Hypothesis Testing in the Wason's 2-4-6 Rule Discovery Task And Matching Bias Inhibition Training

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INTRODUCTION

Hypotheses generation and testing are required when you have to induce a general rule by inspecting samples of evidences.

Imagine that you are given a triple of numbers, 2-4-6, which fits a rule that I've in mind. You have to discover it by proposing new triples. For each one, I indicate whether it fits or not the correct rule. You can stop the task when you are highly confident that you have discovered the correct rule. It's your turn !

Typically, Subjects (Ss) 1-focus on the salient features of the initial triple an tend to adopt a hypothesis that is a subset of the rule like *even numbers increasing by two* and, 2-test only positive examples such as *8-10-12*. The point is that the correct rule, *increasing numbers*, is more general, so all instances of the hypothesized rule are instances of the correct one.

We addressed the first point and propose that it could be due to a matching bias resulting from selective attention processes (Evans, 1998). Ss tend to match salient problem features when generating their first hypothesis and fail to redirect their attention on alternative properties of the initial example. So, only few Ss discover the rule at their first attempt.

We postulate that this error may be rooted in faulty cognitive inhibition in working memory.

The success of a matching bias experimental inhibition training was observed by Moutier et al. (2002) on Wason's selection task. Our aim was to adapt and test this procedure on the Wason's 2-4-6 rule discovery task (1960).

EXPERIMENTAL PROCEDURE

Pre test

Ss were given a modified version of the 2-4-6 rule discovery task 1/ they were required to inform the experimenter about the feedback they expected to receive about the conformity of their triples to the correct rule (Caverni et al., 2000) and 2/ we stopped the task after the first rule announcement.

Experimental training

The following day after the pre test, Ss were given an other rule induction task which requires hypothesis generation and testing and triggers a same matching bias. We conceived a novel task where Ss were given a triple of letters, B-D-F, which fits a rule that they had to discover (three different letters) by proposing new triples with the same procedure as in the modified Wason's task.

Ss who failed were divided in two groups. The experimental group received a matching bias inhibition training and the control group received a logical training (see Figure 1).

The logical training instructed Ss to use positive as well as negative examples in their hypothesis testing.

The specific features of *the inhibition training* was that it introduced warning elements, both verbal and visual spatial, about the trap in the matching bias. Given that different task, the B-D-F task, with different materials and answers was used, the inhibition training was executive or metacognitive in nature (i.e., not just teaching how to avoid the trap on the 2-4-6 task).

Post test

The post test used the same task as the pre test.

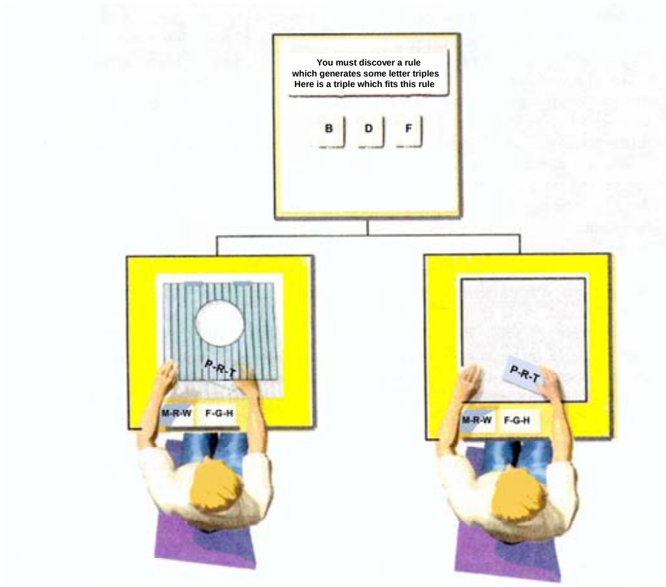

Figure 1 : Matching bias inhibition training or logical training on the B-D-F task

RESULTS

Classically, Ss on the pre test focussed on the salient properties of the 2-4-6 initial example and formulated a narrowed hypothesis. Furthermore, they exhibited positive hypothesis testing strategy. We observed a massive failure at the first attempt. The same results were obtained the fallowing day on the B-D-F analogous task before the experimental training. Ss who failed on the 2-4-6 and the B-D-F tasks received a logical or a matching bias inhibition training.

We didn't observed a significant effect of the training condition on the success in post test on the 2-4-6 task. Most of Ss discovered the experimenter's rule at their first attempt (9/12 in the experimental group and 11/12 in the control group). However, we collected some interesting results regarding their hypothesis testing strategies.

Only subjects of the experimental group who succeed in post test are able to use different and more effective strategies on post-test (see Figure 2). They proposed less positive hypothesis tests associated to positive expected feedback (53.4 *vs.* 81, *Wilcoxon test, p<.05*), and more negative hypothesis tests associated to negative expected feedback (19.5 *vs.* 2.2, *Wilcoxon test, p<.05*).

Such results suggest to discuss two points 1-the analogy between the 2-4-6 and the B-D-F tasks and 2-the experimental inhibition training effect on hypothesis testing.

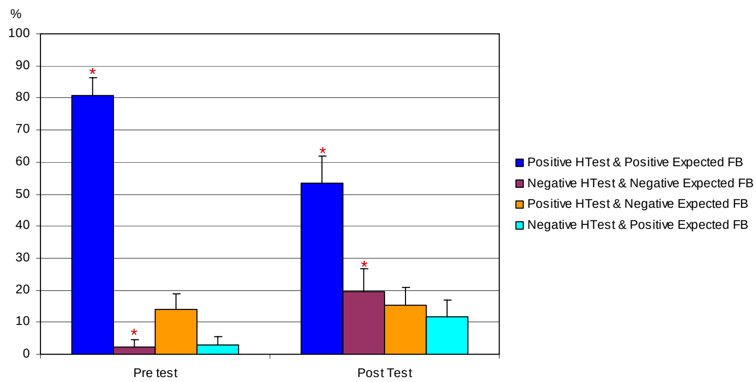

Figure 2: Percentages of each type of hypothesis test on Wason's 2-4-6 task before and after the matching bias inhibition training

DISCUSSION

The experimental training require to use a rule induction task analogous to the pre and post test task. It is possible that the two tasks, B-D-F and 2-4-6, had been too similar. This will explain why Ss who received the logical training on hypothesis testing succeed in post test. They may have succeed intuitively in inducing the correct 2-4-6 task's rule from the B-D-F task. They proposed a majority of positive hypothesis tests associated to positive expected feedback in considering alternative hypotheses like if they were confident of success.

Even if Ss who received matching bias inhibition training would induce the correct 2-4-6 task's rule from the B-D-F task, they were alerted with visuo spatial and verbal warnings. So, they were attentive to avoid the trap of the salient features of the initial triple by exhibiting more negative hypothesis tests associated to negative expected feedback. They made sure of it will not going.

After this preliminary study, we have now to investigate a novel task dedicated to experimental training and retest the matching bias inhibition procedure to value the exact benefit of inhibition components on hypothesis testing in an inductive rule induction task.

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