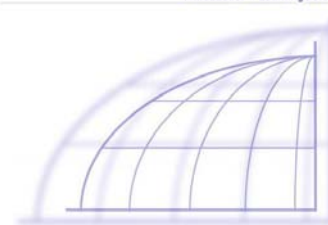


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Section B-5•



C-2: Trial and Error Responses

Students must select a response strategy to react to a question or problem. This knowledge construction function enables students to gauge the efficiency of different response strategies and steer clear of those with little likelihood of success.

Response strategies vary in the amount of information processing they entail. In pure *guessing* there is none at all as when students randomly mark answers on a multiple choice test or indiscriminately grope the pieces of a brain teaser. *Trial and error* is another response strategy. Instead of thinking to determine the correct or best solution students try different responses in hopes of coming upon one that fits. When executed systematically, trial and error *does* rely on a cognitive strategy and it should not be confused with guessing: In tasks with a limited number of possible answers, systematic use of trial and error will eventually produce the correct solution even if the reason it is correct remains unknown to the learner.

Response strategies beyond trial and error include increasing amounts of information processing, knowledge construction and problem solving. In *reasoning by elimination* students use knowledge to rule out incorrect answers and in *reasoning by estimation* they hone in on the correct response without thoroughly thinking through every part of the problem. Above these response strategies students may reason by *analogical thinking* and, finally, *analytical thinking* to precisely identify answers to questions and solutions to problems. Response levels vary from lower level to higher level across the spectrum from guessing to logical inference.

Response strategies vary in the amount of time they require because they vary in the amount of reasoning and effort they include. The time requirement decreases going from analytical reasoning to analogical reasoning, to estimation, to elimination, to trial and error and

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guessing. The latter may require hardly any time at all. Since time is a factor on many tests, including standardized measures of achievement, students are often encouraged to select the response strategy that optimizes their chances of getting a high score. This may include guessing. Some tests penalize for incorrect answers which reduces or eliminates the benefit of using low level response strategies.

The development of this knowledge construction function equips students with the ability to knowingly select the response strategy that serves them best in the situation they are in. The need to specifically attend to the development of this function is apparent from observations of students who describe the correct solution to a problem yet fall prey to a low level response strategy when presented with a range of answer options. At that point they may fall back on guessing or they may use trial-and-error by pointing to different answers while scrutinizing the teacher's facial expression for confirmatory clues (see also C-3).

Given a range of response strategies people tend to apply the lowest strategy that will give them an acceptable probability of success. It is common for people across all levels of functioning to try to minimize the demand for mental effort and time. In a situation that may not be of great importance many people will initially give trial-and-error a shot just in case it we might get lucky and avert the need to perform a more laborious, time consuming analysis of the problem.

To mediate the development of this knowledge construction function have students deliberately practice each of the different response strategies. Have them use guessing, trial and error, elimination, estimation, analogical and analytical approaches. Have students discuss these approaches so they clearly see not only the difference between them but also how they themselves can regulate and choose which one to use.

Discuss situations where temporal constraints and costs of error play a role in the selection of response strategies. What would you do if you had to take over for the pilot and fly an airplane in an emergency? What would be your response strategy? What factors might move you towards picking a lower level strategy? What factors might move you towards picking a higher level strategy? Have your students discuss the impact of time pressure and cost of error on the selection of response strategies.

Below are some examples of situations you and your student might create. Each requires a response which produces the need to select a

response strategy. In each of the situations you and your students work with, have them think about how time and cost of error might influence the selection of the response strategy.

A mother needs to prepare dinner for her children. What kind of response strategy would be best to use? What might happen if she guessed about the foods she used and guessed about the time they needed to be cooked?

A person gets a snake bite. What kind of response strategy would be best to use? Is time a factor? Is cost of error a factor?

A baby is crying. What kind of response strategy would be best to use? Is time a factor? Is cost of error a factor?

A spaceship is running out of oxygen. What kind of response strategy would be best to use? Is time a factor? Is cost of error a factor?

Random guessing and trial and error are at the low end of the range of response strategies. Even so, are there situations where they could or should be used? Yes. For example, when scientists do not understand a disease they may use trial and error to try to come up with a cure. If successful, such treatments are known as empirical treatments. Empirical treatments are treatments that work even though we do not know how they work. In spite of that, it may be a big step forward to find an empirical treatment.

Should you ever use random guessing? Sure. There may be situations where you are better off taking a random chance instead of doing nothing at all. For example, a demolitions expert is looking at a bomb that is about to go off in a crowded room. There are several wires he can cut. If he cuts the right wire he will disarm the bomb. If he cuts a wrong wire the bomb will go off. The clock is ticking. What would you do? People work hard to acquire knowledge so they can avoid using random response strategies, especially in critical situations, but a random response strategy may sometimes be the only one we have and we should use it

Keep in mind that the selection of response strategies is sensitive to affective and motivational conditions. Stress may impair the use of this function and, unless you keep cool, lead to the selection of lower level response strategies such as guessing and trial and error.

A student's persistent use of low level response strategies is a reliable cue that there are different knowledge construction functions that need to be developed such as attention (R-2), exploratory behavior

(R-7), pre-analysis (T-3), goal seeking and goal setting (T-22) and self-regulation (C-10). Completing a MindLadder LearningGuide will help to identify which functions need to be developed.