

CREATIVITY IN VERBALIZATION AS
EVIDENCE FOR ANALOGIC KNOWLEDGE

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An issue which I take to be of great interest at the present time is whether human knowledge can be adequately represented in terms of a network of propositions. The alternative is that knowledge has a significant analog component, which I understand to mean that continuous differences in the real world are stored in a continuous mental representation. Three views are possible. A strict propositionalist would say that a propositional network is adequate to account for everything in memory. A strict analogist would claim that everything is stored analogically. But I suppose that many people are willing to admit some combination of these two views, and allow that the mind has the capacity for both kinds of knowledge.

Evidence for analogic storage is in part introspective. Many people seem to be able to observe themselves using mental imagery for thinking about the world, and even for solving logical problems. Although it is easy to demonstrate that mental images are not "pictures" in any literal sense, nevertheless they do seem to retain some of the analogic quality of reality. Those whose thinking has a strong imaginal component are predisposed to believe that both language and propositions are derivative, in the sense that they are ways of talking about or describing something more basic which shows up in consciousness in the form of imagery. But there is a counterargument which says that the basic processes of the mind take place outside of consciousness, and that we deceive ourselves if we think we can observe cognitive processes directly. Furthermore, it has been noted that imagery does not allow us to individuate objects and events that were not individuated when first perceived. The familiar demonstration of the power of imagery in which you are asked how many windows are in your living room or the like, and then you seem to go through a process of imaging the room and counting the windows, can in fact be used to show how much preprocessing has taken place. For one is evidently able to count in one's mind only those objects which have already been attended to and individuated, just as one might count the nodes in a propositional network. Images don't seem to allow for further individuation, but are dependent on whatever individuating took place at the time of perception.

But what needs to be done is to sort out those interpretive processes which must take place during perception, if they are to take place at all, and those which can still be performed on material stored in memory. If there are processes of the latter kind, and if they depend on analogic properties of

the stored material, then the analogic view will have strong support. Roger Shepard and his coworkers, for example, seem to have demonstrated that such processes do exist in people's ability to continuously rotate mental objects. I want to suggest that the way people talk about things provides another demonstration of this kind.

In my earlier paper I suggested that verbalization -- the set of processes by which a speaker turns stored experience into words -- requires that choices be made at various points. These choices, I suggested, are of three kinds. I called them schematizing, framing, and categorizing. What is of interest here is that all three of these processes are interpretive in just the sense we are looking for. All of them require the speaker to interpret stored material, related to particular events and objects, as instances of stored prototypes. All of these processes may take place at the time of perception, but they do not have to. In fact, it is clear both from hesitations in speech and from the frequency with which people use different verbalizations for the same material at different times that many of these choices are made only while the material is being verbalized.

Categorization is the clearest example, if only because the data are more extensive. It has been known for a long time that items stored in memory differ in their degree of "codability": the degree to which they can readily be categorized. Highly codable items tend to be named with short words, to be named with single words rather than phrases, to be named without hesitation, to be given the same names by different people, and to be named the same way by the same person on different occasions. Items of low codability show the opposite symptoms. It is these latter items that are of interest here.

Imagine a person who has observed a scene and individuated events and objects within it. Certain of these individuated events and objects are likely to be highly codable, and undoubtedly the observer will have categorized them immediately as part of his perception of the scene. There might, for example, be a typical table which he immediately categorizes as a table. On the other hand, there might also be objects and events which he has individuated but not categorized, or categorized only in a highly general way (as a piece of furniture, for example). He will have stored his knowledge of this object with enough analogic information included to enable him to search for an appropriate categorization at a later time when he refers to that knowledge in speaking. At that time he will arrive at a point in the verbalization where he realizes the necessity of expressing his knowledge of the object in words. Typically at that point he will hesitate so that he can compare his mental representation of the object with his mental representation of available category prototypes, will decide on the best match, will perhaps add modifiers to improve the match, and will finally utter something like "a

lozenge-shaped green marble coffee table". This choice, made in the course of speaking, may or may not be remembered on a subsequent occasion when he has to verbalize the same knowledge again. At that time he may have to think about how to categorize it all over again, and may very well choose differently.

It is important that categorization is often a more-or-less affair, not a matter of yes-or-no. The choice seems to be made on the basis of comparing the "experiential content" associated with the individuated item with the experiential content associated with the category. The match between the two takes place on a continuous scale. If both individual items and categories have associated with them a content which allows such continuous comparisons to be made, the best conclusion seems to be that the content itself has analogic properties.

I will just mention here that the two other kinds of choices which may be made during verbalization -- the choices of what I have called frames and schemata -- seem to lead to the same conclusion. While, for example, a particular chunk of experience may be interpreted as an instance of a specific schema while it is being experienced, the schematization process is something that can be applied while one is talking. I take this to be evidence that people must be able to store enough analogic information about an experience that they are able to interpret it later as an instance of some schema. The same can be said for framing. A particular event might be framed on one occasion as "Jim finally planted the seeds" and on a later occasion as "Our garden finally got started", where the objects and their roles are quite different. The speaker's memory for this event was flexible enough to allow for these two interpretations.

In short, although some interpretive processes such as individuation seem to be confined to the perceptual stage of information processing, others such as categorization, framing, and schematization are applied for the first time, in some cases at least, while a person is verbalizing knowledge recalled from memory. In order for this to take place it would seem that some nonpropositional representation of knowledge must exist.