



Resuscitate Your Dying Lectures! Applying Evidence-based Principles to Improve Slide Design

Lectures are a longstanding tradition in medical education, although in some settings they seem to be drawing their last breath. But the lecture need not die! When presentations are designed in ways that are consistent with how the human mind works, they can be highly effective instructional tools. Mayer's work on multimedia learning provides evidence-based guidance on how to improve presentations, but most physicians are unfamiliar with these principles.¹⁻³ This educational download uses graphic examples to familiarize educators with several of Mayer's key concepts that relate to slide design and offers tips to improve the visual and educational impact of future presentations (Figure 1).

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References

1. Mayer RE. Applying the science of learning to medical education. *Med Educ* 2010;44:543-9.
2. Mayer RE. Applying the science of learning: evidence-based principles for the design of multimedia instruction. *Am Psychol* 2008;19:177-213.
3. Mayer RE, Moreno R. Nine ways to reduce cognitive load in multimedia learning. *Educ Psychol* 2003;38:43-52.

A CASE OF DIFFICULTY BREATHING

- *Coherence principle* – excluding interesting but irrelevant content reduces extraneous cognitive load and makes the slide as easy as possible to process.

A Case of Difficulty Breathing

- Start with a plain background (avoid templates, logos).
- Use colors with high contrast (i.e. black on white).
- Use sans serif fonts.

HISTORY OF PRESENT ILLNESS

- 24 year old man presenting by ambulance with 1 hour of sudden onset dyspnea and pleuritic chest pain
- No history of previous similar episode
- Occurred suddenly after running a marathon
- Limited history upon arrival due to dyspnea
- PMH: PSH, Meds, Allergies none/allergic
- Social history: Occasional tobacco smoker, no EtOH, no illicit drug use

- *Multimedia principle* – words and pictures are more memorable than words alone.
- *Modality principle* – since people cannot process written and spoken words simultaneously (dual channel hypothesis),¹ use narration with graphics instead of text.

PHYSICAL EXAM

- Temp: 36.6°C | RR: 95/56 | Heart Rate: 132 | RR: 31 | SpO2: 99% (on room air)
- GENERAL: Thin young male, anxious appearing in moderate distress.
- VITALS: Tachypneic, non-tender with normal range of motion. Leftward tracheal deviation
- CARDIOVASCULAR: Tachycardic rate and regular rhythm with no murmurs.
- RESPIRATORY: Increased work of breathing, decreased right-sided breath sounds
- GASTROINTESTINAL: Soft, non-tender, non-distended.
- ENTHUSIASMS: Non-tender; no edema; no pain swelling
- NEURO: Awake and alert; oriented to person, place, and time; moving all 4 extremities

- *Spatial contiguity principle* – print words adjacent to corresponding graphics.
- *Temporal contiguity principle* – narration should coincide with related graphics.

PHYSICAL EXAM

- Place words next to the related graphic.
- Tailor animations and slide timing to your message. This limits the audience's ability to anticipate what you'll say next and helps hold their attention. This slide has 7 simple animations. Avoid distracting effects.

WORK-UP

- CXR shows a collapsed right lung with slight left shift of mediastinal structures

- *Signaling principle* – design slides to visually highlight essential material.

WORK-UP

- Fill the slide with the radiograph or other relevant image, then use arrows to draw the eye to important details.
- Attribution: A. Murphy, Radiopaedia.org, rID: 46492

Great presentation images...

4:3 :: 1024 x 768 16:9 :: 1920 x 1080 Are High Resolution	 Augment The Narration	 Tell A Story	 Are Watermark-Free
 Highlight Key Ideas	 Are Not Distracting	 Fit A Color Scheme	 Are Legal

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Figure 1. Applying Mayer's multimedia principles.

The authors have no relevant financial information or potential conflicts to disclose.