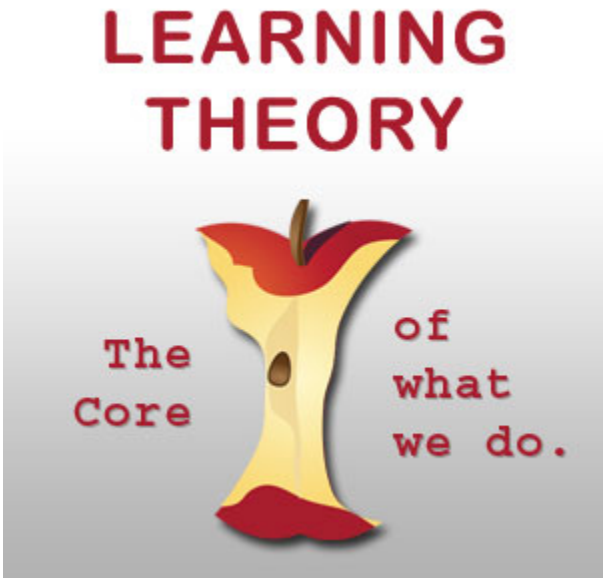

The Learning Theory Podcast

Episode 8

Paivio's Dual Coding

Original Broadcast Date: 04/27/08

Introduction

Welcome to episode 8 of the Learning Theory Podcast. If you recall from the previous episode on Sweller's Cognitive Load Theory, one of Sweller's recommendations was to reduce the load on working memory by dual coding with auditory and visual information that is both essential to understanding, but not redundant (Soloman). Just as Sweller's theory relied heavily on the work of George Miller in regard to working memory, Sweller's thoughts on dual coding draw heavily on Allan Paivio's Dual Coding Theory.

Background

The basic premise of Duel Coding Theory is that cognition involves two subsystems, a verbal subsystem to process language and a non-verbal imagery subsystem to process non linguistic information (Paivio, 2006). The verbal subsystem is most suitable for processing abstract information, where as the imagery subsystem is most suitable for processing concrete objects or events. These two sub-systems according to Paivio (2006) are composed of the representational units; logogens which represent verbal entities, and imagens which represent visual entities. These logogens and imagens are similar the 'chunks' of information described by George Miller in his research on working memory (Kearsley, 1994-2008). These representational units "are activated when one recognizes, manipulates, or just thinks about words or things" (Paviao, 2006, p. 3). These representational units are also modality specific, meaning that we have different logogens and imagens for each of our auditory, visual, and haptic senses; which can operate independently or in cooperation with each other (Paivio).

Concreteness

According to Paivio, the verbal sub-system is a necessary in all aspects of language comprehension, but it is sufficient in few. In order to fully comprehend language, the abstract verbal sub-system must draw on the concreteness of the visual subsystem. Conversely, the visual sub-system is insufficient for processing the abstractness of language but vital for some tasks, especially those which require spatial manipulation of objects. How well we understand a concept and how well we can perform a task is dependent on the interplay of the two sub-systems (Paivio). Especially important to this interplay is the concreteness of non-verbal cues. Dual Coding Theory research by Paivio and others has shown that memory performance increases when verbal information can be reinforced by non-verbal cues.

The obvious thought here is that dual coding is accomplished by presenting verbal information supported by a picture. This is true, but before going there it is interesting to note that dual coding does not necessarily come from external stimuli, sometimes we dual code internally. Fore example, if I say the word iPod, you will likely create a mental image of an iPod in your head. iPods are somewhat ubiquitous, and even if you do not own one you have likely seen several so it is easy for you to create that image – even if you work for Microsoft. iPod is what Dual Coding Theory would classify as a concrete word. What has occurred here is an imagen, which was already present in your visual sub-system, has activated. In effect, what I have just done is chosen language to dual code my message, but I did not show you a picture.

Other words are not as concrete. For example, the word liberty. It may be very difficult for you to create a mental image of an abstract word such as liberty, but some of you who are listening may have pictured the Statue of Liberty when I mentioned the word. Others of you may not have pictured the Statue of Liberty on your own, but my mention of it has triggered the

imagen in your mind and concept of liberty becomes much less abstract because the image adds concreteness to the word. Still others may not be familiar with the Statue of Liberty and my mentioning it does not elicit a mental image because the imagen for it is not present. The concept of liberty thus remains abstract because no imagery, whether imagined or presented, is dual coded with the word liberty in order to add concreteness to the word. This example illustrates Paivio's (2006) position that memory and cognition, is influenced by the interplay of the two aub-systems as well as the degree to which the two sub-systems have been developed.

Implications for Educators

Research by Paivio and others suggests that concrete memory performance exceeds abstract memory performance by a ration of 2:1 (Pavio, 2006). The implication for the educator is that although our primary method of communicating information is linguistic, in either a spoken or written form, we can increase the memory and cognition performance of our learners if we dual code with imagery that adds concreteness to the linguistic message. As we have just seen, verbal clues can be used to create the dual coding effect without showing a real picture, by simply helping the learner activate imagens that already exists in the learner's visual sub-system. Good authors do this all the time. As I previously mentioned however, the most obvious dual coding strategy is to use visual imagery to support the linguistic message. This is also a strategy that I have often seen used incorrectly.

Recall that the purpose of supporting the linguistic message with a visual is to add concreteness to the abstract concepts of the message. In my profession as an e-learning instructional designer, I frequently see imagery used in training modules that adds no concreteness to the message. For example, call center training modules are often filled with images of beautiful young people at a computer workstation, wearing a telephone head set, and

smiling with a set of perfect teeth. These images, besides not representing the reality of a call center, typically do nothing to add concreteness to the material being taught. In other words, the images are simply eye candy, and just like the sugar in candy they add unwanted weight. I have even seen cases where instructional designers argue that text on a screen matching the narration is dual coding. Not only is this not dual coding, but if you recall from episode 7, it is redundant information that causes cognitive load.

The main point I would like to make here is that the research into dual coding theory suggests that imagery is a very powerful educational tool, but it must be used properly. As you contemplate the use of imagery in your educational or training products ask your self, does this image add concreteness to my message? If the answer is no, then your imagery may instead be adding to cognitive load; thus acting as a barrier to the message you are trying to communicate.

Wrap up

Thank you for listening! If you would like to provide feedback please visit me at www.dancampbell.us where you can find the transcript for this and other episodes, as well as links to other learning theory resources. I'll be back in two weeks. Until then, go out and learn something new everyday.

References

Kearsley, G (1994-2008). *Dual coding theory (A. Paivio).* Theory Into Practice (TIP) database. [Online] Available: http://tip.psychology.org/paivio.html

Paivio, A. (2006). *Dual coding theory and education.* Pathways to Literacy Achievement for High Poverty Children. University of Michigan School of Education, September 29-October 1, 2006. [Online] Available: http://www.umich.edu/~rdytolrn/pathwaysconference/presentations/paivio.pdf