



CENTER FOR TEXTUAL STUDIES AND DIGITAL HUMANITIES

DIGH 402 - Instructional Design and e-Learning

Spring Semester 2015

Week 4 - Extra

Online Learning - Bryan Alexander Interview

[Bryan Alexander: Preparing Teachers and Students to Succeed in an Open-Ended Future](#)

audio or text in e-Learning

redundancy principle - intro

- graphics described using both on-screen text and narration
 - narration repeats the on-screen text
- on-screen text is redundant with the narration
- people learn better from concurrent graphics and audio
 - instead of concurrent graphics, audio, and on-screen text
- generally, do not add printed text to a narrated graphic
- avoid overloading the visual channel of working memory

audio or text in e-Learning

redundancy principle 1 - no on-screen text for narrated graphics

- should you include on-screen text in addition to the agreed narration?
 - multimedia based e-Learning program with graphics and narration
- avoid courses that contain redundant on-screen text with graphics and narration
- learners may overly focus attention on on-screen text and filter out accompanying graphics
 - focus on words ignores graphics
- learners may try to compare and reconcile on-screen text and the accompanying narration
 - requires cognitive processing extraneous to learning

audio or text in e-Learning

redundancy principle 1 - counter considerations

- commonly held that some people have visual learning styles, others auditory
 - it would seem that words should always be presented as print and narration
 - the learning styles hypothesis
- appealing to designers tired of a perceived 'one-size fits all' approach
- hypothesis based on information acquisition theory (IAT) of multimedia learning
- IAT posits three ways of information delivery preferable to two
 - especially if a given route does not work for some learners
- IAT predicts deeper learning from multimedia presentation when redundant on-screen text is included rather than excluded

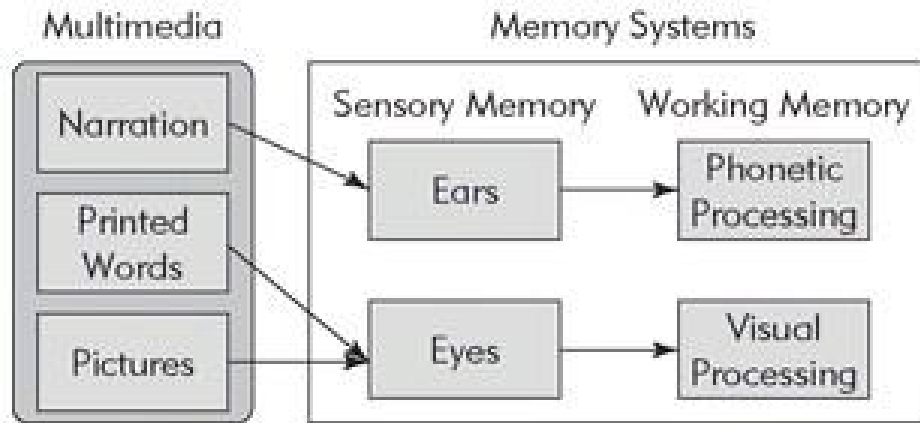
audio or text in e-Learning

redundancy principle 1 - psychological considerations

- IAT makes unwarranted assumptions on how people learn
 - assumes people learn by adding information to memory
- Cognitive Theory of Multimedia (CTM) based on assumptions that
 - separate channels for processing verbal and pictorial material
 - limited processing per channel at a given time
 - learners actively attempt to build pictorial and verbal models and connections
- CTM assumptions consistent with theory and research in cognitive science
 - represent a consensus view of how people learn
- CTM argues that redundant on-screen text could overload the visual channel

audio or text in e-Learning

redundancy principle 1 - psychological considerations



Mayer, R.E. 2001. "Multimedia learning." Cambridge University Press.

*Mayer, R.E., and Moreno, R. 2003. "Nine ways to reduce cognitive load in multimedia learning." Educational Psychologist 38. PP.43-52.

audio or text in e-Learning

redundancy principle 1 - evidential support for omission of redundancy

- inclusion and omission of redundancy has been tested by several research studies
- both options tested for learning about the formation of lightning

- Craig, S.D., Gholson, B., and Driscoll, D.M. 2002. "Animated pedagogical agents in multimedia learning environments: Effects of agent properties, picture features, and redundancy." *Journal of Educational Psychology* 94. PP.428-434.

- Mayer, R.E., Heiser, J., and Lonn, S. 2001. "Cognitive constraints on multimedia learning: When presenting more material results in less understanding." *Journal of Educational Psychology* 93. PP.187-198.

- tested training in soldering

- Kalyuga, S., Chandler, P., and Sweller, J. 1999. "Managing split attention and redundancy in multimedia instruction." *Applied Cognitive Psychology* 13. PP.351-372.

- educational computer game

- Moreno, R., and Mayer, R.E. 2002. "Learning science in virtual reality multimedia environments: Role of methods and media." *Journal of Educational Psychology* 94. PP.598-610.

audio or text in e-Learning

redundancy principle 2 - special circumstances allowed

- carefully consider using redundancy in special circumstances that will not overload the learner's ability to process visual information
- a few examples:
 - no graphical presentation (screen contains no animation, video, photos...)
 - sufficient opportunity exists to process the graphical presentation (sequential presentation of on-screen text and corresponding graphics or when pace of presentation is reduced...)
 - learner struggles to comprehend narration over on-screen text (non-native language for narration, accessibility issues, obscure and verbose language such as technical terms, equations...)

audio or text in e-Learning

redundancy principle 2 - psychological considerations

- exceptions occur in special situations where on-screen text aids learner processing
 - podcast
- dual modes of presentation can be helpful
 - complex narration, foreign language learning, technical terms...
- lesson presented at slow pace or under learner's control
 - on-screen text less likely to cause cognitive overload in the visual channel
 - user has sufficient time to process all of the incoming material
- printing unfamiliar technical terms on screen may reduce cognitive processing
 - technical narrative may be harder to follow and process due to terminology and subject complexity

audio or text in e-Learning

redundancy principle 2 - evidential support for inclusion of redundancy

- narration and on-screen text vs narration alone

- Moreno, R., and Mayer, R.E. 2002. "Verbal redundancy in multimedia learning: When reading helps listening." Journal of Educational Psychology 94. PP.156-163.

audio or text in e-Learning

redundancy principle 2 - possible guidelines and suggestions...conclusions

Avoid redundancy:

- when words and pictures are simultaneously presented at a fast pace

Consider redundancy:

- when there are no graphics
- when the learner has sufficient time to process graphics
- when the learner may have difficulty processing narration

Research the following:

- target learners
- material presented
- presentation methods and styles

visuals and text in e-Learning - cont'd

coherence principle - intro

- avoid adding any material that does not support the instructional goal
 - keep the lesson uncluttered
- commonly violated principle
- straightforward to apply
- potential for strong impact on learning
- 'weeding' refers to the need to uproot any words, graphics, or sounds...
- avoid 'seductive details' to embellish e-Learning lessons
 - Garner, R., Gillingham, M., and White, C. 1989. "Effects of seductive details on macroprocessing and microprocessing in adults and children." Cognition and Instruction 6. PP.41-57.

visuals and text in e-Learning - cont'd

coherence principle 1 - avoid extraneous audio

- based on psychology of learning and research evidence
 - default recommendation is to avoid extraneous sounds in e-Learning courseware
 - tempered by consideration of how people learn from both words and graphics
- background music and sounds may overload working memory
- unhelpful in situations where the learner may experience heavy cognitive load
 - unfamiliar material
 - material presented at a rapid rate
 - rate of presentation is not under learner's control

visuals and text in e-Learning - cont'd

coherence principle 1 - psychological reasons to avoid extraneous audio

- reports claim that there is a high dropout rate in e-Learning courses
 - Svetcov, D. 2000 "The virtual classroom vs. the real one." Forbes 166. PP.50-54.
- may encourage addition of extraneous material in attempt to maintain learner's interest and attention
- premise underlying 'arousal theory'
 - predicts learner's gain more from interesting sounds and music

"When things have to be made interesting, it is because interesting itself is wanting. Moreover, the phrase is a misnomer. The thing, the object, is no more interesting than it was before..."

- Dewey, J. 1913. "Interest and effort in education." Houghton Mifflin. PP.11-12.

visuals and text in e-Learning - cont'd

coherence principle 1



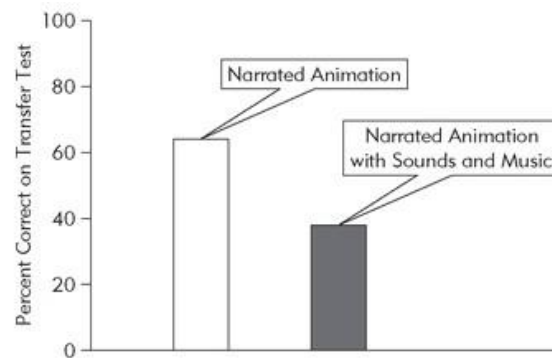
visuals and text in e-Learning - cont'd

coherence principle 1 - evidential support for omission of extraneous audio

- narrated animation for two tests plus versions with background music
- music was unobtrusive instrumental piece, low volume and did not mask narration

- Moreno, R., and Mayer, R.E. 2000. "A coherence effect in multimedia learning: The case for minimizing irrelevant sounds in the design of multimedia instructional messages." *Journal of Educational Psychology* 92. PP.117-125.

- appropriate sound effects were also added to the test
- both background music and sound effects caused worse learner results



Mayer, R.E. 2001. "Multimedia learning." Cambridge University Press.

visuals and text in e-Learning - cont'd

coherence principle 1 - evidential support for omission of extraneous audio

- text read in a quiet environment with text read with irrelevant conversational background speech

- Kenz, I., and Hugge, S. 2002 "Irrelevant speech and indoor lighting: Effects of cognitive performance and self-reported affect." Applied Cognitive Psychology 15. PP.709-718.

- comparison of the quality and efficiency of essay writing with and without music

- Ransdell, S.E., and Gilroy, L. 2001. "The effects of background music on word proceeded writing." Computers in Human Behavior 17. PP.141-148.

"For all those college students who listen to music while they write on a computer, the advice from this study is clear. One's writing fluency is likely to be disrupted by both vocal and instrumental music."

(Ransdell & Gilroy, P.147)

visuals and text in e-Learning - cont'd

coherence principle 1 - a quick test

[H G Wells Reading](#)

Try reading the above document as follows,

- read the above text with a song playing in the background
- read the same text for the same period of time without music

Then compare how much you remember, transition from working to long-term memory, and general recall and understanding of the text.