

## Taking a Stand on the Meanings of *Stand*: Bodily Experience as Motivation for Polysemy

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### Abstract

This paper reports four experiments designed to examine the role that recurring bodily experiences have in motivating people's understandings of different senses of the polysemous word *stand*. Different patterns of recurring bodily experiences, called *image schemas*, emerge throughout sensorimotor activity and from our perceptual understanding of actions and events in the real world. The present claim is that each use of *stand* is motivated by a complex pattern of different image schemas. Experiment 1 revealed five major image schemas that are primarily to people's bodily experiences of standing. Experiment 2 looked at people's judgements of similarity for different uses of *stand*. Experiment 3 first examined people's intuitions about the relative importance of five image schemas for different senses of *stand*. We then attempted to predict the pattern of data from Experiment 2 using the image schema profiles obtained for the different senses of *stand* in Experiment 3. Finally, Experiment 4 considered an alternative hypothesis for people's judgements of similarity for different uses of *stand*. The data from these studies generally suggest that people tacitly believe there are significant connections between their recurring bodily experiences and the various meanings of the polysemous word *stand*. We argue that theories of psychological semantics should account not only for the organization of polysemous words in the mental lexicon, but must also be capable of explaining why different senses of a word make sense to people in the way they do.

### INTRODUCTION

One of the most difficult challenges for theories of psychological semantics is to explain people's understanding of polysemous word meanings. Polysemous words have more than one meaning that, unlike ambiguous words, are related. Consider the word *stand* in the following sentences: *Please stand at attention. He wouldn't stand for such treatment. The clock stands on the mantle. The law still stands. He stands six-foot five. The part stands for the whole. She had a one-night stand with a stranger.* These sentences represent just a few of the many senses of *stand* that are common in everyday speech and writing. Some of these senses refer to the physical act of standing (e.g. *Please stand at attention, The clock stands on the mantle, He stands six-foot five*), while others have nonphysical, perhaps figurative,

interpretations (e.g. *We stood accused of the crime*, *The part stands for the whole*, *He wouldn't stand for such treatment*).

Polysemous words, such as *stand*, are pervasive in language (e.g. 97 out of the most frequent words in English are polysemous). Psycholinguistic evidence shows that people often judge different uses of polysemous words to be highly related (Colombo & Flores d'Arcais 1984; Durkin & Manning 1987). In many cases the different meanings of a polysemous word are so interconnected that people automatically access many of these different senses even when these meanings are contextually inappropriate (Williams 1992).

What are the principles that relate the meanings of polysemous words? Traditional linguistic and psychological theories assume that there is a single, abstract sense for each polysemous word and that its extended senses can be derived through context (Bennet 1975; Caramazza & Grober 1976; Ruhl 1986). For instance, consider the word *stand* in the sentences *Please stand at attention* and *He wouldn't stand for such treatment*. The *abstractionist view* of word meaning assumes that there is a single, very general, and abstract concept 'stand' that is neutral between the physical and metaphorical sense of *stand* in the above two sentences. Both sentences contain special cases of the same abstract concept. The general and abstract core meaning of the concept is presumed to form our mental representation of the polysemous word *stand*. Various rules operate on the core meaning to produce the different surface senses of words in different contexts.

Despite the broad appeal of the abstractionist view in recent years, many linguists have noted that many polysemous words resist being defined by a general core sense. To take just two examples, Fillmore's (1982) analysis of *climb* and Brugman & Lakoff's (1988) analysis of *over* clearly demonstrate the implausibility of the abstractionist view for explaining the extended meanings of all polysemous words (and see Clark 1983; Deanne 1988; Geeraerts, 1993; Gibbs, 1994; Nunberg 1979; Sweetser 1986).

One view of polysemy, advocated by many cognitive linguists, is that the meanings of polysemous words can be characterized by metaphor, metonymy, and different kinds of image schemas (Lakoff 1987; Johnson 1987; Sweetser 1990). Each sense of a polysemous word is linked via metaphorical and other mappings to the sense adjacent to it. It is possible to construct a structure of senses as a network called a *radial structure*, in which senses of a word are related in a family resemblance that characterizes the complexity of polysemous words (Brugman & Lakoff 1988; Lakoff 1987). The lexical representation of polysemous words is therefore not a repository of random, idiosyncratic information, but is structured by general cognitive principles that are systematic and recurrent throughout the lexicon (Brugman & Lakoff 1988). Most important, perhaps, is the claim that these principles are natural because they arise from our phenomenological, embodied experience.

Our aim in the present work is to provide psycholinguistic evidence on people's intuitions about why polysemous words have the interconnected meanings they do. Consider the uses of the word *stand* in *The clock stands on the mantle* and *He wouldn't stand for such treatment*. To what extent do people have some tacit understanding of the connection between these fairly different uses of *stand*? We specifically examined the role of bodily experience in motivating people's intuitions as to why the different senses of *stand* have the meanings they do.

Most theories of linguistic meanings assume a distinction between mind and body where meaning is a fixed and determinate state or product. For example, semantic features are seen as having no inherent meaning but are made meaningful by virtue of their connections to objects and events in the objective world. Although people's sensory systems (e.g. vision, audition) are sometimes viewed as contributing to how important conceptual distinctions that underlie linguistic meaning are acquired, few theories in cognitive psychology and psycholinguistics acknowledge the role of human embodiment in motivating the concepts we have or why linguistic symbols (i.e. words, phrases, sentences) have the particular meanings they do.

Over the past ten years, cognitive semanticists have begun to articulate their view that knowledge arises out of people's bodily interactions with the world. Knowledge is seen by many cognitive semanticists not as being static, propositional, and sentential, but as grounded in patterns of bodily experience. These patterns, called *image schemas*, emerge throughout sensorimotor activity as we manipulate objects, orient ourselves spatially and temporally, and direct our perceptual focus for various purposes (Johnson 1991). The main contribution of the present studies is to demonstrate experimentally that different image schemas underlie people's understanding of polysemous word meanings.

We can illustrate in more detail what is meant by the notion of image schema by considering the BALANCE schema (Johnson 1987). The idea of balance is something that is learned 'with our bodies and not by grasping a set of rules' (Johnson 1987: 74). Balancing is such a pervasive part of our bodily experience that we are seldom aware of its presence in everyday life. Our BALANCE image schema emerges through our experiences of bodily equilibriums and disequilibriums and of maintaining our bodily systems and functions in the state of equilibriums. We refer to these recurring bodily experiences as *image schemas* to emphasize means of structuring particular experiences schematically so that we can give order and connectedness to our perceptions and conceptions (Johnson 1987).

One of the most interesting things about image schemas is that they motivate important aspects of how we think, reason, and imagine. The same image schema can be instantiated in many different kinds of domains because the internal structure of a single schema can be metaphorically understood. For

example, the BALANCE image schema is metaphorically elaborated in a large number of abstract domains of experience that motivate understanding of balanced personalities, balanced views, balanced systems, balanced equilibrium, the balance of power, the balance of justice, and so on. In each of these examples, the mental or the abstract concept of balance is understood and experienced in terms of our physical understanding of balance. It is not the case that a large number of unrelated concepts (for the systematic, psychological, moral, legal, and mathematical domains) all just happen to make use of the same word *balance* and related terms. Rather, we use the same word for all these domains because they are structurally related by the same sort of underlying image schemas, metaphorically elaborated.

How can we apply the notion of image schemas to understand the related meanings of polysemous words? Consider several uses of the word *stand* in the following expressions.

- (1) *Please stand at attention.*
- (2) *The clock stands on the mantle.*
- (3) *Let the mixture stand in the bowl for one hour.*

Each of these uses is partly motivated by the image schema of BALANCE. For instance, the sentence in (1) expresses the idea of standing as a human bodily experience. But in sentences (2) and (3) the act of standing is not bodily, but is extended to refer to how objects interact with other landmarks, such as how a clock occupies space on the mantle or how a mixture occupies some position in a bowl.

It looks thus far as though the BALANCE schema is really nothing more than a perceptual image or some other static perceptual representation. However, the above cases (1)–(3) constitute only a small proportion of the vast range of instances of *stand*. Our understanding of most instances of *stand* depends upon metaphorical elaborations of the BALANCE image schema as is evident in the following sentences.

- (4) *He wouldn't stand for such treatment.*
- (5) *The law still stands.*

In each of these cases the BALANCE schema is understood metaphorically. Just as bodily standing entails certain equilibrium *vis-à-vis* the ground below to counteract the forces of gravity, we can metaphorically counteract some nonphysical force to remain in a mental or abstract equilibrium as seen in sentences (4) and (5). Sentence (4) illustrates the idea of standing as resisting some metaphorical force while sentence (5) refers to standing as maintaining equilibrium despite the influence of various metaphorical forces. These simple metaphorical uses of *stand* suggest that some aspects of polysemous meaning are connected to recurring patterns of bodily experience.

A good deal has been written about image schemas in the cognitive semantics literature (e.g. Brugman & Lakoff 1988; Lakoff 1987; Langacker 1987; Johnson 1987, 1993; Talmy 1988). The aim of the present studies was to show that the different senses of the polysemous word *stand* are motivated by different image schemas that arise from our bodily experience of standing. We do not claim that image schemas provide a complete account of the meanings of *stand* or any other word. Our argument is that each use of *stand* is motivated to some degree by a complex pattern of different image schemas.

## EXPERIMENT 1

Cognitive linguists have hypothesized that over two dozen different image schemas appear regularly in people's everyday thinking, reasoning, and imagination (Johnson 1987). These image schemas cover a wide range of experiential structures that are pervasive in experience, have internal structure, and can be metaphorically elaborated to provide for our understanding of more abstract domains. As a first step towards understanding how image schemas partly motivate the meanings of the polysemous word *stand*, we sought in Experiment 1 to determine which image schemas best reflect people's recurring bodily experiences of standing. Participants in this study were guided through a brief set of bodily exercises to get them consciously to think about their own physical experience of standing. We asked participants to stand up, to move around, bend over, to crunch, and to stretch out on their tiptoes. Having people actually engage in these bodily experiences was shown in pilot testing to facilitate participants' intuitive understandings of how their experience of standing related to many different possible image schemas. Simply asking participants to read written descriptions of image schemas without engaging in bodily exercises makes it more difficult to introspect about the importance of various image schemas in the physical act of standing. After participants in Experiment 1 engaged in the brief standing exercise, they then read brief descriptions of 12 different image schemas that might possibly have some relationship to the experience of physical standing. Finally, the participants rated the degree of relatedness of each image schema to their own experience of standing. Our expectations were that some image schemas would be closely related to standing (e.g. VERTICALITY, BALANCE, and RESISTANCE), whereas other image schemas would be judged to be far less related to standing (e.g. PATH, ATTRACTION, and CYCLE).

## *Method*

### **Subjects**

Twenty-four undergraduate students at the University of California, Santa Cruz participated in the experiment to fulfill a psychology course requirement. All of the participants were native English speakers.

### **Materials and procedure**

Groups of eight participants were brought into a large quiet room. The participants were told that the purpose of the study was to assess their intuitions about the physical experience of standing. Participants were asked to stand up and spread out around the room. They were next asked to close their eyes and sense what it feels like to stand. To make their experience of standing more salient, the participants were asked to make special movements. For instance, the participants were asked to bend to the left, to the right, to crouch down, and finally, to stand on their tiptoes. This orientation task lasted approximately two minutes.

Afterwards, while the participants continued to stand, the experimenter read a brief description of an image schema. For example, the description for the BALANCE image schema stated: 'Balance refers to your sense of symmetry or stability relative to some point within your body. As you stand there do you feel a sense of balance?' The participants were then asked to rate how strongly that image schema was related to their experience of standing. Participants made this rating on a 7-point scale where 1 indicated that a description 'not at all related', while 7 indicated that a description was 'very strongly related'. The instructions encouraged the participants to use all parts of the 7-point scale in making their ratings for the different image schemas. All 12 image schemas were presented in a counterbalanced order across three lists of stimuli. The entire procedure took approximately 15 minutes to complete. Table 1 presents descriptions of all 12 image schemas.

## *Results and discussion*

Participants' mean 'relatedness' ratings for the 12 image schemas are presented in Table 2. Higher ratings reflect participants' intuitions that a particular image schema was more related to their physical experience of standing. The data show that BALANCE was the most relevant image schema to people's bodily experience of standing, while PATH was viewed as the least relevant. The five most important image schemas, those of BALANCE, VERTICALITY, CENTER-PERIPHERY, RESISTANCE, and LINKAGE were selected as

**Table 1** Description of 12 image schemas in Experiment 1

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Consider the notion of LINKAGE. Linkage refers to the perception of a connection between objects or events. As you stand there, do you feel a sense of linkage?
Consider the notion of VERTICALITY. Verticality refers to the sense of an extension along an up–down orientation. As you stand there, do you feel a sense of verticality?
Consider the notion of BLOCKAGE. Blockage refers to the experience of some obstacle that prevents further physical or mental actions. As you stand there, do you feel a sense of blockage?
Consider the notion of RESISTANCE. Resistance refers to the experience of your body opposing some external force. As you stand there, do you feel a sense of resistance?
Consider the notion of ENABLEMENT. Enablement refers to your sense of some internal force or power that allows you to perform various actions. As you stand there, do you feel a sense of enablement?
Consider the notion of ATTRACTION. Attraction refers to the experience of being pulled toward some objects or events. As you stand there, do you feel a sense of attraction?
Consider the notion of CENTER-PERIPHERY. Center-periphery refers to the experience of some objects or events as central while surrounding objects and events are peripheral or to the outside. As you stand there, do you feel a sense of center-periphery?
Consider the notion of CONTAINER. Container refers to the experience of boundedness and enclosure. As you stand there, do you feel a sense of container?
Consider the notion of PATH. Path refers to the experience of moving. A path has a beginning, a course along which one proceeds, and an end. As you stand there, do you feel a sense of path?
Consider the notion of FULL-EMPTY. Full-empty refers to the experience of some physical or mental thing being filled or emptied. As you stand there, do you feel a sense of full-empty?
Consider the notion of CYCLE. Cycle refers to the experience of a particular process. Cycle begins, proceeds through a sequence of events, and ends where it started. As you stand there, do you feel a sense of cycle?
Consider the notion of BALANCE. Balance refers to your sense of symmetry or stability relative to some point within your body. As you stand there, do you feel a sense of balance?

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constituting the basic image schema profile for people's bodily experience of standing. These five schemas do not necessarily exhaust all of the image schemas that arise from people's bodily experience of standing. But our aim in the following experiments was roughly to determine how several image schemas that are especially salient to our physical experience of standing help motivate people's understanding of the different uses of the word *stand*. For this

**Table 2** Mean ratings of relationship between 12 image schemas and the bodily experience of standing

Image schemas	Ratings
BALANCE	6.83
VERTICALITY	5.50
CENTER-PERIPHERY	5.21
RESISTANCE	4.46
LINKAGE	4.33
CONTAINER	4.29
ENABLEMENT	4.21
ATTRACTION	4.08
BLOCKAGE	3.92
FULL-EMPTY	3.92
CYCLE	3.79
PATH	3.21

reason, we somewhat arbitrarily selected the five highest-rated image schemas to study further in the next three experiments.

## EXPERIMENT 2

Experiment 2 examined people's judgments of similarity of meaning for different uses of the polysemous word *stand*. Participants in this study sorted 35 uses of *stand* into different groups based on their similarity of meaning. Our main hypothesis was that the participants would, most generally, group together instances of *stand* that shared similar image schema profiles. Experiment 3 provides the main test of this idea. The simple aim of Experiment 2 was first to assess people's judgments of similarity of meaning for different senses of *stand*.

### *Method*

#### Subjects

Twenty-seven undergraduates from the University of California, Santa Cruz, participated as subjects to fulfil a course requirement. All subjects were native speakers of English. These subjects did not participate in Experiment 1.



## Materials and design

35 different uses of *stand* were printed on  $3 \times 5$  cards, one sense per card. These 35 senses were selected from the *Oxford English Dictionary*, the Kucera & Francis (1975) corpus, and from our intuitions. We specifically attempted to obtain a wide range of uses for *stand*, including both physical and nonphysical senses. However, we do not claim that these 35 uses represent entirely different senses nor do the 35 uses reflect all aspects of how *stand* is used in contemporary speech and writing. Table 3 presents a list of all 35 senses of *stand*.

**Table 3** 35 senses of *stand* used in Experiment 2

<i>stand at attention</i>	<i>stand in awe</i>
<i>stand out in several sports</i>	<i>the police told them to stand back</i>
<i>stand firm</i>	<i>stand by your man</i>
<i>don't stand for such treatment</i>	<i>the engine can't stand constant wear</i>
<i>to stand the test of time</i>	<i>to stand on shaky ground</i>
<i>united we stand</i>	<i>to stand accused</i>
<i>we stand on 30 years experience</i>	<i>the house stands in the clearing</i>
<i>let the issue stand</i>	<i>the barometer stands at 30 inches</i>
<i>buy the house as it stands</i>	<i>as the matter now stands</i>
<i>let the mixture stand</i>	<i>the part stands for the whole</i>
<i>he stands six-foot nine</i>	<i>it stands to reason</i>
<i>the clock stands on the mantle</i>	<i>they did nothing but stand around</i>
<i>stand in someone else's shoes</i>	<i>he stands committed to the foolhardy plan</i>
<i>stand to make a profit</i>	<i>he stands against great odds</i>
<i>one-night stand</i>	<i>the law still stands</i>
<i>on the witness stand</i>	<i>a standing ovation</i>
<i>stand in the way</i>	<i>the boss always stands over me</i>
<i>get stood up on a date</i>	

## Procedure

Each participant was presented with the 35-card stack and asked to sort all the cards into five piles based on surface similarity. Five stacks were specified to constrain the task sufficiently to allow the participant to complete the sorting task in a relatively short period of time. No minimum numbers of cards per stack was specified and the participants were told that cards did not have to be evenly distributed among the piles.

### Results and discussion

The sorting data for each participant were tallied. These results were then converted into a matrix in which each cell represents the number of times two senses of *stand* were assigned to the same pile summed across all the participants.<sup>1</sup> We used a hierarchical agglomerative cluster analysis method to explore participants' groupings of similar senses of *stand* (Aldenderfer & Blashfield 1984). Because we wished our analysis to be sensitive to closely spaced clusters, the *SAS Cluster* procedure employed Ward's method (SAS Institute 1985).<sup>2</sup> The number of clusters in the data was determined by inspecting the fusion coefficients and solving the inequality as suggested by Aldenderfer & Blashfield (1984: 57). Although a three-cluster solution clearly met the stopping criteria, a four-cluster solution was reasonably close.

We used multidimensional scaling to help illuminate the analysis (Jackson 1983). Multidimensional scaling is a procedure designed to analyse similarity ratings or judgments made by individual participants. Because we assumed the associations across senses of *stand* are based on physical experience and are common across native speakers, our analysis averaged rating across subjects. The ALSCAL procedure (SAS Institute 1985) solved up to five-dimensional space. The Kruskal stress levels, an index of the  $n$ -dimensional solution's ability to account for the data, ranged from 0.53 for the one-dimensional solution to 0.10 for the five-dimensional solution. Guided by Jackson's criteria of an elbow in stress reduction, the three-dimensional solution was judged to be the most parsimonious choice (Kruskal stress level = 0.16). This provided additional evidence that senses of *stand* were grouped into three, rather than four, important clusters. A scatterplot of linear fit confirmed that the three-dimensional solution was linear and non-degenerate.

Drawing from both sets of analyses reported above, we chose the three-cluster solution as the most appropriate representation of the similarities of meaning for the 32 senses of *stand*. Table 4 presents a list of the three groups of *stand* senses that emerged from the above analyses. It is important to note here that the individual senses have complex spatial relationships to each other (i.e. are judged as having different degrees of similarity of meaning to each other) that are not shown by simply providing the three main clusters of senses from the cluster analysis.

A preliminary examination of the three groups clearly shows that the participants did not sort physical senses of *stand* separately from the non-physical or figurative senses. For example, the physical idea of standing in *to stand at attention* was often grouped together with metaphorical senses of *stand* as in *let the issue stand* and *to stand the test of time*. It is difficult, though, to discern a single, abstract meaning that underlies the uses of *stand* in either the three groupings or among all the 32 uses of *stand* studied in this experiment. A more

**Table 4** Result of clustering analysis in Experiment 2

Group 1	Group 2	Group 3
<i>a one-night stand</i>	<i>stand in someone else's shoes</i>	<i>to stand by your man</i>
<i>let the mixture stand</i>	<i>the clock stands on the mantle</i>	<i>to stand accused</i>
<i>a standing ovation</i>	<i>he stands committed</i>	<i>the house stands in the clearing</i>
<i>on the witness stand</i>	<i>we stand on 30 years experience</i>	<i>he stood six-foot nine</i>
<i>the police told them to stand back</i>	<i>united we stand</i>	<i>the barometer stands at 30 inches</i>
<i>to stand at attention</i>	<i>to stand on shakey ground</i>	<i>to stand against great odds</i>
<i>let the issue stand</i>	<i>to stand firm</i>	<i>they did nothing but stand around</i>
<i>stand out in several sports</i>	<i>to stand in awe</i>	<i>the engine can't stand constant wear</i>
<i>the boss always stands over me</i>	<i>to stand to profit</i>	<i>the parts stand for the whole</i>
<i>to stand the test of time</i>		<i>it stands to reason</i>
<i>won't stand for such treatment</i>		<i>to get stood up for a date</i>
		<i>as the matter now stands</i>

likely possibility is that the different uses of *stand* are related to one another through a set of complex semantic relations that are partly motivated by various image schemas. The next study investigates this possibility.

### EXPERIMENT 3

The purpose of Experiment 3 was to examine the relationship between the five image schemas for the physical experience of standing and various senses of the word *stand*. Our specific aim was to determine which image schemas are most relevant to each of the 32 instances of *stand* we studied. Experiment 3 allowed us to construct an *image schema profile* for each sense by rank-ordering the participants ratings of the five image schemas for each use of *stand*. Our expectation was that the image schema profiles would differ considerably across the 32 uses of *stand*. For example, some instances of *stand* such as *stand on shaky ground* should be viewed as more directly related to the image schemas of BALANCE and VERTICALITY, while other instances, such as *he stands committed*, should be viewed as more related to the image schemas of CENTER-PERIPHERY and RESISTANCE.

### Method

#### Subjects

Twenty-seven undergraduate students from the same population sampled in Experiment 1 participated in this study to fulfill a requirement for an

introductory psychology course. All of the participants were native English speakers. These subjects did not participate in either Experiment 1 or 2.

## Materials and procedure

The participants in this study were first asked to stand up and focus on different aspects of their bodily experience of standing in the same way as did participants in Experiment 1. Following this, we introduced the five image schemas of BALANCE, VERTICALITY, CENTER-PERIPHERY, RESISTANCE, and LINKAGE as was done in Experiment 1. Afterwards, the participants were provided with a booklet containing five pages. At the top of each page was a description, once again, of a particular image schema, followed by the 32 instances of *stand*. The participants' task was to rate the degree of relatedness between the image schema and each of the 32 uses of *stand*. Participants made their 'relatedness' ratings on a 7-point scale with 1 meaning 'not at all related' and 7 meaning 'very strongly related'. The participants completed the same ratings for all 32 senses independently for each of the five image schema descriptions. The order of image schemas in the booklet was counterbalanced across five lists of materials. The order of the 32 senses of *stand* was counterbalanced in two blocks for each image schema. Participants gave their ratings for all 32 uses of *stand* for a particular image schema before moving on to the next image schema. The task took approximately 35 minutes to complete.

## Results and discussion

A mean 'relatedness' rating was calculated for each image schema for each use of *stand*. Higher ratings reflect participants' intuitions that a specific image schema was related to a particular instance of *stand*. The complete set of numerical ratings for the 32 instances of *stand* are presented in Table 5. Table 5 also shows the image schema profiles for each use of *stand* in their rank-order of importance (from most related to least related).

Examination of the data in Table 5 reveals some interesting similarities in the image schema profiles for many of the 32 instances of *stand*. For example, *it stands to reason* and *as the matter now stands* both have image schema profile of L - B - CP - R - V. The phrases *don't stand for such treatment* and *to stand against great odds* are characterized by the image schema profiles of R - CP - L - B - V. To what extent, though, does sharing similar image schema profiles affect people's judgments of similarity of meaning between two phrases?

The primary goal of this study was to assess whether the groups of *stand* seen as being similar in meaning from Experiment 2 were reliably predictable from the image schema profiles obtained in the present study. We used the SAS

**Table 5** Mean ratings and qualitative profiles for five image schemas for 32 senses of *stand* in Experiment 3 and for equivalent expressions without *stand* in Experiment 4

Meanings of <i>stand</i>	R	V	B	CP	L
<i>stand at attention</i> V - B - CP - L	4.00	6.08	5.00	3.08	2.08
<i>be at attention</i> V - B - L - R - CP	3.40	5.10	4.53	3.30	3.50
<i>stand out in several sports</i> CP - V - L - B - R	2.13	3.54	2.83	5.04	3.42
<i>be distinguished in several sports</i> L - B - CR - V - R	2.20	3.00	4.43	3.73	4.67
<i>to stand firm</i> R - B - V - CP - L	6.21	4.13	5.04	3.75	2.83
<i>to hold firm</i> R - B - L - V - CP	5.47	3.67	4.73	3.30	4.00
<i>don't stand for such treatment</i> R - CP - L - B - V	5.54	2.21	3.04	3.13	3.08
<i>don't allow such treatment</i> R - L - CP - B - V	5.90	2.60	3.03	3.13	4.03
<i>to stand the test of time</i> R - L - B - CP - B - V	4.88	2.38	3.92	3.00	4.08
<i>to pass the test of time</i> R - L - CP - B - V	4.03	2.40	3.40	2.73	4.20
<i>united we stand</i> L - R - CP - B - V	4.79	4.21	4.25	4.78	6.33
<i>united we are strong</i> L - B - R - CP - V	4.33	3.13	4.93	4.27	5.73
<i>we stand on 30 years of experience</i> L - CP - B - V - R	2.46	2.63	2.92	3.43	4.58
<i>we are backed up by 30 years experience</i> L - CP - B - V - R	2.50	2.73	3.00	3.13	5.20
<i>let the issue stand</i> CP - L - R - B - V	2.83	1.92	2.08	3.04	2.96
<i>let the issue remain as is</i> R - B - L - V - CP	3.37	2.47	2.97	2.47	2.87
<i>let the mixture stand</i> B - V - L - CP - R	1.54	2.08	3.17	1.88	2.00
<i>leave the mixture undisturbed</i> B - R - CP - V - L	2.97	2.43	3.60	2.60	2.33
<i>get stood up for a date</i> V - B - CP - L - R	1.83	3.17	3.04	2.29	2.17
<i>have a date with someone who didn't show up</i> L - R - CP - V - B	3.93	2.80	2.27	3.87	4.23
<i>he stands six-foot nine</i> V - B - R - L - CP	2.29	6.50	3.54	1.96	2.00

**Table 5** (*cont.*)

Meanings of <i>stand</i>	R	V	B	CP	L
<i>he measures six-foot nine</i>	1.60	5.73	2.73	2.30	2.40
V - B - L - CP - R					
<i>the clock stands on the mantle</i>	2.00	4.38	4.46	2.13	2.42
B - V - L - CP - R					
<i>the clock is on the mantle</i>	1.17	3.23	3.60	2.77	3.10
B - V - L - CP - R					
<i>one-night stand</i>	1.63	1.46	1.29	2.17	3.04
L - CP - R - V - B					
<i>one-night fling</i>	2.70	2.03	2.10	3.13	3.43
L - CP - R - B - V					
<i>to stand to profit</i>	2.04	1.75	1.79	1.74	3.54
L - R - B - V - CP					
<i>to be in the position to make a profit</i>	2.03	2.73	3.20	4.27	3.90
CP - L - B - V - R					
<i>to stand in someone else's shoes</i>	2.25	3.58	2.96	4.13	4.70
L - CP - V - B - R					
<i>to be in someone else's shoes</i>	2.57	2.63	2.10	4.13	4.67
L - CP - V - R - B					
<i>on the witness stand</i>	1.83	2.08	1.50	3.63	2.96
CP - L - V - R - B					
<i>on the witness platform</i>	3.17	3.40	2.60	4.83	4.10
CP - L - R - B - V					
<i>stand in awe</i>	2.33	3.75	3.29	3.65	3.50
V - CP - L - R - B					
<i>be in awe</i>	2.23	2.47	2.57	3.43	4.37
L - CP - B - V - R					
<i>the police told them to stand back</i>	3.63	3.42	2.17	3.46	2.74
R - CP - V - L - B					
<i>the police told them to get back</i>	5.43	2.37	2.47	4.23	4.73
R - L - CP - B - V					
<i>stand by your man</i>	3.00	3.79	2.79	3.46	4.74
L - V - CP - R - B					
<i>support your man</i>	2.53	3.53	3.47	3.83	3.83
L - CP - V - B - R					
<i>the engine can't stand the constant wear</i>	4.88	1.33	1.83	1.58	3.50
R - L - B - CP - V					
<i>the engine can't endure the constant wear</i>	4.60	2.40	2.77	3.23	4.13
R - L - CP - B - V					
<i>stand on shaky ground</i>	4.63	3.92	6.04	2.71	3.29
B - R - V - L - CP					
<i>to be on shaky ground</i>	4.60	3.47	5.33	3.20	3.77
B - R - L - V - CP					
<i>to stand accused</i>	3.50	2.29	2.00	3.63	3.54
CP - L - R - V - B					

Meanings of <i>stand</i>	R	V	B	CP	L
<i>to be accused</i>	4.80	2.13	2.23	4.47	4.43
R - CP - L - B - V					
<i>the house stands in the clearing</i>	1.83	4.63	3.50	4.08	3.17
V - CP - B - L - R					
<i>the house is in the clearing</i>	1.40	2.53	2.27	4.83	2.80
CP - L - V - B - R					
<i>the barometer stands at 30 inches</i>	1.83	4.71	3.38	1.46	3.13
V - B - L - R - CP					
<i>the barometer is at 30 inches</i>	2.30	5.03	2.70	2.87	3.10
V - L - CP - B - R					
<i>as the matter now stands</i>	2.42	1.88	2.96	2.63	3.25
L - B - CP - RV					
<i>as the matter now exists</i>	2.30	2.40	2.43	2.70	3.70
L - CP - B - V - R					
<i>the part stands for the whole</i>	2.29	1.83	1.96	3.87	2.42
L - CP - R - B - V					
<i>the part represents the whole</i>	1.87	2.33	3.23	4.47	4.67
L - CP - B - V - R					
<i>it stands to reason</i>	2.25	1.96	2.63	2.42	3.63
L - B - CP - R - V					
<i>it conforms with reason</i>	2.47	1.97	2.57	3.10	3.57
L - CP - B - R - V					
<i>they did nothing but stand around</i>	1.92	4.71	3.54	2.13	2.21
V - B - L - CP - R					
<i>they did nothing but hang around</i>	2.53	2.80	2.43	3.27	2.90
CP - L - V - R - B					
<i>to stand against great odds</i>	6.46	3.08	4.13	5.13	4.25
R - CP - L - B - V					
<i>to face great odds</i>	5.70	3.07	3.20	3.97	4.33
R - L - CP - B - V					
<i>a standing ovation</i>	1.96	5.00	3.17	3.50	3.50
V - CP - L - B - R					
<i>a roaring ovation</i>	2.63	4.13	2.73	4.83	5.43
L - CP - V - B - R					
<i>the boss always stands over me</i>	3.58	4.71	2.75	4.04	3.75
V - CP - L - R - B					
<i>the boss always hovers over me</i>	4.37	3.90	2.70	4.40	3.93
CP - R - L - V - B					
<i>he stands committed</i>	4.12	3.66	3.55	3.12	3.29
R - V - B - L - CP					
<i>he remains committed</i>	3.56	3.21	2.12	3.01	3.66
CP - L - V - B - R					

Note: R—RESISTANCE; V—VERTICALITY; B—BALANCE; CP—CENTER-PERIPHERY; L—LINEAGE.

Candisc and Discrim procedures (SAS Institute 1985) to perform a direct discriminant analysis and classify senses of *stand*. Discriminant analysis allows us to distinguish between groups of *stand* with a classification rule that is based on image schematic structure. We attempted, therefore, to account for participants' sortings of *stand* at a rate better than what is expected by chance alone (50%). This analysis revealed that one significant function accounted for 80% of the between-group variability,  $F(10, 50) = 2.61, p < 0.01$ . The confusion matrix for classifications revealed that, overall, 79% of the senses of *stand* were correctly separated into the groups from Experiment 2 by a classification equation derived from the image schema profiles for the different senses of *stand* obtained in this study. In particular, 73% of group one cases, 88% of group two cases, and 77% of group three cases were correctly classified by the discriminant function obtained from the image schema profile ratings. These data provide very strong evidence in support of the hypothesis that the various meanings of *stand* are, at least, partly motivated by image schemas that arise from people's bodily experience of standing.

A second goal of this study was to evaluate the relative importance of individual image schemas to the groupings of senses of *stand*. First, we examined associations between the five image schema predictors and the significant discriminant function. We then examined these associations separately for each group. Table 6 presents these correlations.

Across all three groups, BALANCE and LINKAGE were seen as the most important image schemas for predicting participants' groupings of different senses of *stand* from Experiment 2.

**Table 6** Correlations between image schemas and the significant discriminate function

	Image schemas				
	V	B	R	CP	L
<i>Stand</i> groups					
Overall	0.19	0.70	0.27	0.26	0.55**
Group 1	0.28	0.80**	0.28	-0.28	0.24
Group 2	0.09	0.50	0.38	0.10	0.46
Group 3	0.04	0.42	-0.02	0.47	0.58**

\*\* $p < 0.01$ .

Note: V—VERTICALITY; B—BALANCE; R—RESISTANCE; CP—CENTER-PERIPHERY; L—LINKAGE.



## EXPERIMENT 4

The fourth experiment was an extension of the Experiment 3. Participants in Experiment 3 rated the degree of relatedness of five image schemas to different senses of the word *stand*. However, the different senses of *stand* were created by placing the word *stand* in different phrases. One possible explanation of the sorting data from Experiment 2 suggests that people viewed uses of *stand* as being similar because of the contexts and not because of the interaction of *stand* in those contexts. Thus, people's similarity judgments for the phrases in Experiment 2 might have little to do with the underlying image schema profiles for *stand* in these contexts. Instead, the contexts themselves might suggest different image schema profiles. Our ability to significantly predict the sortings of *stand* senses in Experiment 2 with the image schema profiles of *stand* in Experiment 3 might be really due to the pragmatics of the contexts.

The aim of Experiment 4 was to examine this alternative explanation for the results in Experiment 3. We asked participants in this study to rate how related five image schemas were to the 32 phrases examined in the previous study. This time, however, we replaced the word *stand* in each phrase with an alternative word or words that roughly maintained the meaning of the original phrase. For example, the phrase *the clock stands on the mantle* was changed to *the clock is on the mantle*. We obtained image schema profiles for these modified context phrases and then attempted to predict membership in the groups that emerged from Experiment 2 with these new ratings. Our expectation was that the image schema profiles for the modified context would not serve as good predictors for the data in Experiment 2.

### *Method*

#### Subjects

Thirty undergraduate students at the University of California, Santa Cruz participated in the experiment to fulfil a requirement of an introductory psychology course. All participants were native English speakers and did not serve as subjects in the previous studies.

#### Materials and procedure

Thirty-two phrases from the second experiment were modified by substituting the word *stand* with a different word or words. These new words were chosen roughly to maintain the meanings of the original phrases. Most of the

substituted words were auxiliary verbs (e.g. *to be* or *is*) or verb phrases (e.g. *are backed up by 30 years of experience* for *we stand on 30 years of experience*). The modified phrases are also listed in Table 5. The design and the procedure employed were identical to those in Experiment 2.

### *Results and discussion*

The ratings for the five image schemas for each modified phrase are also presented in Table 5 along with their image schema profiles. A quick glance at these ratings show some similarities and some differences with the ratings for the image schemas with each sense of *stand* studied in Experiment 3. The question, though is to what extent the data from the present study can predict the similarity judgments for senses of *stand* from Experiment 2.

We first evaluated the relation between image schemas and the context within which *stand* originally appeared. The classification rule that correctly placed 79% of the senses of *stand* in Experiment 2 was used to classify contexts without the word *stand* into the same three groups obtained from Experiment 2. We were unable to classify contexts correctly without a sense of *stand* into the groups of senses of *stand* that emerged as salient when *stand* was present. This provides evidence that the relation between image schema ratings of senses of the word *stand* and the groupings of similar senses is peculiar to *stand* and not to the context within which it appears.

Our next step was to assess whether the groups of *stand* that emerged in Experiment 2 were reliably predictable by any combination of image schema ratings given to contexts without the sense of *stand*. There were no significant discriminant functions and only 35% of the between group variability was accounted for by the two functions calculated. In other words, information about the image schema ratings of contexts without a sense of *stand* does not significantly improve classification of those contexts into the groups that emerged when the sense of *stand* was present over what would be expected by chance. Only 49% of the contexts without *stand* were correctly placed into the groups that emerged when *stand* was present. These findings clearly demonstrate that participants' sortings of different senses of *stand* in Experiment 2 cannot be explained simply in terms of their understandings of the contexts. Instead, it appears that people's similarity judgments are best attributed to their tacit understanding of how different patterns of image schemas motivate different uses of the polysemous word *stand*.

## GENERAL DISCUSSION

Most empirical studies on psychological semantics focus on the representation of different words in the mental lexicon of native speakers. This emphasis on the organizational properties of the mental lexicon has generally not addressed the critical questions of how the complex meanings of individual words are mentally represented and what motivates why words have the particular meanings they do. Our interest with this latter issue stems from the belief that how words get the meanings they have is not only a concern for historical linguistics, but bears directly on the psychological problem of why words are meaningful to speakers and listeners in the way they are used in linguistic communities.

The general aim of this paper was to demonstrate empirically that the meanings of the polysemous word *stand* are not arbitrary for native speakers, but are motivated by people's recurring bodily experiences in the real world. Several experiments extend the observations of cognitive semanticists to show how different forms of human embodiments influence people's understandings of polysemous word meaning. Studying a word such as *stand* is a natural place to start in the psycholinguistic exploration of how bodily experience motivates linguistic meaning because *stand* is both a complex polysemous word and a pervasive bodily experience in our lives. We have demonstrated that people make sense of different uses of *stand* because of their tacit understanding of several image schemas that arise partly from the ordinary bodily experience of standing. These image schemas, the most important of which are RESISTANCE, CENTER-PERIPHERY, BALANCE, VERTICALITY, and LINKAGE, not only produce the grounding for many physical senses of *stand* (e.g. *he stands six-foot nine*, *stand in the way*, and *stand at attention*), but also underlie people's understanding of complex, metaphorical uses (e.g. *the part stands for the whole*, *as the matter now stands*, and *the engine can't stand the constant wear*). People perceive different senses of *stand* as similar in meaning partly on the basis of the underlying image schema profile for each use of the word in context.

This conclusion about the meanings of the word *stand* does not imply that people judge similarity of meaning between two senses of a word only on the basis of image schemas. Many aspects of word meaning that have little to do directly with image schemas certainly play some role in people's understanding of word meaning and their judgments of similarity of meaning for different senses of a polysemous word. At the same time, our evidence showing that image schemas partly motivate linguistic meaning does not imply that people automatically access some specific pattern of image schemas each time they encounter a particular use of a word. In fact, most cognitive semanticists view image schemas as preconceptual and it is not entirely clear whether or not image schemas constitute a particular kind of mental representation. For example, although

people may have some abstract concept for balance, the BALANCE image schema that gives rise to this concept is itself phenomenological and/or embodied. Cognitive linguists refer to systematic, recurring bodily experiences as being image schematic to emphasize the schematic nature of these different bodily experiences such as that for BALANCE. Our only claim, one that points to a new direction for theories of psychological semantics, is that people tacitly recognize some connections between these schematic bodily experiences and different aspects of linguistic meaning, including meanings that are highly abstract and/or metaphorical. The present studies provide the first steps in the experimental examination of not only what meanings people attribute to different uses of a polysemous words, but also of why these uses make sense to people in the way they do. We view our research as part of what we hope will become the study of *experiential semantics* in the cognitive sciences.

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## NOTES

- 1 Because three senses of *stand* were missing from two subjects in Experiment 3, they were eliminated from all the analyses reported in Experiments 2, 3, and 4.
- 2 We address the issue of validity, mainly, by demonstrating that the cluster solution is predictable in a new sample. However, we also ran the analysis using average linkages as an alternative method. These two types of analysis did not differ in any significant way.

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