emphases, all theories of

embodied cognition conceive the cognitive agent as a living organism whose sensorimotor apparatus and affective systems are fundamental to its cognitive activities. In some cases, the living body functions as a constraint, while in others its role may be that of a distributor or a regulator of cognition (Wilson and Foglia, 2017, section 3).

Within this framework, an important line of research purports to show that the body plays a key role in language processing. A bibliometric review by Wang, Yan and Guo (2019) found that research efforts of the last two decades are “emphasizing that language comprehension is a process of mental simulation of sensory and motor systems and other related experiences” (p. 29). The fundamental idea underlying this *embodied simulation approach to meaning*, as Bergen (2015, p. 142) calls it, is “the notion that language users construct mental experience of what it would be like to perceive or interact with objects and events that are described in language”. In Wang, Yan and Guo’s words, “language comprehension involves simulation and the resonance of related experiences” (2019, p. 29). On intuitive grounds, one could have it that these simulations are nothing but effects of language comprehension. For the proposal in question, however, embodied simulations are a constitutive part of our linguistic activities.

My contention here is that the embodied simulation approach is better off as a foundational theory of meaning. In broad terms, foundational approaches can be thought of as *descriptive*, in case the search for foundations goes into “the deep psychology of users and its evolutionary history, as revealed by our best empirical theories” (Garcia-Carpintero, 2012a, p. 397), or as *normative*, in case the foundations are to be found in “norms enforced among speakers” (Garcia-Carpintero, 2012b, p. 410). Furthermore, they can be classified into *mentalist* or *non-mentalist*, as they resort or not to mental states (/mental representations) as the foundations

of meaning (Speaks, 2021). Obviously, something is mentalist or non-mentalist according to a certain conception of the mind (and, by extension, of the mind-body relation). Since Duffley openly challenges the Chomskyan view of syntax, I assume that he is also interested in proposals that challenge the conception of mind that provides the conditions of possibility for that autonomous syntactic machinery. In light of this, I am inclined towards a reading of the embodied simulation approach as a descriptive and non-mentalist (in the sense of non-dualist) foundational theory. Let me sketch some arguments in this direction.

A first argument consists in making the point that the embodied simulation approach to meaning offers a promising solution to the grounding problem (Harnad, 1990). Here, one could argue that (i) any linguistic unit (a word, an expression, a sequence of letters or sounds) needs some sort of definition or grounding (Hauk and Tschentscher, 2013); (ii) an objectivist grounding (word & object correspondence) fails for several reasons; (iii) a distributional grounding (word & other words correspondence) also fails for a number of reasons; (iv) embodied grounding is promising as it combines different components such as affordances, experiences and goals “in a manner that respects intrinsic constraints on bodily activity that arise from biology and physics”, and when these components are successfully meshed, “they form a coherent, doable, and envisionable set of actions: the individual’s meaningful construal of the situation” (Glenberg and Robertson, 2000, p. 383).

A second argument stresses that the embodied simulation approach allows for an explanation of the parsimony of language learning. Here, one could (i) outline an empiricist view that relates perceptual and motor experiences to multisensory representations; (ii) highlight that these experiences and representations are constrained to specific

features of the body; (iii) present evidence that brain areas involved in these experiences are reused when it comes to mentally imagining objects or simulating actions (Pulvermuller, 1999); (iv) argue that language learning is an embodied process in the sense that it is driven by components such as “the amount of sensorimotor activation, gestural congruency with content, and perception of immersion” (Johnson-Glenberg et al, 2014, p. 102).

A third argument turns to emotional experiences and emotion-related linguistic items (the so-called “emotion-words”). Such line of reasoning could (i) resort to a physiological description of emotions (Damasio, 1999; 2003; 2010); (ii) claim that somatosensory and motor elements of emotional experiences interact with emotion-words; (iii) present evidence that emotion-words bring on embodied simulations and vice-versa; (iv) suggest that emotion-words have an arousal dimension (e.g. ‘pain’ and ‘guilt’ have a much higher arousal dimension than ‘kindness’ and ‘boredom’) that is ultimately “grounded in our bodily systems of arousal” (Kever et al, 2015, p. 586).

A fourth line of argument explores the experiences of mental imagery that often occur to neurotypical agents processing language. Here, one could contend that (i) mental imagery covers all senses and that we can distinguish voluntary from involuntary imagery; (ii) neural mechanisms of voluntary mental imagery overlap significantly with perception areas; (iii) the processing of words (or expressions, or sentences) is closely tied to, maybe even based on, perceptual and motor simulation.

A full development of the arguments outlined above will include empirical evidence of different sorts. The case for the embodied simulation of meaning has indeed been made with different methodologies, such as behavioral reaction time experiments, brain imaging research, dissociation and adaptation studies, transcranial magnetic stimulation

techniques and computational modeling of simulation, among others.

3. Sign-based semantics could find support in embodied simulation

Duffley's (2020) approach is called "sign-based semantics" because it "grounds the analysis of the natural-language meaning on the linguistic sign itself" (p. 02). The several interesting analyses he carries out are all designed to show cases where "the message conveyed by a sequence of linguistic signs can be explained by stable form/meaning units of which it is composed" (p. 198-199). The crucial lesson to be learned is that the proper starting point for a semantic investigation of natural language should be "where a linguistic sign is stored in a stable, permanent and direct relation with its meaning", rather than by "attributing a meaning to the whole construction" (p. 199). I am sympathetic to this approach for a number of reasons: it is developed in terms of case studies; the cases are real discourse situations and not fabricated examples; it highlights shortcomings of both logically and cognitively-driven approaches to natural language; it positions itself in relation to contrasting theories.

In what follows, I'll draw attention to three cases where sign-based semantics could find support in embodied simulation, the latter taken as a foundational theory. Since Duffley himself acknowledges the existence of a level on which "meaning is stably embodied" (p. 199), this proposal hardly comes as a surprise.

3.1. *The preposition FOR*

One of Duffley's case studies focuses on the preposition FOR, which is notoriously polysemic (a dozen different senses recorded in the dictionary) and therefore a hard challenge for someone who claims that linguistic signs have stable meanings. His analysis aims at showing that each of the many different uses of FOR obeys an underlying abstract meaning-schema "whereby some entity x moves from an initial state in which it is not in contact or relation with another entity y into a new situation, which is the result of the movement or change, and in which x is closely associated or bonded with y " (Duffley, 2020, p. 38).

After arguing that all uses of FOR conform to that schema, Duffley faces the question of why this underlying meaning is not immediately accessible. His two-fold answer, with which I agree, criticizes the way dictionaries work and claims that the schema operates subconsciously. Another question he could have raised in this scenario is the following: In virtue of what do all uses of FOR obey the same meaning-schema? Here, I see room for a foundational response: one could argue that the schema is enforced by embodied simulation. The upshot of the argument would be that we grasp the stable meaning of FOR because we are able to simulate, very much in line with what our body affords, a movement whereby x and y come closer or get bonded. So, when I text my girlfriend "I have bought something for you", she grasps the meaning by simulating an event where something in my possession (initial state) is handed over (the movement) and now belongs to her (resulting situation). Ultimately, this line of reasoning questions whether the underlying schema of FOR is abstract, as Duffley says, or embodied, as I am suggesting.

3.2. Verbs of positive and negative recall

Duffley's (2020) careful and detailed analysis of verbs such as 'remember' and 'forget' considers a number of perplexing difficulties found in the literature. One is to explain the combination of positive *forget* and the *-ing* form, as it occurs in sentences like "Director-general John Birt should forget hiring an agency" and "We cannot make someone a Christian. Forget imposing your faith" (p. 89). In addition to not having parallelism with *remember* + *ing*, this *forget* + *ing* is puzzling because "the gerund-participle evokes an event which has not yet been performed" (p. 92). Duffley's explanation highlights that

the *-ing* form refers to an event which exists only in someone's mind, as a course of action which is being contemplated. The *forget* + gerund-participle construction is used in such contexts to instruct the other person to delete a projected action from their live memory, [...]. It is related to the expression *Don't even think about it*, and represents an even more radical warning which enjoins the addressee to nullify even the condition for thinking about a projected action, namely keeping the latter in one's active memory (Duffley, 2020, p. 92).

A foundational account could strengthen this explanation. From an embodied point of view, one could say that a certain course of action is not just being contemplated, but *simulated*. As an actual event, the embodied simulation may figure as a reason why we resort to the *forget* + gerund-participle construction in such cases. If so, then my girlfriend's warning "No kidding with the virus. Forget going out for beers" is more than an instruction to delete a

projected action; it is a request to pause or stop an ongoing simulation of mine.

One could take this proposal a step further, arguing that it also offers a reason why the *remember + ing* is much more frequently used than the positive *forget + ing* with a retrospective function. In short, the argument rests on the idea that activities such as remembering past events, counterfactual thinking (imagining alternatives to past events) and future episodic thinking (imagining possible future events) are all a matter of simulation (Schacter, Addis and Buckner 2008; Shanton and Goldman 2010; Michaelian, 2016).

Another difficulty from the literature is the combination of *remember + to*-infinitive, as it occurs in sentences like “I remembered to lock the door”. This is perplexing because “the infinitive paradoxically evokes something future in time with a retrospective notion such as *remember*” (Duffley, 2020, p. 94). Duffley’s interpretation calls attention to the fact that “the notion of movement signified by *to* can be construed as actually leading to the realization of the event denoted by the infinitive”. This, he proceeds, “allows one to understand both (1) why one gets the impression that the remembering and the locking up were both actualized in the past [...] and (2) why the remembering is felt to concern a prior obligation to lock up” (p. 93).

A foundational explanation of the meaning of *remember + to*-infinitive would come in handy. For instance, one could propose that two events take place: first, an embodied simulation of a certain action, and then an action. Often, the second event (the action) resembles the first enough to be felt as its implementation. In a sentence like “I remembered to lock the door”, both events (the simulation and the subsequent action) were actualized in the past. This proposal also works for sentences like “Remember to wear a proper mask whenever you are out and about” and “I will remember

to call you on your birthday”. The former instructs the recipient to simulate and act accordingly, and the latter promises that a simulation and a corresponding action will occur in due course.

3.3. Causative verbs

Duffley extends his sign-based approach to “the correlation between the semantic content of causative verbs [such as *make*, *cause*, *get*, *force*, *have*, *persuade*] and the linguistic form of the complement that follows them in English” (p. 94). Causative constructions are indeed a complex challenge. For instance, one has to explain (i) why the verbs *cause* (with a *to* complement) and *make* (without a *to* complement) are sometimes interchangeable (eg. “Enzymes cannot make a reaction occur” is interchangeable with “Enzymes cannot cause a reaction to occur”, and so is “The temperature causes them to decompose” and “The temperature makes them decompose”); (ii) why in other situations one of them seems more appropriate, even though they are not mutually exclusive (e.g. “Orthodontic appliances may cause teeth to decay” feels more appropriate than “Orthodontic appliances may make teeth decay”); and (iii) why in other cases they are not interchangeable at all (e.g. “She made me carry her upstairs” cannot be substituted by “She caused me to carry her upstairs”). So, a good semantic theory should be able to explain the slight differences in meaning between *make* and *cause*.

According to Duffley, when the two verbs are construed with a noun object, then the difference is a matter of direct or indirect causation: “*make* denotes causation as the direct producing or authoring of an effect, [and] *cause* evokes it as acting indirectly to provoke the occurrence of an effect by stimulating a secondary agent into action” (p. 103). When

they are construed with and object + infinitive structure, on the other hand, then “the verb *cause* evokes a prior condition for the occurrence of the infinitive event, whereas *make* denotes the effective production of the infinitive event by the maker acting on a secondary agent” (p. 105).

Why do these verbs have this discrete but stable difference in meaning? Due to a difference in the respective embodied simulations, one could suggest. Basically, the meaning of *make* rests on a comparatively greater degree of bodily involvement of the agent in the situation: the closer, both from a temporal and from a spatial perspective, the greater the bodily involvement and the greater the plausibility of the construction with *make*. This degree is easily discernible in first person, and that’s why one says “She made me carry her upstairs”. It becomes a little harder to discern when the agent is someone else, and increasingly harder as this agent’s bodily status becomes more and more different than ours (like an orthodontic appliance, or the temperature, or an enzyme). According to this line of reasoning, cases where the degree of bodily involvement of the agent is not discernible allow for an interchangeable use of *make* and *cause*. This could be developed into an empirical hypothesis.

4. Challenges on the agenda of embodied semantics

Like any progressive research program, embodied semantics faces several kinds of challenges. In what follows, I will suggest that some of them can be addressed by means of a virtuous relationship with sign-based semantics.

4.1. *Abstract language*

The embodied approach is often criticized for its difficulty in explaining abstract language. Pulvermüller (2013) proposes that abstract words built their meaning on “concrete examples of situational instantiations, or *action-perception manifestations*” (p. 90). To illustrate the idea, he asks “How would we explain the meaning of ‘justice’, say to a child? Typically by mentioning situations that can be taken as instantiations of JUSTICE — children receiving each the same amount of sweets, a thief having to pay for stolen goods, a killer being locked away for life for his killings” (p. 90). Criticizing this proposal, Arbib, Gasser and Barrès (2014, p. 65) draw attention to the following:

Consider “a thief having to pay for stolen goods”. This rests on notions of ownership of property, of theft, of social compulsion (“have to”) and of payment (through imprisonment or a fine, involving concepts of freedom and money, respectively). These are very abstract notions based on an understanding of a range of legal concepts in a given society, rather than action–perception manifestations.

If this remark is right, then “even for understanding a simple phrase like ‘a thief having to pay for stolen goods’, a tower of abstraction has to be erected” (Zwaan, 2014, p. 230). Many theorists of embodied language have indeed acknowledged that abstract language remains an open question. First and foremost, it is not clear which words and expressions count as abstract and why. The most prominent candidates are numbers, emotion-words and moral words like ‘justice’ and ‘freedom’. Second, there is no wide agreement on how to explain the semantic content of

abstract language: is it based on perception and action experience, as Pulvermüller (2013; 2018) argues? Could it be based on an inner experience, such as interoception (Connell, Lynott and Banks, 2018; Miceli et al, 2021)? What if it is mostly based on linguistic and social experience (Borghi et al, 2018; Borghi, 2020; Borghi et al, 2021)? Maybe the distinction abstract vs. concrete language is simplistic and prone to distortion (Barsalou, 2020; Barsalou, Dutriaux and Scheepers, 2018)?

A sign-based approach can shed light on cases that supposedly involve abstract language, such as “A thief having to pay for stolen goods”. As mentioned earlier, Duffley’s approach starts by investigating “whether the message conveyed by a sequence of linguistic signs can be explained by the stable form/meaning units of which it is composed” (p. 198-199). This leads us to the preposition *for* and to the expression *having* + to-infinitive. Arguably, both have stable meanings that can be based on embodied simulation. This seems promising and I wonder how Duffley himself would analyze “A thief having to pay for stolen goods”. At the end of the day, the “tower of abstraction” mentioned by Zwaan (2014) may not be as tall as his comment leads one to believe.

4.2. *Simulation beyond single words*

The embodied approach to language has focused so far mainly on simulations related to single words (e.g. action-verbs, nouns referring to graspable objects, adjectives that denote sensorimotor properties of objects). This state of affairs raises the question of whether and how embodied simulations relate to more complex units, in particular to sentences. A positive answer may stress that the “examination of sentence-level processing from an

embodied perspective is important since it is at sentence level that key ‘compositional’ mechanisms of language understanding become active” (Knoeferle, Crocker and Pulvermüller, 2010, p. 138). For the time being, however, “evidence for the role of simulation in language processing beyond single words is still missing” (Ostarek and Huetting, 2019, p. 594-595). So, one may ponder that “it is too early to make any sweeping claims about the scope and adequacy of the *embodied simulation hypothesis*, but there is growing evidence that many parts of language understanding work in this fashion” (Johnson, 2018, p. 631).

Sign-based semantics and embodied semantics share an important common ground when it comes to the sentence level: both deny that syntax has autonomy or primacy over semantics and pragmatics. Duffley challenges the alleged autonomy of syntax “by arguing that semantics plays a highly significant role in syntax, and that a properly articulated linguistic semantics, together with the requisite pragmatics, goes a very long way towards exploring the relational processes involved in the building of syntactic sequences in natural language” (2020, p. 01). In much the same spirit, embodied theorists of language aim to demonstrate that “embodiment is not just the source of semantic content that would then somehow be ordered by a pure, disembodied system of formal relations, manifested either as syntax or logical patterns of thought. Instead, even syntax is shaped and given meaning by the contours of our bodily experience” (Johnson, 2018, p. 632).

If syntax is shaped by bodily experience, then the following seems a promising line of reasoning: (i) human perception is active: “to see things is to see how to get about among them and what to do or not do with them” (Gibson, 1979, p. 223); (ii) we have schemas for bodily actions — “executing schemas” (Narayanan, 1997); (iii) these schemas modulate our ability for joint attention (Baldwin, 1995) and

joint action (Sebanz, Bekkering and Knoblich, 2006); (iv) since these schemas are recurring dimensions of our experience, natural language grammatically codes them. Consequently, the activity of grasping the meaning of a certain utterance involves running a simulation of a scheme.

As quoted above, Duffley thinks that syntactic sequences involve relational processes. I wonder how he would unfold this idea in contrast to the line of reasoning I just sketched. My expectation is that his theory will place constraints on my attempt to suggest a foundational account for it.

5. Concluding remarks

Our understanding of language and linguistic meaning is changing for the better with works like Duffley's. For his extensive critiques of the logically and cognitively-driven approaches to meaning, I would praise him as a post-cognitivist linguist. His sign-based approach is indeed very compatible with the work of post-cognitivist philosophers and scientists, i.e., people whose research shifts away from views centered on abstract and logical features of the mind and language in order to explore how and to what extent the living body, through sensorimotor and emotional interactions with its surroundings, shapes all cognitive activities, language among them.

Once a key post-cognitivist premise — namely, that human mind is embodied — is in place, sign-based semantics and the tradition known as “embodied semantics” may indeed be articulated. This, in turn, would allow us to maintain, without contradictions or recalcitrant dualisms, that linguistic meaning is in the mental domain and that it is grounded on embodied simulations.

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