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ENGLISH VERBS OF MOTION AND PROTOTYPE THEORY*

DUŠAN STAMENKOVIĆ and MILOŠ TASIĆ

University of Niš

Abstract: The main goal of this paper is to check whether Prototype Theory can be applied to the analysis of the English verbs of motion. More precisely, the paper attempts to apply various elements of S.G. Pulman's (1983) model of prototype effect testing to a semantic analysis of the English motion verbs (as defined and selected in Miller 1972 and Levin 1993). The methods of analysis include prototypicality rating tests previously used by psychologists (Rosch 1975a,b, Rosch and Lloyd 1978, *inter alia*), frequency tests and corpus data analysis. The results show that a semantic analysis of verbs based on Prototype Theory is possible, though it has certain constraints. On the whole, there is a steady semantic pattern related to the obtained category structure of motion verbs: the more generic verbs seem to be closer to the centre and, as we move towards the periphery, the verbs tend to be more specific.

Keywords: verbs of motion, prototypicality, semantic analysis, English, word frequency.

1. Introduction

The main aim of the paper is to analyse the English verbs of motion from the perspective of Prototype Theory, using the findings of S. G. Pulman (1983), which will be presented in the next section. To this point, Prototype Theory has been mostly concerned with nouns, sometimes with adjectives and prepositions, but there have been very few attempts to apply Prototype Theory to verb analyses. After a short historical overview of the development of Prototype Theory and a presentation of two major attempts to approach verbs using Prototype Theory, the English verbs of motion, as defined and selected in Miller 1972 and Levin 1993, are sorted in accordance with two prototypicality experiments involving respondents and one frequency experiment based on the *Corpus of Contemporary American English (COCA)*. The paper will also try to find out whether there are any semantic "patterns" in the order of verbs obtained from the three experiments.

2. Theoretical framework

2.1. The Basics of Prototype Theory

In discussing Prototype theory, one usually starts with the problem of categorization. According to Smith and Medin 1981 and Medin and Rips 2005, we

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may distinguish between at least three groups of approaches to categories: *atomistic*, *probabilistic*, and *exemplar*. The atomistic approach largely corresponds to what we call the *objectivist view*, in which things belong to the same category in case they have certain (usually objective) properties in common – categories are consequently verifiable and they correspond to the real world. The probabilistic approach is based on binary features, which can be either present or absent within a concept, and configurations of these features determine whether a concept can be classified within a particular category or not. Properties within these two approaches are called *necessary and sufficient conditions* for defining a category. Categories based on necessary and sufficient conditions and/or binary features are usually clearly bounded and their members have equal status (Taylor 1989:23–24). In the exemplar approach, the best representatives of a category serve as 'role models' in the process of categorization and this view seems to be very close to what we call Prototype Theory, which is the dominant approach to categorization in the *experiential view*.

Even though we may track the beginnings of the prototypical approach to categories back to Kant's claims that concepts cannot be empirically delineated and that the synthesis of our knowledge is not arbitrary, but related to our experience (Kant 1791, *Einleitung*, III, IV, in Antović 2009: 90) and Husserl's notion of *categorical intuition* (Husserl 1900/2001), contemporary semanticists usually regard Wittgenstein as the forefather of Prototype Theory. While trying to define the term *game*, Wittgenstein (1953:31–33) claims that the boundaries of the category are fuzzy and that this does not make it less valid than some of the categories which are not as fuzzy – the category of games is not based on shared necessary and sufficient features or conditions, as there are no attributes common to all the games in the world, but on a "criss-crossing network of similarities" (Taylor 1989:38). Wittgenstein uses the famous metaphor of 'family resemblances' to illustrate this network of similarities – the notion that entities thought to be connected by one essential common feature may actually be connected by a series of overlapping similarities, with no feature common to all of them. Wittgenstein's views on categories certainly influenced Zadeh's (1965) fuzzy set theory and Lakoff's (1972) early claims that category membership is not binary in any way, but rather a matter of degree (Stamenković 2012:176–177).

The early experiments which confirmed these assumptions on categories were performed by William Labov (1973), Willett Kempton (1981), Eleanor Rosch (1973, 1975a,b), Brent Berlin (1978), Paul Kay, and Chad McDaniel (1978) among others. Labov's experiments (1973) included line drawings of various household receptacles, such as mugs, cups, and bowls. The subjects in this experiment were to classify the presented drawing as one of these and, among other conclusions, the experiment proved that there was no clear dividing line between cups and bowls and no attribute crucial to distinguishing one category from another. Eleanor Rosch's frequently quoted experiments (1973, 1975a, 1975b) on categorization represented a real challenge for the classical view of categories, as she tackled very many apparently delineated categories and proved that they are far from being discrete in relation to reality. Her respondents were to grade memberships of

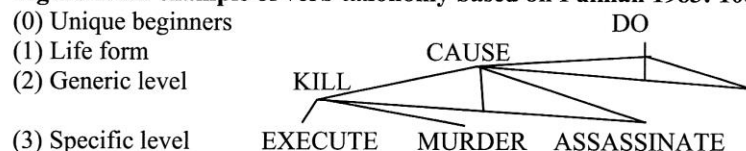
concepts within certain categories, including birds, furniture, tools, sports, fruits, vegetables, toys, etc., using a 7-point membership scale or response time measurement. These experiments proved that neither natural categories (such as birds, fruits, and vegetables) nor nominal kind terms (furniture, sports, or toys) have clear boundaries. Moreover, the experiments showed that we can also talk about a degree of membership, including the notions of centre and periphery of a category. This method introduced the notion of prototypicality in the sense in which it is used nowadays – prototypes or exemplars are those concepts which take central places within a category. However, Vidanović (forthcoming: 13) notices that the very term of prototypicality can be found in Wittgenstein's *Brown Book II*.

Using experimental data, as well as various previous attempts to weaken the position of the classical view of categories, George Lakoff, in *Women, Fire and Dangerous Things* (1987), framed a comprehensive overview of the new position on categories and provided the philosophical background and possible implications of the experientialist view. When we come to prototypicality, we encounter a number of topics, including family resemblances, centrality, polysemy as categorization, membership and centrality gradience, conceptual and functional embodiment, basic-level categorization and primacy, reference-point, or "metonymic," reasoning, and other phenomena (Stamenković 2012:177–178). Lakoff (1987:68–76) uses the notion of prototypicality as one of the bases for the formation of *idealized cognitive models* (ICMs or in Fillmore's (1982/2006) terms *frames*), which represent stable and complex gestalt structures that are essential in the process of conceptualisation.

2.2. Verbs and Prototype Theory

In his book *Word Meaning and Belief*, Pulman (1983:107–136) performed a wide-ranging analysis so as to prove that there are aspects of verb meaning that can be studied by means of Prototype Theory. He found graded membership and prototypicality effects in the categories denoted by the verbs *kill*, *speak*, *look*, *walk*, *deceive*, *rub*, *hold*, and *burn*. Pulman embarked upon his exploration of verb prototypicality by proposing a taxonomy that starts with a unique beginner and ends with a specific verb:

Figure 1. An example of verb taxonomy based on Pulman 1983: 108



However, he realized that there are very many problematic issues related to the unique beginners, as well as to the life form level. For instance, it is quite difficult to decide whether the verb *DO* or the verb *BE* can be considered to be the

hypernym of 'close' in "*John closed the door*" and "*The door was closed.*" Therefore, he focused his study on the generic and the specific level, investigating only those verbs which seemed to be organized in "hyponymy sets reminiscent of the distinction between basic and subordinate level categories" that are found in nouns (Pulman 1983:109). Firstly, Pulman wanted to check whether prototypicality effects can be obtained for verbs; in order to do so, he tried to replicate one of Rosch's original experiments – Pulman's subjects were asked to decide which members of a given category were more representative of the category in question, using a 7-point scale (the lower the figure, the more prototypical the verb, just like in Rosch's tasks). He selected eight hyponymy sets: *kill*, *speak*, *look*, *walk*, *deceive*, *rub*, *hold*, and *burn* and, for each of them, he selected a range of six hyponyms to cover the largest part of the generic verbs' meanings. The results that emerged from this experiment were the following:

Table 1. The results of Pulman's (1983:113) prototypicality test.

	1	2	3	4	5	6
look	<i>survey</i>	<i>stare</i>	<i>glance</i>	<i>scan</i>	<i>peer</i>	<i>squint</i>
	2.05	2.80	2.87	3.25	3.91	6.05
kill	<i>murder</i>	<i>assassinate</i>	<i>execute</i>	<i>massacre</i>	<i>sacrifice</i>	<i>commit suicide</i>
	1.10	2.05	2.82	3.28	5.22	5.33
speak	<i>recite</i>	<i>mumble</i>	<i>shout</i>	<i>whisper</i>	<i>drone</i>	<i>stutter</i>
	2.57	3.46	3.51	3.64	3.98	5.35
walk	<i>stride</i>	<i>pace</i>	<i>saunter</i>	<i>march</i>	<i>stumble</i>	<i>limp</i>
	1.86	2.05	2.41	3.01	5.31	5.37
deceive	<i>lie</i>	<i>cheat</i>	<i>mislead</i>	<i>defraud</i>	<i>hoax</i>	<i>decoy</i>
	1.87	2.20	2.34	3.84	4.10	5.01
hold	<i>grasp</i>	<i>grip</i>	<i>clutch</i>	<i>hug</i>	<i>squeeze</i>	<i>pinch</i>
	2.03	2.03	2.45	3.40	4.36	5.30
burn	<i>scorch</i>	<i>singe</i>	<i>kindle</i>	<i>toast</i>	<i>brand</i>	<i>cauterise</i>
	2.10	2.61	3.90	4.54	4.80	4.83
rub	<i>polish</i>	<i>scour</i>	<i>scrape</i>	<i>file</i>	<i>grate</i>	<i>fray</i>
	1.81	3.80	4.21	4.70	4.76	5.69

Secondly, Pulman wanted to acquire more data related to the prototype effect by performing a test which would give him some sort of a 'family resemblance' measure. He wanted to rate the hyponyms of the selected sets in accordance with the number of features they shared (or did not share) with other hyponyms, in this case other category members. The results he received were very difficult to assess, because the responses could be classified into roughly five quite diverse categories: when asked to provide features of certain verbs, people tended to list (1) their synonyms (or near synonyms), to give (2) definitions or (3) the category name itself, sometimes they would list (4) connotations and they offered (5) a number of attributes which were parallel to what Rosch used in her studies. Thirdly, Pulman edited some of the data in order to reach better consistency in the

analysis, i.e. he deleted a number of attributes which seemed to be unrelated to certain verbs and amended others, to make them more uniform. The results were analysed in both their edited and unedited form and summarised in the following way:

Table 2. Pulman's (1983:119) result survey for 'kill'.

<i>Kill</i>	murder	assassinate	execute	massacre	sacrifice	commit suicide
Ranked by:						
1 Prototypicality	1	2	3	4	5	6
2 All attributes	1	4	6	2	5	3
3 Shared attributes	2	3	5	4	6	1
4 Edited attributes	2	1	5	4	6	3

Pulman concluded that family resemblances do not positively correlate with prototypicality, which might lead one toward thinking that family resemblance is not a causal factor in the formation of prototypes when it comes to verbs. Nevertheless, Pulman did not reach a firm conclusion in regard to this on several grounds: he admitted that the number of selected category members in his study was too low and quite arbitrary, which led the statistical methods he used to unreliable results. Moreover, the number of subjects was much lower than in Rosch's experiments (20 as compared to 400) and, lastly, verbs proved to be quite delicate when it came to listing attributes and required a more comprehensive experimental design. On the whole, Pulman arrived at the conclusion that verbs, just like nouns, can be regarded as more or less prominent, prototypical or representative members of their semantic categories and that prototypicality probably derives from semantic closeness between a member and a category. Pulman's experiments, though mainly aimed at being pilot studies in this domain, reveal that there are aspects of verb meaning that can be approached by means of Prototype Theory. Besides this, we may assume that an improved experimental design may provide more relevant data in the future (Stamenković 2012:180).

Taylor (1989:105–109) studied prototypicality as related to the polysemy of the verb *climb*, in order to explain the contrast between *the family resemblance approach* and *the core meaning approach*. The main problem of the core meaning approach stems from the fact that it is close to the classical approach to categories, as it implicitly demands that there is a set of necessary and sufficient conditions which govern the existence or stability of a category. Various senses of *climb* prove that there is no possibility to subsume them all under a general core sense. Taylor follows Fillmore's (1982/2006) characterization of the process in terms of the attributes 'ascend' (as in 'The plane climbed to 30,000 feet') and 'clamber' (as in 'The boy climbed down the tree and over the wall'). The clambering sense of this verb cannot be applied to entities without limbs. Therefore, although some of the uses of the clambering sense may seem to be close to 'the core meaning', there are

some others connected to the ascending sense (to some of which the former sense cannot be applied), which depart from this kind of centre. Taylor notes that these "different senses cannot be unified on the basis of a common semantic denominator [...] the different meanings are related through 'meaning chains'" (Taylor, 1989: 108). In this way any "node in a meaning chain can be the source of any number of meaning extensions" (Taylor, 1989: 109).

2.3. Verbs of Motion in English

Motion as such is probably one of the most frequent concepts we encounter in our everyday life – this is why there are very many verbs which could be labelled as '*verbs of motion*' and this applies to almost all languages. Practically all verbs which describe any state change could be called verbs of motion. Yet, this study will have a limited scope when dealing with this class of verbs: it will treat those verbs which denote natural human movement (i.e. change of position) along a vertical path and it will exclude all the verbs which refer to movement that requires a vehicle or any other device. This limitation is in accordance with the limitations which we can find in other studies of verbs of motion, such as Fillmore 1971 and Vujović 2009. The selection will include most of what Levin (1993:263–270) calls *Verbs of Inherently Directed Motion*, *Leave Verbs*, and *Manner of Motion Verbs*.

3. Research corpus and procedures

3.1. Corpus

The corpus of verbs used in this study was designed to meet the requirement of encompassing all the verbs which denote natural human motion along a path; it was compiled with the help of a number of previous studies involving the English verbs of motion: Miller 1972, Žic-Fuchs 1991, and Levin 1993. The list of verbs of motion which entered the experiments was the following: *abandon, advance, amble, arrive, ascend, bound, canter, cavort, charge, clamber, climb, clump, coast, come, crawl, creep, cross, dart, dash, depart, descend, desert, dodder, drift, escape, exit, flee, float, gallop, gambol, go, goosetep, hasten, hike, hobble, hop, hurry, inch, jog, journey, jump, leap, leave, limp, lollop, lope, lumber, lurch, march, meander, mosey, move, pad, parade, perambulate, plod, plunge, prance, promenade, prowl, race, ramble, return, rise, roam, rove, run, rush, sashay, saunter, scamper, scoot, scam, scud, scurry/scutter/scuttle, shamble, shuffle, sidle, skedaddle, skip, skitter, sleepwalk, slink, slither, slog, slouch, sneak, somersault, speed, spin, stagger, stray, streak, stride, stroll, strut, swagger, swim, tiptoe, toddle, totter, traipse, tramp, travel, trek, troop, trot, trudge, trundle, vault, waddle, wade, walk, wander, whiz, zigzag, zoom.*

3.2. Procedures

Drawing on Pulman's findings, our study attempted to 'measure' the verb of motion prototypicality by combining three different experiments:

- (1) Direct Grading,
- (2) Free Association Test,
- (3) Corpus Frequency Test.

Our respondents in the first two experiments were 45 native speakers of English. In the first test (direct grading using the inverted 1-7 scale aimed at relevance/salience), they were given a list of verbs (as seen in the corpus) to grade from 1 to 7, according to their relevance to their everyday experience. Circling grade 1 meant that the verb was absolutely irrelevant, whereas grade 7 meant that the verb was exceptionally relevant. In the second, free association test, the respondents were given 3 minutes to list as many verbs of motion as they could remember. The word frequency test was performed on the data obtained from the *Corpus of Contemporary American English (COCA)* (Davies 2012). In a previous study (Stamenković 2012), it turned out that a prototypicality analysis based only on frequency data had a number of disadvantages: in such a study, it may be very difficult to isolate idioms, homonyms and homographs, and prevent them from interfering with word frequency results. As the study showed that verb frequency was an insufficient factor in establishing verb prototypicality, we decided to include respondents and carry out a combined analysis. The combined analysis meant that the results obtained from the second and the third test had to be converted into a 1-7 scale and added to the results of the first experiment.

4. Results and discussion

The following table presents the order of the top 35 verbs in accordance with the result of the three experiments:

Table 3. The combined results of the three experiments.

No.	Verb	Relevance	Associations	Frequency	Total
1.	run	6.11	5.00	5.96	17.07
2.	walk	6.82	5.00	5.19	17.01
3.	move	6.56	5.00	5.41	16.97
4.	go	6.62	1.36	6.96	14.95
5.	come	6.58	1.40	6.51	14.49
6.	leave	6.53	1.40	6.02	13.95
7.	jump	5.71	3.92	3.49	13.12
8.	climb	5.73	2.72	3.26	11.72
9.	travel	6.40	1.24	3.88	11.52
10.	return	5.64	1.00	4.76	11.40

11.	arrive	6.29	1.00	4.07	11.36
12.	skip	5.38	3.44	1.60	10.42
13.	rise	4.89	1.16	4.00	10.05
14.	cross	5.27	1.20	3.44	9.90
15.	crawl	4.40	3.28	1.79	9.47
16.	hurry	6.29	1.20	1.91	9.40
17.	swim	5.76	2.44	1.18	9.38
18.	leap	4.87	2.56	1.87	9.30
19.	jog	4.98	3.00	1.22	9.19
20.	race	6.02	1.36	1.63	9.01
21.	depart	6.09	1.00	1.53	8.62
22.	rush	5.60	1.00	1.94	8.54
23.	hop	4.36	2.68	1.30	8.34
24.	speed	5.24	1.20	1.83	8.27
25.	stroll	4.91	1.84	1.40	8.15
26.	dash	5.33	1.48	1.28	8.09
27.	exit	5.22	1.20	1.52	7.94
28.	tiptoe	5.31	1.52	1.09	7.92
29.	escape	4.91	1.16	1.79	7.86
30.	sneak	4.91	1.12	1.52	7.56
31.	advance	5.20	1.20	1.14	7.54
32.	strut	4.84	1.56	1.12	7.52
33.	stagger	4.89	1.32	1.25	7.46
34.	wander	5.18	1.16	1.02	7.36
35.	wade	4.62	1.36	1.21	7.19

The first two experiments had statistically significant correlations with the third experiment 0.726 (*Pearson Correlation*, significant at 0.01), whereas the second experiment had no correlations with the other two. The reliability of scales in the experiments involving respondents was 0.962 and 0.617 (*Cronbach's Alpha*) for the first and the second experiment, respectively. In the first and the third experiment, generic verbs such as *go*, *walk*, and *run* and verbs reflecting direction, such as *come*, *go*, *leave*, *arrive*, took the lead, whereas in the second experiment, there was more space for those verbs depicting the manner of motion, such as *crawl*, *jog*, *sprint*, *stride*. These tests seemed to be measuring different prototype effects, which is why they were combined in order to give the final list. Although extracting meaning components or semantic features may seem to be atomistic and non-prototypical in method, it is nevertheless interesting to see how features change from the centre to the periphery of a verb class or category. One may say

that the number of semantic features added to 'the core meaning' increases on the way from the centre to the periphery. Generic verbs seem to be closer to the centre (and to the top of the list – verbs such as *go*, *move*, and *run* have very few distinguishing features linked to them), whereas specific verbs tend to move towards the periphery – they get more specific in the sense that they denote different manners of movement (such as *crawl*, *sneak*, or *strut*), directions (*climb*, *exit*, *depart*, or *arrive*), impediments to the motion (*stagger* or *wade*) or speed (*dash*, *hurry*, or *rush*). As we go from the top towards the bottom, it seems that verbs get more "difficult" in terms of defining or describing. Verbs limited in terms of use in specific contexts have greater chances to find themselves on the periphery. Besides this, obsolete or derogatory or insulting verbs are always on the periphery and this is probably due to the fact that their 'specificity' actually limits them to certain contexts, but we may also claim that it makes them less prototypical. To get a more detailed account of specific features which change as we go from the top toward the bottom of the list, we need to perform an individual verb analysis, which will be our next task.

5. Conclusion

Even after the three experiments, we cannot claim that we have achieved the order of verbs in accordance with the verbs' prototypicality, as the prototypicality effects of the verb seem to be more difficult to analyse, especially when compared to nouns or adjectives. We can, nonetheless, hope that including a large list of verbs, an average number of native respondents, and involving three methods of measurement brought us a step closer to such a goal. Unlike nouns, verbs are rarely thought of as belonging to categories and this makes their classification and exploration more difficult. As we could see in Pulman's experiments, it seems impossible to measure and describe verb components, which is why we have not included another experiment that would break these verbs into constituents. An individual verb analysis which will follow is likely to give us more details on the relation between verb features and prototypicality. However, the order we acquired had at least one significant tendency: the (most) generic verbs are at the top of the list of potential prototypicality, becoming more and more specific as we move toward the bottom, which means that the number of semantic features increases as we go down the list. This tendency should be tested in other languages in order to provide additional information on the connection between the semantic features of verbs and their prototypicality across languages. An ongoing study will apply the same procedure to the analysis of the Serbian verbs of motion.

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