# A PSYCHOLOGICAL INVESTIGATION INTO THE DEICTIC CENTER

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## The Deictic Center.

When we read a narrative much of what we understand is not explicitly stated in the text. Not only do we usually not have a detailed description of the environment within the narrative, but the information that we need to understand movement through narrative space and time is not always explicitly provided for us. Nevertheless, comprehenders of narrative seem effortlessly to understand who characters are, where they are at any given moment in narrative time, and proper sequences of time intervals for events that take place. We know when a character leaves the current scene, and we know how much time has elapsed, accurately enough to make proper temporal judgments about the flow of the narrative. Since we also have available our general knowledge of how events are usually structured, space is generally laid out, and time progresses, a combination of linguistic and non-linguistic information can be used to construct a mental model of the scenes and events in a narrative. This model and the input from the narrative enable us to construct our comprehension of the narrative.

Members of the Graduate Group in Cognitive Science at SUNY Buffalo have been examining the methods by which we understand the flow of time and space in narrative text. We hypothesize that information about time, space, and the focal-character form a single data structure. They are part of what we call the deictic center, referred to from now on as the DC. The DC is composed of a WHO-point, a WHERE-point, and a WHEN-point, corresponding to the character, space, and time elements of the current place in the narrative. The concepts of deictic time, deictic place and person deixis are discussed by Fillmore (1975). We propose that the reader's mental model of the current narrative contains the DC. The DC tracks the movement of the narrative in time, space, and focal-character, cued by particular linguistic devices in the text.

Current investigations of the DC are being carried out by members of our group. A computer model of temporal movement was reported in Almeida and Shapiro, (1983) and is being continued in Almeida, (in progress). Rapaport and Shapiro, (1984) and Rapaport and Wiebe, (forthcoming) examine the concept of the WHO-point in relation to the DC. Bruder, Engl, and Schultz, (1985), have reported sentence

reading time research on the psychological validity of the role of the DC. The research reported here concerns the psychological validity of the concept of the deictic center.

**Lexical Controllers of the Deictic Center.**

We have identified some of the specific lexical items that act as controllers of deictic movement. The deictic verb 'go' or the presence of preposed adverbials, such as 'outside the house' at the beginning of a sentence, tend to indicate a shift from one DC to another. The nature of the linguistic devices demands the movement of the comprehender spatially, (i.e. the DC shifts to a new location) so that the new WHERE-point must actually be mentioned. In contrast, the deictic verb 'come' seems to indicate that the current WHERE-point is not moving and the reader should assume that the following textual information is coming into the current deictic center. The absence of a preposed adverbial, or lack of information about a new WHERE-point indicates that the reader should assume that the current DC is being maintained.

Thus, the comprehender learns to expect that shifts of the scene of action or event, the WHERE-point, will be cued by certain markers ('go' or a preposed adverbial) along with a naming or brief description of the new DC, and the comprehender expects no shift of the DC due to their absence (e.g., lack of a preposed adverbial) or due to the use of a maintenance marker (e.g.,'come'). If the reader finds a movement marker, the new DC will be established at that point, with the new information describing it. Minimal description is necessary if the reader is moving within the model already built, but a more detailed description is necessary if the new location has not been previously mentioned. Based on this information, the old DC will be at some greater mental distance, from where the reader currently is in the narrative. If the reader does not find a movement marker, or finds one that indicates maintenance, then he will remain at the current DC. If a shift in DC occurs, but there is no movement marker for the reader indicating the shift, then the reader should become confused by a description of a WHERE-point inconsistent with her current position established with her mental model. In addition, the reader should assume, in the absence of this marker, that he is in the same Deictic Center if no new description is provided.

**Preliminary Experimental Evidence for the Deictic Center.**

A preliminary examination of this hypothesis, an untimed reading comprehension experiment with naturally occurring text was conducted and reported by Segal, Bruder,

and Daniels, (1984). The results were not significant in all cases, but, generally, the direction of the results were in line with these predictions: (1) sentences with a maintenance of the DC should be answered with greater certainty of validity, and answered more uniformly among subjects. (2) if a movement marker should have been provided and was not, then subjects should have more difficulty answering statements about that event than if they had been provided with the original linguistic input.

**The Experiment.**

The research currently being reported is a reaction time study. The stimuli are artificially constructed stimuli and reflect situations in the real world, acknowledging that general information has an influence on responses. General information should be used in construction of the mental model by the reader, not in construction of the response.

This experiment specifically examines the effect of the deictic verbs 'come' and 'go', and of preposed adverbials on conceptual movement of the DC in narrative text. It is assumed that the verb 'come' will maintain the DC where it is currently and that 'go' will move the center to a new location. If a subject must respond to a statement about a DC that s/he has moved away from, s/he should take longer to do so, since s/he must leave where s/he currently is in memory and go back to a previous DC to respond. We assume that if a preposed adverbial is present in the text it will move the subject to a new DC causing the subject to take longer to respond than if the adverbial is absent. This would be due to the subject returning mentally to a previous DC to find the relevant information to determine the answer to the statement. However, the absence of a preposed adverbial may cause confusion if the comprehender cannot determine where s/he is in the mental model, because an important cue is missing. This will leave the comprehender in the previous DC, trying to incorporate current linguistic input into an incomplete model.

**METHOD.** Subjects. Subjects were 48 SUNY Buffalo undergraduate students, who participated to fulfill a requirement for their introductory psychology course.

Materials. Each subject was presented with fifty narratives of four sentences each. Ten narratives investigated the role of preposed adverbials; five compared sentences with 'come' versus 'go'; and five compared a sentence with 'go' versus a non-movement marker such as 'remain', or 'stay', or the verb 'to be'.

In each case, the narrative was used as its own comparison set. For example, the starred sentences were the

only difference in each presentation set. Each set had only one of the starred sentences.

Sample experimental set:

John and Mary were eating dinner when there was a knock at the door.
*John got up and went to answer the door.
*John looked up to see his partner come in.
Kevin greeted John with a bottle of champagne and a big hug.
They had just won a large advertising account.
**********
Mary is in the dining room.

The target, or statement requiring a true-false response, was the same in all versions. It always referred back to the original DC. Subjects also saw twenty-eight fillers, each also composed of four sentences. Fillers generally described a situation, or scene, without any movement. Fillers were the same for all versions. The narrative presentation order was randomized. After the first four sentences had been presented, the subject saw a row of asterisks flash on the screen to signal that s/he should respond 'TRUE' or 'FALSE' to the statement that would immediately follow, based on the information provided in the preceding sentences.

Procedure: Narratives were presented on an Apple IIe computer with a Thunder Clock Card, controlling the timing to the nearest millisecond. Subjects were given printed instructions to read. They were then given oral directions, with general printed directions repeated again on the computer screen. This was followed by ten practice narratives. After the practice session, general directions were again displayed. Subjects pressed the space bar to have the present sentence disappear, and the next sentence or row of asterisks appear. The true/false test statement was presented automatically after the row of asterisks disappeared. Subjects pressed the space bar if the statement was true, and any other key if it was false.

Results.

| | MOVEMENT | | NON-MOVEMENT | |
|---|---|---|---|---|
| GO | 3.17 sec | COME | 2.64 sec. | |
| PREPOSITION | 2.77 sec | NO PREP | 2.49 sec | |

Mean reading/reaction times to the same final statement presented in compared test sets.

The results are significant for both the come/go and the preposition/no preposition distinctions using the paired sample t-test. The come/go distinction shows significance with $t(8) = 4.74$ $p < .01$. The preposition/no preposition distinction shows significance with $t(11) = 3.11$ $p < .05$. There is also a main effect of movement versus non-movement $t(19) = 4.07$ $p < .01$. Two narrative sets examining the come/go distinction were deleted from analysis due to excessive errors in subject responses to the final statement. Due to item by item examination, it was determined that these sets should be eliminated since the overall error rate, excluding these two sets was less than 1%.

Discussion. Movement through narrative in terms of space and time are dependent not only upon general world knowledge about how events and space are laid out in the real world and specific types of linguistic markers, but also the previous DC. The WHERE-, WHEN- and WHO-points that are involved at any place in a narrative text are all currently activated in a focusing mechanism, the DC. When the DC shifts in time or space to a new WHO-, WHEN-, or WHERE-point, we, as comprehenders, update our current knowledge accordingly. The psychological validity of the DC is evident from the results investigating the movement of the WHERE-point in this experiment. If a reader remains in a DC and new information does not update this DC to a new DC, then when asked about DC1 the subject is "there" at DC1 in his/her mental model and s/he can respond quickly. If the DC has shifted to DC2 and the subject is asked about DC1, then s/he takes longer to respond, because s/he must leave the current center, DC2, and interrogate information about DC1 that is now at a mental distance.

**Future work.**

The next issues to be dealt with concern the determination of other specific linguistic markers that update the DC's WHERE-, WHEN-, and WHO-points. A continuing investigation of the placement of the adverbial is also warranted. Bruder et. al., 1985, has investigated sentence reading times and found a significant effect for post-posed adverbials on the sentence following the one with the adverbial, but no effect on the reading times for the sentence containing the adverbial. This suggests that the current experimental paradigm might be extended to include an examination of the effect of post-posed adverbials. We also might ask if the spatial, temporal and focal-character focus of the DC is only one component of a larger concept in which all activated parts of a narrative are dependent upon what is currently active in the DC.

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