

The pros and cons of having a word for it

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I found Premack's paper methodologically suspect and terminologically confusing, but theoretically very interesting indeed. Obviously no one has either the time or the money to run balanced experiments with large groups of chimps subjected to various forms of training, and therefore the messy methodology is entirely excusable; but! think it has to be said that the data are not only restless but rambling, and it is not always clear that null hypotheses to do with individual differences should be rejected. The terminological confusion is also understandable, as Premack is in some respects breaking new ground, but I feel sorry for the word "abstract," which is beaten to a pulp somewhere between "only primates have abstract codes" and the similarity reaction, which is "abstract, widely distributed over species." However, the gathering together of the spatial-reasoning experiments and the token-reasoning work is extremely instructive, and the contrast between imaginal and nonimaginal codes is impressive. The general way of talking about comparative psychology seems rather novel, although, if I understand Premack correctly, he is moving towards a version of fourteenth century nominalism. Occam is quoted as having said then that "man thinks in two terms: one, the natural term, shared with beasts; the other, the conventional terms, enjoyed by man alone" (McCulloch 1965, p. 5). It looks to me as though Premack wants to change "man" in this statement to either "primates" or "language-trained Hominoidea," but I'm not sure which. "Primates" is a word, along with "abstract," whose use, in my view, tends to create more problems than it solves, but let me start with a methodological quibble before saying why.

Leaving aside doubts about the cases of Sarah versus the rest and the difficulties of comparing groups of twos and threes, I am not convinced that the lack of difference in "overall test sophistication" means that there could not be fairly direct transfer of training advantages for the language-trained animals. Of course, in a sense this is what the paper is about, but I think there are quite a few pernicky questions to be asked about the crucial variables in the transfer. For instance, if chimpanzees are used to handling and arranging tokens, couldn't this make them more likely to handle and arrange the pieces in the face jigsaw puzzle for reasons to do with habits of manipulation, rather than changed cognitive codes? In one case the difference between the groups seems almost a tautology: chimpanzees who have been language-trained to use the "same" and "different" tokens succeed at the simultaneous procedure, which requires the use of these tokens — surely it is not surprising that animals who have not been taught to use the tokens cannot do the problem that requires their use? That is, unless one expected that the simultaneous comparison would be a good way of teaching the "same" and "different" tokens from scratch. If it turns out not to be, then perhaps the conclusion should be that learning to attach meaning to tokens is more general and difficult — it may be necessary to train the animals with easy concrete tokens for proper names, items of fruit, and so on, before they can apply tokens to logical relationships. (One is reminded of Helen Keller's report that realizing that one sort of tactile token could *stand for* something else was a watershed.) Unless I have misunderstood what was done, the same/different result is not so much a matter of codes as a demonstration that "same" and "different" are not good tokens, or concepts, to start language training with.

The analogies tests did not require the use of tokens, although one gathers that Sarah had learned to do analogies by using the same/different tokens before being tested on the matching-to-sample version. Here an appeal to codes seems more appropriate,

although I think it could be argued that Sarah's advantage lay in having a concrete code of representations of tokens, rather than (or as well as) better abstract ideas about analogies and similarities. To be awkward, let us suppose that when Sarah saw can opener/can this primed a concrete image of the "opening" token, so that when she saw key/lock and had a second priming of the same image, she was able to match the images of the tokens, rather than having to deal with either more abstract conceptions of opening or the differences between the detailed representations of can opener/can and key/lock. Possibly even the perception of similarity is helped by a priming of the "similar" token's representation, but the analogies experiment suggests most directly that having a "word" for the common factor (such as "open," "cut," or "mark") is what makes correct performance possible. I assume that the illiterate animals had just as much experience as the others of opening, cutting, and marking — the "word" explanation does not work for the experiments on matching proportions, but in that case Sarah had the distinct advantage of having been previously trained to conserve volumes and quantities. If language-trained animals are able to bridge perceptual comparisons by using mental representations of appropriate plastic tokens, one could almost revive Osgood's theory (Osgood 1953), but with representations, rather than responses, doing the mediating. This sort of thing is very difficult to subject to experimental testing, but I would certainly like to suggest that Premack is being too modest in referring to an abstract code that is already present in primates — surely it is worth claiming that the training with tokens supplies chimpanzees with a set of "conventional terms," which allows them to think differently from animals with only natural forms of reasoning available to them. And despite the difficulties of hypothesis-testing, it is surely best to be as specific as possible. At some points Premack uses "abstract code" to refer to something particularly related to the tokens, (as when talking about the quantifiers "all" and "some"); but elsewhere he uses "abstract" in referring to cross-dimensional or cross-modal transfer, as it may occur in laboratory rats. Is it nominalist or realist to say that this seems to be creating a universal "abstract" that does not really exist? Presumably there is an almost indefinite number of codes, depending on what "tags" are used to "disambiguate the image" in Premack's theory, but I would have thought that perceptual image codes, action codes, and token codes could be separate categories.

Premack rightly stresses that chimpanzees are different from rats and pigeons, and suggests a dimension of the detachability of conceptual tags, away from specific images and actions, so that in the chimpanzee these become free-swimming and cognitively available for attachment to external tokens. The new experiments on "natural reasoning" in chimpanzees are extremely useful, but Premack's own argument about the superiority of language-trained animals suggests that the process of attachment to external tokens is quite a big step in itself. Whether to say it merely enhances an already present code, or whether, as I would prefer, to say that it provides the animals with a new way of thinking (Walker 1983) is perhaps an obscure point. But I think an empirical criticism can be made of the "only primates have abstract codes" claim, since it is based on comparisons of chimpanzees with rats and pigeons. There are many problems in comparing orders (or classes) on the basis of selected species, but the most glaring problem is the confounding of species with brain size. One may not necessarily be convinced that brain size is a crucial variable in the development of cognitive codes (e.g., Passingham 1982), but the variable surely should be taken into account. It is a safe bet that rats and pigeons (and goldfish) would fail some of the spatial reasoning tests passed by chimpanzees, but I am willing to bet that the mouse lemur and the pigmy marmoset would fail some of them too. If Premack has an "only primates" hypothesis, I would like to hear some *Gedankenexperiments* in which there are comparisons between

a lemur, a raccoon, and a capybara, or between a pigmy marmoset and a jackdaw — that is, where there has been some attempt to match brain size. Primates may be good, but primates with brains of less than 30 gms will not be as good as those, like the chimpanzee, with ten times as many neurons to play with.

All these points are rather minor niggles. One must applaud Premack for the range of data produced, and his imagination in searching for it. But since the token training seems so important, can we ask for some more token-training data? After success on analogies, might Sarah be even better at prepositions and tenses? Could she say “Banana *was* in container; banana *taken by* man; container *is now* empty”?