Psychology 230Bm -- Laboratory Practical Students' Guide

Practical 4: Mental Rotation of Images

This demonstration is designed to illustrate one of the theories of knowledge representation; Imagery theory. Experiments on mental imagery go back to the very beginnings of cognitive psychology when participants were trained to use introspection as a method to explore the contents of consciousness. The introspective method was largely abandoned with the rise of Behaviourists who argued that psychology should be restricted to studying the relations between stimuli and responses in the physical world. The revitalised interest in cognitive psychology brought back an interest in mental imagery, and more objective methods to study how people manipulate mental images. One of the key questions is whether or not the manipulation of mental images follows some of the same rules that govern perception of physical objects. For example, if I showed you a picture of someone and asked you who it was, but I handed the picture upside-down, you would probably have to turn the picture right-side up in order to recognise the face. Rotation of the physical picture would require some time. Does rotation of mental images operate in a similar manner? A series of studies suggest that they do.

The experiment you are about to try presents two abstract images at once and the participants must decide whether the two images are the same or mirror images of one another. For half the trials, the two shapes will be the same; on the other half of the trials they will be mirror images, each type occurring in random order. On each trial the images will be rotated with respect to the other, at rotations of 0, 60, 120, 180, 240, or 300 degrees. The six rotations will occur equally often, in random order. Twelve practice trials will be given to participants (to demonstrate the procedure) and will be repeated until they meet an 80% accuracy requirement before the experimental trials begin. It is important to respond as accurately and quickly as possible to each pairing. Feedback on reaction time and accuracy will be presented to the participants after each trial. Each participant will then complete 96 trials. At the end of the experiment you will be presented with your individual results in a table and in a graph.

Additional Reading (optional)**:**

Shephard, R. N. & Metzler J. (1971). Mental rotation of three-dimensional objects. Science. 171, 701-703.

Pylyshyn, Z. W. (1973). What the mind's eye tells the mind's brain: A critique of mental imagery. Psychological Bulletin, 80, 1-24.

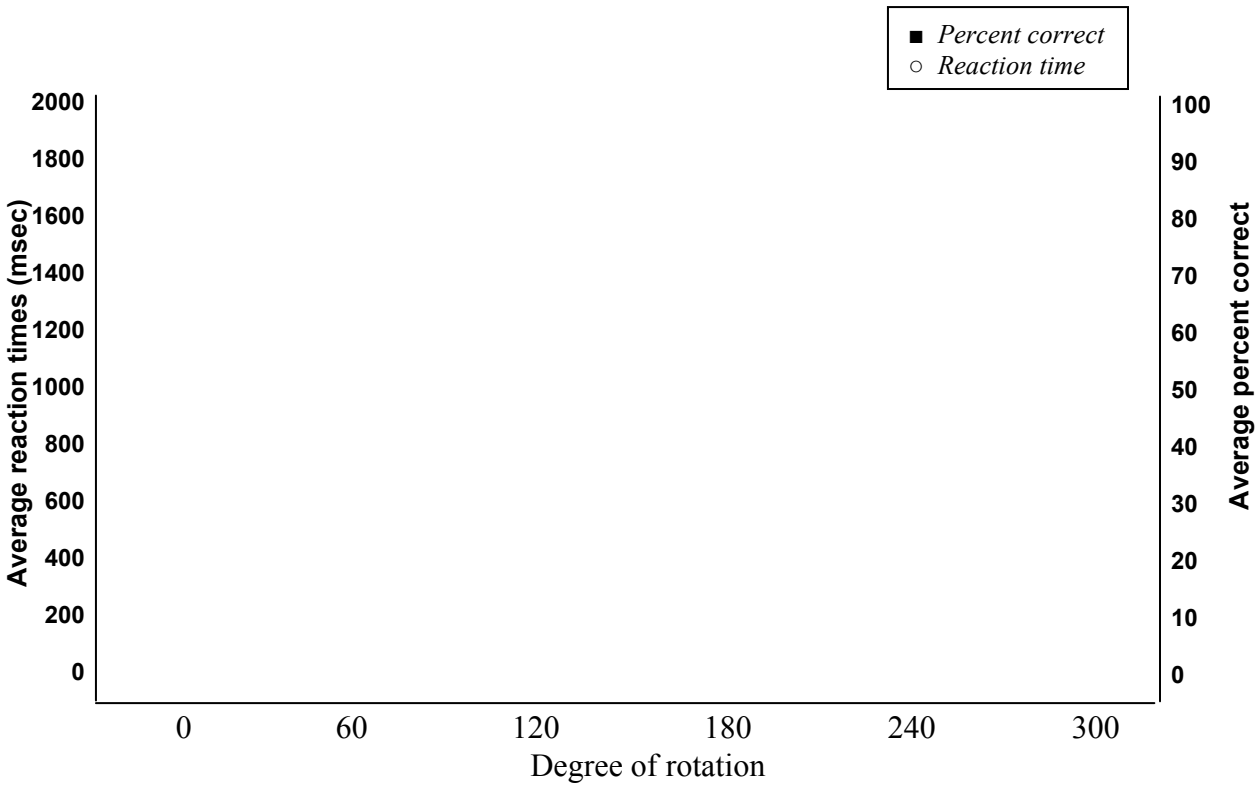
Some questions for you to consider:

What was the hypothesis for this experiment? What is the dependent variable (measured)? What is the independent variable (manipulated)? What other variables were controlled in this experiment? If they were not controlled how might they have affected the results? Was the speed of mental rotation constant? If not how did it vary? What pattern of reaction times would support an imagery effect? Did you find one? What do the accuracy data tell us? Do you think we can mentally rotate objects in more than the three dimensions used in this experiment? (Shephard & Metzler did and you might want to read their paper.)

Prepared by Samuel G. Charlton, Waikato University, 2005

Your data

	Rotation (degrees)					
	0	60	120	180	240	300
Reaction time (msec)						
Percent correct						



Group data

	Rotation (degrees)					
	0	60	120	180	240	300
Reaction time (msec)						
Percent correct