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How many of you learned to drive using a stick? I did. At one point, my mom was in tears, as I ground the gears of her transmission. At first, every action required concerted effort and explicit coordination. Soon, however, I driving with my knee, drinking a coke, smoking a cigarette, adjusting the radio station, and carry on a conversation - all at the same time.

Driving just became automatic. How does this happen?

According to Feature Integration Theory, attention is required to select and identify objects. However, it seems that some things can be done without attention. These tasks are said to be performed automatically.

When attentional resources are allocated to more than one task or stimulus, if the performance of one task is not influenced by the performance of another task, either (A) the attentional load is not maximal or (B) the performance of the other task is automatic.

A key question is how the performance of a task or the identification of a stimulus goes from requiring attention to becoming automatic.

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Automaticity was extensively explored by Schneider & Shiffrin. To do so, they used a visual search task using an RSVP procedure. RSVP stands for Rapid Serial Visual Presentation. Accordingly, a series of displays were presented sequentially and briefly, say for 25 ms. Each. On each display was one or more letter and number. Prior to the RSVP, subjects were given a target memory set of several letters or numbers. In this case, the target memory set is 4,7,3, and 5. The subject’s task was to respond target present if one of the targets appeared in the RSVP stream or target absent if they did not.

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The subjects performed this task many, many times, and performance increased over the first 600 or so trials, after which performance leveled off. Subjects reported that the task became automatic.

Should we trust introspections? Probably not…at least Schneider and Shiffrin did not.

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They conducted several other experiments that were almost identical to one that we just discussed. The only difference was that the target memory set had either varied a mapping versus a consistent mapping. In the consistent mapping condition, the target memory set was the same throughout the experiment. In the varied mapping condition, the target memory set changed periodically, such that the target on one trial may have been a foil or distractor on a prior trial.

Subjects in the varied mapping condition did not improve very much and they never reported that the task became automatic.

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Schneider and Shiffrin reasoned that if the task is performed automatically in the consistent mapping condition, then increasing the load should not affect performance. They varied the load by varying the number of stimuli on each display. This was referred to as the search set size. Here the search set size is two, but it varied from 1 to 4.

If the visual search is automatic, then increasing the number of stimuli should not negatively affect performance. In these experiment the dependent variable was reaction time, and thus it should not change with increases in the search set size.

If, on the other hand, the visual search is not automatic, then increasing the number of stimuli should harm performance. That is, reaction time should increase with increase in the search set size. Specifically, the rate of increase in the target present condition should be half the rate of increase in the target absent condition. This is because on average only half of the stimuli on a display need to be searched in order to find a target, but all the stimuli need to be searcher in order to determine that a target is not there.

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These are the results of the varied mapping condition. As you can see, it appears that visual search did not become automatic. The reactions times in both the target present and the target absent conditions increased with search set size, and the slope of the target present function was one half the slope of the target absent function.

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These are the results of the consistent mapping condition. As you can see it appears that visual search did become automatic.