Going Beyond Simple Interactions: How to Get the Most Out of Your Computer-Based Instruction

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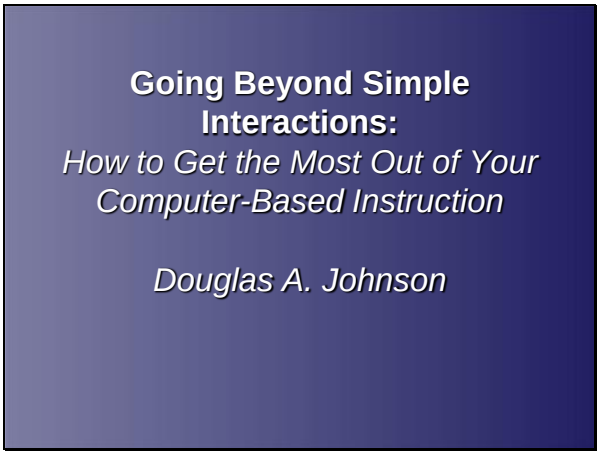

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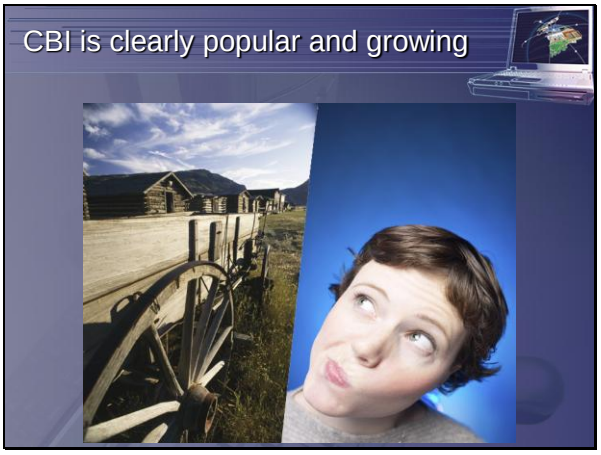

- Justified?
- Jump on bandwagon or be skeptical
- Using PowerPoint that different or same old training methods dressed up in fancy multimedia clothing
- A bunch of bells and whistles signifying nothing

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- First, a small history lesson
- Teaching machines are the 1950s equivalent of CBI
- Designing to overcome the shortcoming of traditional instruction
- What's wrong with our usual way of training
- Lecture: Too fast for some, too slow for others, learners off-task, attempts to facilitate interaction (mass responses) just results in copying
- Books: No interaction, you don't know if people are right until after training
- Videotapes: Again, no interaction
- One-on-one tutor: Better, but not necessarily cost efficient and tutors may not sequence material the best
- Despite being clunky things, teaching machines still fixed all of these problems!

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- Obstacles
- People were uncomfortable with computers and learning from them
- Less relevant in today's highly computerized world
- IBM: Produced many machines, wonderful results, decided to back out at last moment, no contract
- Rheem: All the models they produced were defective
- Eventually teaching machine advocates got frustrated, quit, and just developed textbooks. Today we're not dependent on the whims of manufacturers to develop computer based instruction

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- So, what can we learn from the teaching machine movement, given we no longer face the obstacles they faced?
- Criteria for a good teaching machine / computer based instructional program
- Continual Activity (interactive; make them do something to ensure they're paying attention and learning correctly)
- Carefully tested and retested sequences
- Use small steps to eliminate discomfort from being wrong
- Write out responses rather than select from multiple choice (recall vs. recognition)
- Learner Paced
- Immediate feedback and reward
- Mastery learning (prove you understand concept A before you're allowed to see concept B)

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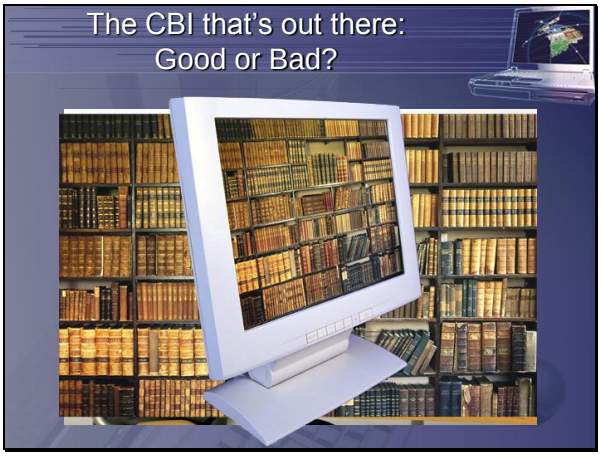

- Induce continual activity, but something still seems missing
- Claim to be interactive, multimedia
- Sounds nice, but what do they usually mean by interactive?
    - User control over words and pictures that are presented
    - Advancing material isn't that revolutionary

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- For remainder of talk, when I say interactive, this is what I'm referring to
- Different from simple user interactions
- Books can't, lecture can't, videotapes can't, one-on-one tutors can't
- This is THE thing that's truly special about CBI. The thing that addresses all those faults I mentioned earlier. Unfortunately, it's also the piece that is usually missing in most computer training programs

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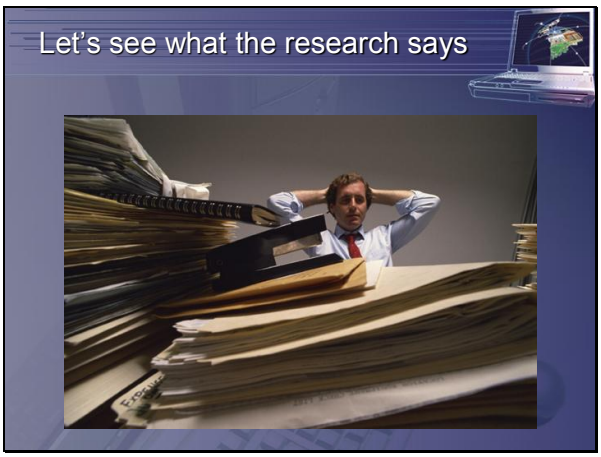

- Assuming that teaching machine criteria hold for CBI, but let's confirm it and see what else is being looked at
- Establish whether interactive CBI is effective compared to other forms of instruction
- Do the criteria for teaching machines hold for to CBI?
- What other variables are being investigated?
- Best practices
- Future directions

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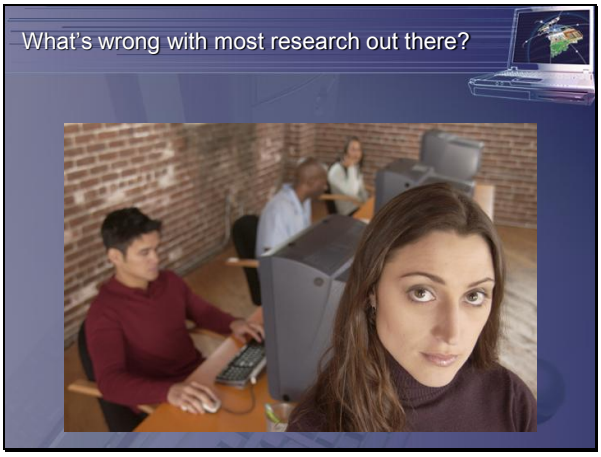

- Failure to utilize uniquely (non-interactive; might as well use a training manual)
- Excessive emphasis on antecedents and inferred behaviors/processes
- Too much reliance on social validation ("did you like it?")
    - Lack of objective performance outcomes (did it work or not???)
- Designs that don't evaluate relative effectiveness of CBI
    - One-group pretest-posttest designs (math-test, teach, math-test)
    - Untreated control group design (two groups, one taught math, one not)
    - All you showed was better than nothing at all...big deal
- Waded the thousands of weak studies to present you with the few good
- Focused on studies where variables could be controlled by instructional designer
    - Pace of program, inclusion/type feedback, etc
    - Not self-directedness, locus of control, etc

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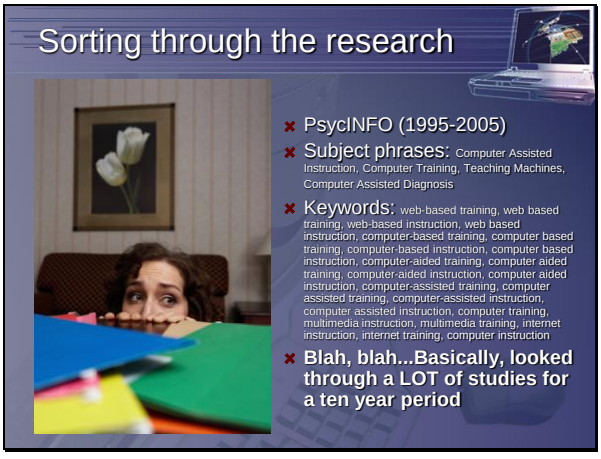

- Lots and lots of articles; some good and many bad

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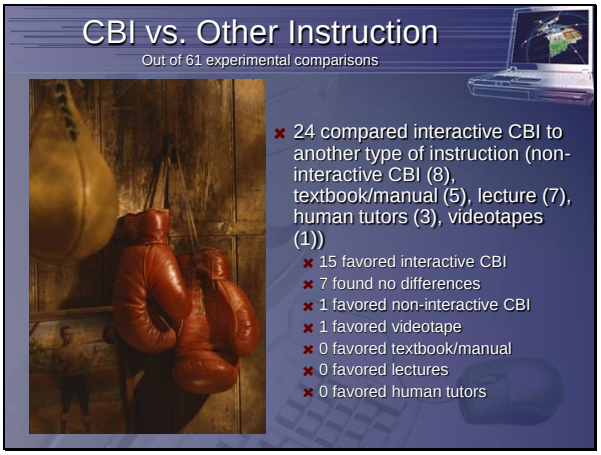

- CBI versus other instruction

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- 57 used student-pacing
- None compared student-pacing to machine pacing
- 3 assessed composing vs. selecting
- All favored composing
- 5 direct assessments of overt vs. covert
- 4 favored overt, 1 found no difference
- 15 used mastery learning, but only 1 compared mastery learning CBI to no mastery learning CBI
- Favored mastery learning

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- Racing: in an effort to complete an instructional program as fast as possible, learners often respond so quickly that mistakes are made

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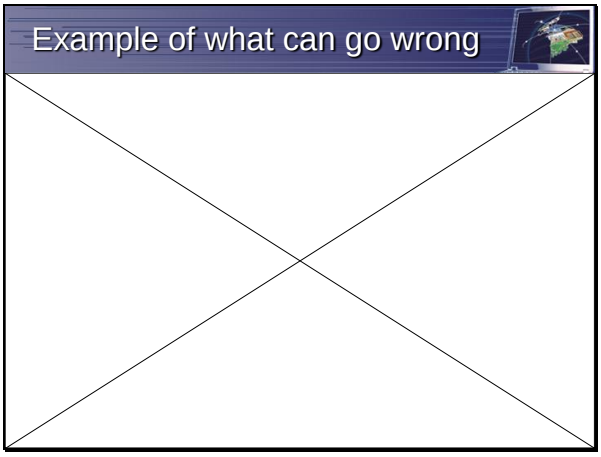

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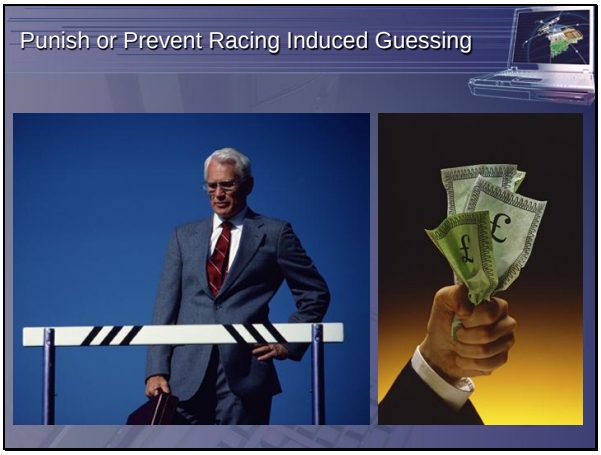

- Mastery criteria
- Early researchers built punishment contingencies into their teaching machines. Repeating sets on which errors were made is aversive because it delays completion (reinforcer of being finished is postponed).
- Postfeedback delays
- One study comparing postfeedback delays and no postfeedback delays favored postfeedback
- Compose rather than select
- External incentives
- Specific performance dependent vs. independent
- 2 studies compared dependent and independent
- Both favored dependent

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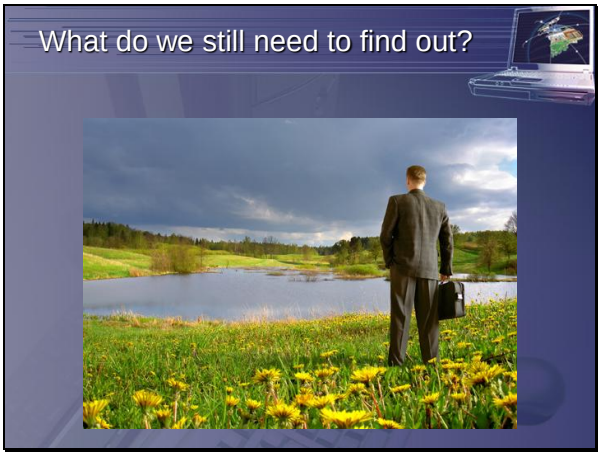

- How to best prevent / punish of trial-and-error responding and racing
- Density of interactions? Frequently, infrequently, only at end of unit?
- Machine vs. student-paced?
- Errorless vs. error management?
    - Small steps: reinforcing or tedious?
- Imposing time limits?
- How much practice should be used?

- Test these things out yourselves

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