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CogLab Response Paper #1

Topic: Perception **Experiment: *Visual Search***

Task description

This experiment straddles two topics, really: attention and perception. I was presented with a display in which I was to quickly: a) locate a particular object (a green circle), or b) note its absence from the display. Other objects also appeared on the display which, it was theorized, would affect the time it took me to identify the object or determine its absence. These "distractors" were blue circles and blue and green squares. In the early trials, there were only a few distractors on the display and they were always blue squares, making it easy to identify the presence or absence of the green circle. As time went on, however, the display became crowded with many distractors, making it necessary for me to slow down and adopt some time of scanning strategy to make sure I was able to find the green circle among the green and blue squares and blue circles or - what was much more challenging - determine that it was not there.

The independent variable was the number and type of distractors that were used in the trials and the dependent variable was the time it took me to identify either their presence or absence.

This experiment was designed to test the theory that it takes more time to focus attention on a task that requires the individual to notice two features (color and type of object) rather than just one feature (color). The expected findings were, firstly, that it would be easier to determine the green circle's presence than its absence; secondly, that as long as the "feature conditions" (green circle in a display of blue squares) remained the same, the number of distractors should have little effect on the time it took to do the task; thirdly, that those trials ("conjunctive searches") that required looking for the target color and shape (a green circle) among the same and different colors and shapes would take more time to process; fourthly, that the number of distractors in the conjunctive searches would increase the time it took to identify the absent target at a faster rate compared to the time it took to identify the target that was present.

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Summary of results

My results on this experiment confirmed most of the hypothesized findings, but not all of them! I will briefly report on the four types of searches: feature present, feature absent, conjunctive present, and conjunctive absent. On the *feature present* searches, the findings were partially borne out - I was able to identify the target in the least amount of time in comparison to the other types of searches, and, adding a greater number of distractors did not increase how long it took me to identify the target -- in fact, I got better at it. With only 4 distractors, my response time was 901ms and with 64 distractors on the screen, my time was 888ms! [I have dropped the fractions in the RT]

On the *feature absent* searches, I performed as hypothesized at first, with the greater number of distractors on the screen forcing me to take more time to confirm that the target was not present. However, when the number of distractors on the screen reached 16 (it began with 4 on the screen), I seemed to start paying a lot more attention, because I reversed my trend and ended up being able to confirm the absence of the target only slightly slower than I began - even though the number of distractors ultimately rose to 64.

On the *conjunctive present* searches, as expected, the target had ceased to "pop out" since there were now green squares on the screen in addition to the blue circles and squares. It took me longer to identify the target and my time increased relative to the number of distractors on the screen (853ms at 4 distractors compared with 2637ms with 64 distractors).

On the *conjunctive absent* searches, again as predicted by the theory, it took me longer to confirm the absence of the target and the time increased relative to the number of distractors. For instance, beginning with only 4 distractors, it took 1090ms for me to see that the green circle was NOT there, compared with 853ms to confirm that it was there.

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Discussion of research & theory

The Background section for the experiment noted that this type of experiment was used to develop a theory of attention by Treisman & Gelade in 1980. Although we haven't been assigned that chapter yet, I looked up the research in our textbook and found that Anne Treisman's *feature-integration theory* proposed that there are two kinds of processing used in attention: distributed attention processing and focused attention processing. Both of these form a continuum, rather than it being a case of either/or. The theory of distributed attention dovetailed almost exactly with my experience. When the feature object was present or absent, for example, the way of apprehending this was almost automatic. I was able to tell at a glance whether there was a green circle on the screen or not by using parallel processing (handling two or more items at the same time, i.e. presence or absence of target). With the conjunctive searches, it seems true that this required a different kind of processing (serial processing) where I was forced to look at one item at a time, especially if there were a lot of distractors present. I developed a kind of scanning method, where I tried to shift back and forth over the screen methodically, so as not to miss the green circle (if it was there) or to confirm that it was not there.

The fact that I was able to stop the upwards trajectory in the feature absent searches and bring my time back to almost the same as it was when I began (with the least number of distractors) might be explained by another factor, and that is -- motivation. I do remember thinking that I needed to "concentrate more" and also strive for speed more than accuracy. This might have been a time that I switched from distributive attention to more focused attention, even though the task remained the same.

Application

I can think of at least one scenario in which focused attention is required - and the better you are at it, the more advantageous it will be for you. Reading the departure flights monitor at airports is a skill that many of us have had to develop. If you have a connecting flight, for example, your ability to quickly scan that screen (which is always refreshing) for: 1) the icon associated with your airline, and 2) the city to

which you are flying (presented in alphabetical order usually), and 3) the time at which the flight departs (with earlier flights listed first) will sometimes determine how quickly you arrive at your gate and how out of breath you are! The same processes are at work in this task - you try to determine the presence or absence of your flight by developing a strategy such as looking first at city names, then times of departure, then airline icon (or vice versa). In fact, an experiment set in an airport - or set to simulate an airport monitor - might have more "ecological validity" than the somewhat abstract task of identifying colors and shapes.

Another activity that might utilize the ability to use distributed and focused attention would be the quality control processes in an assembly line production. If items are passing you in a continuously moving stream and your job is to spot the imperfections or irregularities quickly, then you would certainly be using some combination of the two kinds of processing. You would expect that trained people who were good at this kind of activity would have developed some kind of strategy or "trigger" to help them spot subtle differences among hundreds of objects that appear to be the same. In addition to trying to hire persons who had evidence of this ability, employers would also no doubt be aware, as Treisman found in 1992, that people can search very quickly for conjunction targets, IF they have extensive practice.