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Typicality and Context Effects in Action Categories

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Although action and object categories constitute fundamentally different domains, there are important similarities with regard to their organization and the close relationship between perceptual shape and function. The research presented here suggests a common organization based on (1) a typicality-reaction time effect, and, more importantly, (2) the effects of perceptual and functional information in the organization of categories.

In two experiments, 5 actions from 4 different basic level categories (KICKING, RUNNING, THROWING and WAVING) were presented as patch-light displays. In Experiment 1, goodness-of-exemplar ratings were obtained for the 20 actions in relation to the basic level category labels. In Experiment 2, the same stimuli were used in a speeded verification task.

An important manipulation in Exp. 2 was that 3 blocks of trials were constructed according to the perceptual and functional relatedness of the categories. Each block contained an equal number of *yes*- and *no*-trials. For the *yes*-trials, subjects saw an exemplar that was consistent with the previously presented category label. For the *no*-trials, the exemplar was not consistent with the previously presented label. The *no*-trials in Block 1 were composed of functionally related categories, and the *no*-trials in Blocks 2 and 3 were made up of perceptually related categories. Each block also contained the relevant unrelated contrasting categories. KICKING and RUNNING, for example, were *perceptually* related with regard to the locus of motion centering on the legs, and KICKING and THROWING were *functionally* related in the context of propelling an object (Schank & Abelson, 1977). WAVING and RUNNING are examples of unrelated categories.

The primary result from Exp. 1 is the relationship of the goodness-of-exemplar ratings to the correct verification reaction times (RTs) in Exp. 2. A correlation analysis revealed a strong and significant correlation between these variables, $r = -.81$. This typicality-RT effect is consistent with Casey's (1992) results for object categories.

The main results from Exp. 2 concern the analyses of the effects of perceptual and functional relatedness. Separate analyses were performed on the *yes*- and *no*-trials. The primary issue here was whether perceptual and functional relatedness would make category verification decisions more difficult and thereby lead to longer reaction times.

The results for the *yes*-trials showed that subjects were able to make the relevant category verification decisions without any systematic effect of perceptual or functional relatedness.

An analysis of the *no*-trials, however, revealed a significant interaction between Block and Action Category, indicating that verification RTs for the different categories varies as a function of Block, i.e., relatedness.

The comparisons between the related and unrelated conditions for each block showed significant differences between the two conditions. In Blocks 2 and 3 (perceptual relatedness), verification RTs for perceptually related categories were significantly longer than for perceptually unrelated categories. More revealing, however, was that for the functionally related categories in Block 3, verification RTs were also significantly longer than for the unrelated categories. These results indicate that information about the functional as well as perceptual relatedness of action categories is used in making categorization decisions about contrasting categories.

Taken together, I propose that the results from both experiments point to strong similarities between the structure of object and action categories. First, the typicality-RT effect parallels similar findings for objects categories, as mentioned previously. In addition to the converging evidence for graded structure, Hemeren (1996) presented findings supporting the primacy of the basic level in motion verb hierarchies. This hierarchical organization appears to be common to both domains. Secondly, in the sense that objects have a perceptual shape that provides further information about their associated functions, the albeit limited domain of actions studied here also contain salient perceptual shapes that are closely associated with a general goal or function. Lastly, evidence that functional information is closely tied to the perception of actions in the patch-light displays suggests that the goals of some actions may not be abstract but rather grounded in our ability to process the structural motion components in human movement.

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