LITERATURE REVIEW OF THE REDUNDANCY PRINCIPLE

Leann Larsen

University of Utah
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The redundancy principle grew from the belief held by many multimedia learning developers that people are either visual learners or auditory learners. These developers started combining text with audio narration to describe onscreen graphics. This process has been known to stifle the learning process by overloading visual learning. On-screen text along with graphics and audio learning processes cause the learner to become overloaded with excessive information. The visual eye focuses on the text instead of the graphic and becomes what is called "split focus". This, along with audio narration, causes redundancy of information or in other words, the "Redundancy Principle".

Hypotheses

There are two hypotheses that give us a pro and con explanation for the redundancy principle and the effect it has on learning. The first hypothesis is the learning-preferences hypothesis which states that different people learn in many different ways so information should be presented in different formats. This hypothesis is used in support of adding on-screen text to narrated animations (Mayer, 2001). When many delivery paths are available to the learner, more information can get to them. If one delivery path is blocked, information can get through on another one. Learners can concentrate on their own learning preferences when many formats are presented such as pictures, printed text, and spoken text. The underlying premise of the learning-preferences hypothesis is that learners should choose the method of instruction that is the easiest for them to learn including the format presented. If the information is presented in many different formats, they can focus on the format that is the best for their learning abilities.
The second hypothesis is the capacity-limitation hypothesis which states that people have a limited capacity to process material that is visually and auditorily presented. There is an additional load placed on the visual processing channel when on-screen text is added. Both pictures and printed words enter through the eyes and are represented as images in working memory (Mayer, 2001). Spoken words enter through the ears and are processed in the verbal channel. When all three formats are used the redundancy effect occurs. This means that the learner has a hard time processing all the information because the delivery channels are on overload. The learner spends so much time trying to process the information in three formats that poor learning and poor understanding occur.

**Experiences**

Based on my experience in attending educational presentations, I find that too many graphics or animations mixed with auditory explanations and written words are too much for me. I lose my train of thought because I’m trying to concentrate on the words that are written, the pictures then distract me, and I miss what is being said. I worked for Farmers Insurance for many years and was required to attend financial status update meetings. These meetings could have been a really great way to pass on financial status information. Many knowledgeable people presented information at these meetings but they became a waste of time because the presenters tried to fit too much information on PowerPoint slides. There was one meeting where they were reporting on the financial statistics for the first two quarters of the year. They had a bar graph, a pie graph, words fading in and out, stars flashing, and a little person dancing around all on the same slide. I could not tell what information they were trying to present. My thoughts were not focused on the presentation and I remember thinking that I hope I do not have to comment on what was presented because I don’t know what it is I’m supposed to be
learning. Showing animations or graphics can be a great way of learning and in conjunction with spoken words will put the point across. This experience supports the capacity-limitation hypothesis because there was too much information presented in too many ways. This made for a poor learning and understanding experience. I had this experience several years ago and to this day I still do not remember anything about the meeting except that there were too many things going on all at once.

Another experience I have had with animation, on-screen text, and auditory channels all at once, is foreign films with subtitles. I am so busy reading the text that I miss what is going on with the actual visual part of the movie. The auditory is distracting because you see the people speaking a different language and their lip movements do not go along with the language being read on the screen. As a result of these distractions, I usually do not understand what is happening in the movie.

Research

Research has shown that human cognitive capacity is limited. We can process only a limited amount of information at any one time. Cognitive load theory assumes that information presented to learners should be designed in a way to reduce any avoidable load on working memory. Two experiments were performed to show what happens when there are split-attention instructional designs. Experiment one showed that text presented in both auditory form and visual form was redundant and imposed a cognitive load that interfered with learning. Elimination of redundant visual textual explanations proved to be beneficial. Experiment two showed that materials should be presented in auditory form rather than just written form. Color-coding of text was used and proved beneficial to understanding. (Kalyuga, Chandler, &
Sweller, 1999). These experiments support the capacity-limitation hypothesis that using auditory and visual channels together to present instructional materials is great but when on-screen text is added there can be redundancy and cognitive overload.

Research was conducted on college students who viewed a short multimedia PowerPoint presentation consisting of 16 narrated slides explaining lightning formation or 8 narrated slides explaining how a car's braking system works. Each slide appeared for approximately 8-10 seconds and contained a diagram along with 1-2 sentences of narration spoken in a female voice. The redundant group had 2-3 printed words that were identical to the words in the narration and were placed next to the corresponding part of the diagram. The nonredundant group did not have any on-screen text presented. The results showed that the group whose presentation included short redundant phrases within the diagram outperformed the nonredundant group on a subsequent test of retention. The redundant text served to guide the learner's attention without priming extraneous processing. This experiment supports the learning-preferences hypothesis and there are some significant differences between the prior studies against adding on-screen test and this study adding on-screen test. The on-screen text in this study was very short consisting of two or three words, the on-screen text was placed near instead of far away from the corresponding portion of the graphic, and this study presented the graphics as static illustrations instead of animations (Mayer & Johnson, 2008).

Current research has shown that background knowledge of the topic being presented plays a role in the redundancy effect. If a learner with a high level of previous knowledge receives an animation presented with additional on-screen text and the animation is explicit, this additional information may be redundant because of prior knowledge. The learner may interrupt the processes of information by wandering between text and animation.
Novices may not have the prior knowledge necessary to understand the complex animation without an additional text explanation. They may depend on the additional on-screen text to guide them in the learning process. The additional on-screen text may not be redundant for novices, but essential for learning (Rey & Buchwald, 2011).

**Discussion**

The studies conducted show that further research is needed to determine other factors that may influence whether or not the redundancy effect occurs in real educational environments. These findings indicate that redundancy can occur when animation, narration, and on-screen text are used all together, however, there are circumstances where the redundancy effect does not occur. We know that most people learn the best when graphics and narration are used but learning can also be enhanced when short words are used as on-screen text and it is placed next to the graphic. Also, when the learner has a background knowledge of the information, the on-screen text added to graphics and narration can be redundant but when the learner does not have any experience, the on-screen text added to graphics and narration can help guide the learning process.

In my experience, the redundancy effect occurs when there is too much information given all at one time. Too much on-screen text along with animation and narration will cause problems with the learning process because the focus becomes reading the on-screen text. This causes distractions for the learner because they are so busy focusing on the text that other important information may be missed. If an educational presentation is kept simple with only one or two words of on-screen text then the learner may benefit from this because they are not trying to process too much information at one time.
In summary, the two hypotheses presented show the different arguments for and against adding on-screen text to animation and narration. Recent research has shown that adding some on-screen text, only one or two words right next to the graphic, can be beneficial to learners. More research will need to be conducted in a realistic educational setting in order to make sure these revisions to the redundancy principle are adequate. In my opinion, the more simple the presentation the easier it is to understand. I believe that learning is different for all people but too much information is confusing and causes information overload in the audio and visual learning channels.
References


