

## Video: How does video affect cognitive load?

Summary:

Five modalities were tested including the following: text, picture, film clip, audio-only, and audio-video instructions.

Based on the findings for the three modalities (text, pictures, film clip), it appears that film clips and pictures required less cognitive load to interact because most participants in the film clip condition almost never practiced the exercises. They also had most movements correctly executed compared to text and pictures. Most people preferred the film clips condition to the text and picture condition, but more learning took place under the picture condition rather than film clip condition. Furthermore, participants in the picture condition needed less time for execution than participants in the film clip condition.

Based on the findings for two modalities (audio-video and audio only), it appears that the audio-only condition required less cognitive load to interact. This is because participants in the audio-video condition had to use two channels to process the information, and when people are under high cognitive load they form more biased impressions than people under low cognitive load.

### Reference

Van Hooijdonk, C. & Kraemer, E. (2004). Information modalities for procedural instructions: The influence of text, static and dynamic visuals on learning and executing RSI exercises. Available online at [http://wwwhome.cs.utwente.nl/~theune/IMOGEN/VanHooijdonk\\_Kraemer\\_manuscript.pdf](http://wwwhome.cs.utwente.nl/~theune/IMOGEN/VanHooijdonk_Kraemer_manuscript.pdf). Retrieved on April 14, 2006.

### Population

Experiment 1: 30 young adults, between 18 and 30 years of age. 15 male and 15 female. The participants were randomly assigned to an experimental condition.

Experiment 2: 26 young adults between 18 and 25 yrs age. 13 male and 13 female. None participated in the first study.

### Purpose/Questions

The purpose of the study was to test the effects of task difficulty and information modality (comparing dynamic visuals with static visuals and text) on learning a specific class of procedural tasks, namely exercises aiming at the prevention of Repetitive Strain Injury (RSI). The term CANS (Complaints of Arm, Neck and/or Shoulders) was introduced as an alternative term.

**Experiment 1:** The participants

### Findings

Experiment 1

Learning times

Modality: Participants in the picture condition required the shortest learning times, participants in the text condition had the longest learning times, and learning for film clips was in between the two.

Difficulty: It was found that the difficulty degree had an effect on the amount of time to learn the exercise, but there was no significant differences the difficulty degree and information

<p>attempted to learn and execute 20 RSI prevention exercises in two degrees of difficulty. The following measurement were tested: the influence of presenting and instruction in text, picture or film clips on learning times, amount of practicing during learning, execution times, and number of execution errors.</p> <p>The experiment had a 3 X 2 (information modality: dynamic visual [film clip], static visual [picture], text) as a between participants variable and difficulty degree (easy, difficult) as within participants variable. Learning times, amount of practicing during learning, execution times, and number of correctly executed exercises were dependent variables.</p> <p><b>Experiment 2:</b> Participants were asked which instructional format (text, picture, film clips) they preferred in a forced choice experiment.</p> <p>The experiment had a 3 modality (text, picture, film) X 2 difficulty degree (difficult, easy) factorial design.</p>	<p>modalities were found.</p> <p>Practicing time:</p> <p>Modality: Participants in film clip condition almost never practiced, while in picture condition they practiced about one fifth of the exercises, and in the text condition participants practiced about half of the exercise.</p> <p>Difficulty: Participants practiced the difficult exercises more often than easy ones.</p> <p>Execution times:</p> <p>Modality: Participants in the text condition had much longer execution times than those in the picture and film clip condition. Participants in picture condition needed somewhat less time for execution than the participants in the film clip condition, but the difference was relatively small.</p> <p>Difficulty: The instruction in text was more difficult than the instruction for pictures and film. There was no significant interaction between difficulty degree and information modality.</p> <p>Correct Execution:</p> <p>Modality: The participants who watched the film clip executed the most movements correctly.</p> <p>Difficulty: The participants executed the easy exercises correctly more often than the difficult ones. In the film clip condition, both easy and difficult exercises were almost executed correctly. In the text and picture condition however, easy exercises were performed correctly more often than difficult exercises.</p> <p>Subjective satisfaction:</p> <p>Modality: Had no effect on the subjective satisfaction regarding the web site and the exercise, and no effect was found between the three conditions for web site and for the exercises.</p> <p style="text-align: center;">Experiment 2</p> <p>The results showed that for all exercises most participants preferred the film clips for illustrating the RSI exercises.</p> <p>For all exercises the majority of the participants preferred the film</p>
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	<p>clip to text and pictures.</p> <p>For the first easy exercises, the participants preferred the film clip and text to the instruction in a picture. For the second easy exercise, the participants preferred the film clip and picture to the instruction in text.</p>
<p><b>Reference</b></p> <p>Hinds, P. (1999). The cognitive and interpersonal costs of video. <i>Media psychology, 1</i>, 283-312.</p>	
<p><b>Population</b></p> <p>Study 1: 71 undergraduates from the industrial management program at Carnegie Mellon University who volunteered to get extra credit points toward course grade. All participants learned English as their first language.</p> <p>The study was a 2 X 2 (low [audio only] or high [audio-video] amount of information) x (poor or good signal clarity) within-subjects design.</p> <p>Study 2: 70 undergraduates in the business program at Carnegie Mellon University who volunteered to get extra credit toward course grades. All participants had learned English as their first language. Five participants were suspicious of the priming manipulation and were removed from the analysis.</p> <p>The study was a 2 X 2 (positive or negative) x (low or high) design with priming and cognitive load as independent between-subject variables.</p>	
<p><b>Purpose/Questions</b></p> <p>Hypothesis 1: Interacting over audio-video will generate a higher cognitive load than interacting over audio only.</p> <p>Hypothesis 2: Interacting over media with poor signal clarity (TV-quality) will result in a higher cognitive load than interacting over media with good signal clarity (PC-quality).</p> <p>Hypothesis 3: Increased cognitive load will result in impressions more biased toward a primed trait.</p> <p>Hypothesis 4: Communication over communication technology high in cognitive load will result in impressions more biased toward a primed trait than will</p>	<p><b>Findings</b></p> <p style="text-align: center;">Study 1</p> <p>Hypothesis 1: Findings suggested that communication technology can increase cognitive load (H1). The participants in this study constantly made more errors in audio-video than in audio-only conditions. Thus, showing that more cognitive load is required to interact over an audio-video than over an audio-only system. Also, supporting the idea that having to process more channels and more screens of information may increase cognitive load.</p> <p>Hypothesis 2: There was less support for the idea that poor signal quality increases cognitive load.</p> <p style="text-align: center;">Study 2</p> <p>The results of study 2 confirmed that people under high cognitive load rely more heavily on the use of a negative prime when forming impressions than do people under low cognitive load.</p> <p>Hypothesis 3: Confirmed that high cognitive load can lead to biased impressions (impressions biased toward a primed</p>

<p>communication over communication technology low in cognitive load.</p> <p>Purpose of Study 1: to examine the relationship between two dimensions of communication technology and cognitive load.</p> <p>Purpose of Study 2: to test the effect of cognitive load on impression formation.</p>	<p>construct, thus suggesting less systematic processing of individuated information about the target).</p> <p>Hypothesis 4: Participants who interacted over audio-video were more influenced by the primed-trait than were participants who interacted over audio only. A contrast comparing audio only to audio-video in the negative-trait primed condition indicated that participants in the audio-video condition were more vulnerable to the negative prime than participants in the audio-only condition. Thus, suggesting that impressions of people communicating over an audio-video medium may be more biased toward a primed trait than impressions of people communicating over audio only.</p>
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