# Tutorial: Errorless Learning

## WHAT IS ERRORLESS LEARNING?

### Video Illustration of Errorless Learning

As the name implies, errorless learning refers to teaching procedures that are designed in such a way that the learner does not have to – and does not – make mistakes as he or she learns new information or new procedures. Errorless learning has been contrasted with trial and error learning in which the learner attempts a task and then benefits from feedback, whether the attempt was correct or incorrect.

Trial and error learning may be more effective for students who (1) are more often than not correct, (2) are reasonably confident in their abilities, (3) are able to remember their learning experiences, and (4) are able to remember and use the feedback that they received. Trial and error learning may have the added advantage of producing deeper understanding – but only for those individuals who remember the learning experience. In contrast, errorless learning may be more effective for students who frequently make mistakes, who lack confidence (or may be frankly anxious), and/or who do not remember their learning experiences and the feedback that they receive.

## WHY IS ERRORLESS LEARNING IMPORTANT FOR MANY STUDENTS AFTER TBI?

**Severe Memory and/or Intellectual Impairment:** Errorless learning has been shown to be the most effective way to teach any content (information, rules, procedures, habits, and the like) to individuals with TBI who have significant cognitive impairments and/or severe specific memory problems.

Memory is one of the cognitive functions most commonly affected by TBI. Memory problems are common because (1) damage to the hippocampus in the limbic system of the brain makes it more difficult for information (academic information, everyday memories) to "stick" without special effort, and (2) damage to the frontal lobes makes it more difficult to use the special "strategic" procedures that facilitate retention of information. **[See Tutorials on Memory; (explicit and implicit memory); Cognitive and Learning Strategies]**

**Prevention of errors and ensuring errorless learning is the preferred approach in the classroom for many reasons, including the following:**

**1. Errors "stick" in memory because of emotionality:** Errors seem to "stick" in memory more readily than correct responses for students with significant memory problems. This may be because errors are associated with embarrassment or anger or other strong emotions that "drive in" the incorrect response and make that response more likely the next time. If the student does not remember that the response was an error – at the level of consciousness he may have forgotten the entire experience – then the error will continue to be produced and may be difficult to eradicate. This is one important reason to minimize errors in the learning experiences of students with memory impairment.

**2. Errors may "stick" in memory because they are self-generated:** Errors may "stick" more readily because erroneous responses are self-generated and self-generated responses may be more likely to be retained. This phenomenon creates an interesting challenge for teachers: How can teachers create errorless learning routines while at the same time giving students the sense that they are generating their own responses? Skilled teachers seem to be able to do this. It means that teaching needs to be more than dull rote repetition of easy material. Rather the learning experiences should be fun and students should feel that they are contributing, but with assurance from the teacher that they are most often correct.

**3. Significant anxiety can result in increased errors:** Errorless learning procedures are important for students who experience significant anxiety when they are threatened with failure. For reasonably confident

students, a little anxiety can heighten attention and retentiveness; therefore it may facilitate learning. However, serious anxiety can substantially interfere with acquisition and retention of information. Some students with TBI are anxious because they are perplexed about what they can do and what they can't do after the injury. Others are anxious because of large amounts of unexpected failure after the injury. Still others are anxious because of changes in brain function. In any of these cases, teaching/learning routines designed to minimize errors are important to reducing anxiety and enhancing overall performance.

**4. Significant discouragement, sadness, and/or depression can result in increased errors:** Errorless learning procedures are also important for students who are discouraged or frankly depressed about their overall abilities after the injury. Because of all the losses they may have experienced (e.g., loss of abilities, loss of activities, loss of friends), many students with TBI experience depression at some stage of their recovery in reaction to the changes in their lives. In these cases, teachers should work hard to ensure as much success as possible. Errorless learning procedures are one tool to achieve this goal

## WHAT ARE THE MAIN THEMES IN ERRORLESS LEARNING INSTRUCTION AND SUPPORT?

It is not always easy to anticipate students' difficulties and create teaching routines that guarantee success or "errorless learning". Some students impulsively produce answers or other responses that are incorrect. Other students are so inconsistent from time to time that a task thought to be easy for the student may unexpectedly be difficult on a given occasion. Despite these difficulties, the goal of teaching without having the student make mistakes is important for many students.
[See Tutorials on <u>Instructional Routines</u>; <u>Apprenticeship Teaching</u> Performance-Oriented versus Support-Oriented]

What follows is a sampling of procedures that can be part of instructional routines that facilitate errorless learning:

**1. Adjust your expectations appropriately.** Do not ask for student responses unless you are at least 90% sure that the student is prepared to give the correct response.

**2. Make sure that students are completely clear about what is expected of them.** This may mean (a) giving models of correct responses or having models available for the student to look at, (b) ensuring that the instructions are very clear and well understood by the student, ( c) doing the task collaboratively with the student before asking him to do it by himself, and (d) gradually withdrawing your support – and being prepared to offer more support in the event of difficulty. [See Instructional Routines; Advance Organizers]

**3.** If necessary, **complete the task collaboratively** with the student. "Let's do this together" is a better starting activity than "Let's see if you can do this" for students who need errorless learning. Or "Let's figure out what this means" is a better orientation to a reading comprehension task than, "Now, explain to me what that passage means." **[See Tutorial on <u>Apprenticeship Teaching</u>.]**

**4. Make the task doable** by either (a) breaking it into parts and teaching the parts separately or (b) giving the student responsibility for only one or two components of a larger task while you do the rest. For example, the task of remembering a story that was read can be made doable by asking the student to listen for only one fact in the story and subsequently asking him to remember only that one fact. Alternatively, the teacher and the student can collaboratively retell the entire story, with the student contributing only one or two components. The advantage of the latter approach is that the meaning of the entire story is held together rather than being fragmented into parts. In either case, gradually add components as the student achieves mastery.

**5. Anticipate problems and "pre-correct".** For example, if the student is reading and the next sentence has a word in it that you doubt the student can read, say something like, "I see a tricky word in the next sentence – the word is X – let me know if you need help when you get to that word."

**6. Provide adequate cues.** The cue can be the entire answer (e.g., "I think these two numbers add up to 13; what do you think?") or a sentence completion cue (e.g., "The president at the time was Abraham ... That's right, Lincoln") or a semantic orienting cue (e.g., "The branch of government responsible for that... let's think about that... clearly it's not the legislative branch... it must be the... you know the judges and courts ... that's right, judicial; the judicial branch of government"). Multiple choice cuing may be helpful (e.g., The president at the time was a. Lincoln, b. Washington, or c. Cleveland). The cue should be strong enough to elicit the correct response. It would NOT be helpful, for example, to give a letter cue (e.g., "The capitol of Wisconsin is MMM...") which might just produce an error response either spoken or just thought. Furthermore, with letter cues of this sort, teachers often create a feeling in the student of being quizzed for the sake of being quizzed and may therefore cause a negative reaction. You should rather start with a cue that is strong enough to elicit the correct response the first time and is presented in a natural way that doesn't seem like a quiz.

**7. Ensure large numbers of successful repetitions to ensure learning.** Students with significant memory problems may need to learn material much like we learn habits or rote procedures – with large amounts of successful repetition.

When you look back at the lesson after it is completed – or back at the instructional day as a whole – be sure that the student has been successful at least 90% of the time. Students with significant memory and learning problems are often successful less than 50% of the time, sometimes much less. This rate of failure explains much of their discouragement, resistance, oppositionality, and possibly also their retention of erroneous information or mistaken procedures.

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