Comments on Documenting Models Based on Documenting an ACT-R Compiler

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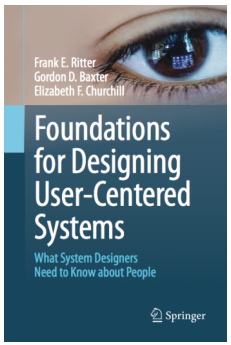
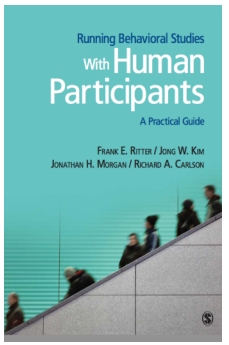
- Documenting a large model
- Counted all the rules at http://act.psy.cmu.edu/
  - Brief reflection of the vision of UTCs
- Lessons for documenting models





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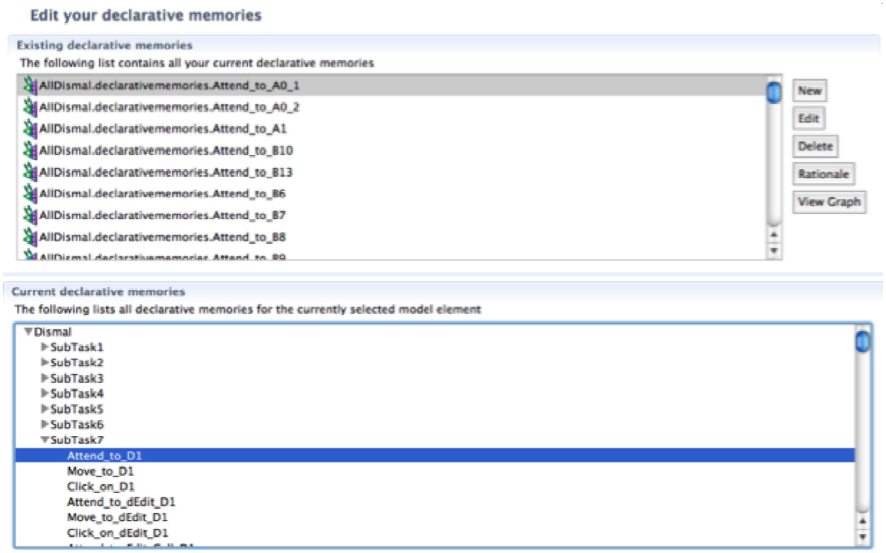
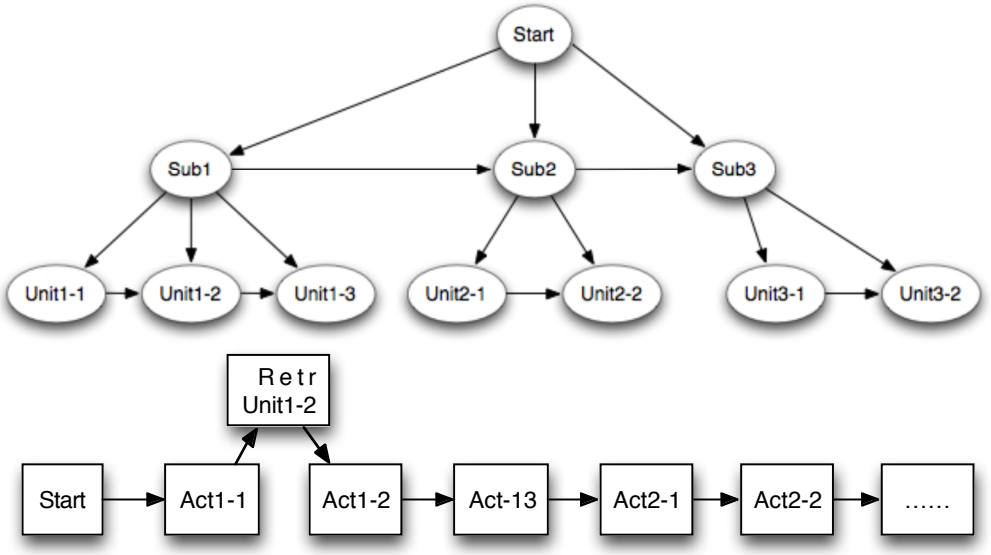
Large ACT-R Model with Herbal

(Paik, Kim, Ritter, & Reitter, in press)

- Built with Herbal/ACT-Rv2 compiler (Paik)
- 2-way compiler: novice, expert
- Paik and Kim wrote model as HTA (14 tasks, 538 actions) in 4 hours

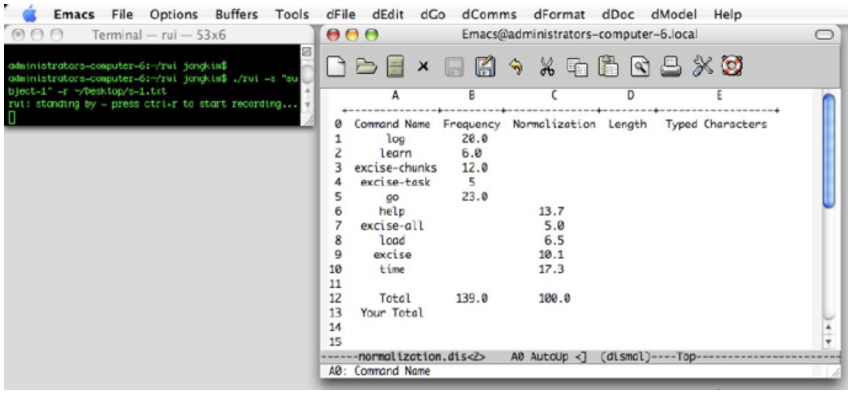




Dismal Spreadsheet task

(Kim, 2008)

- 30 to 20 min., non-iterative task, 4 trials
- 14 subtasks
- Uses Dismal
- N=30, 4 trials,
  some retests

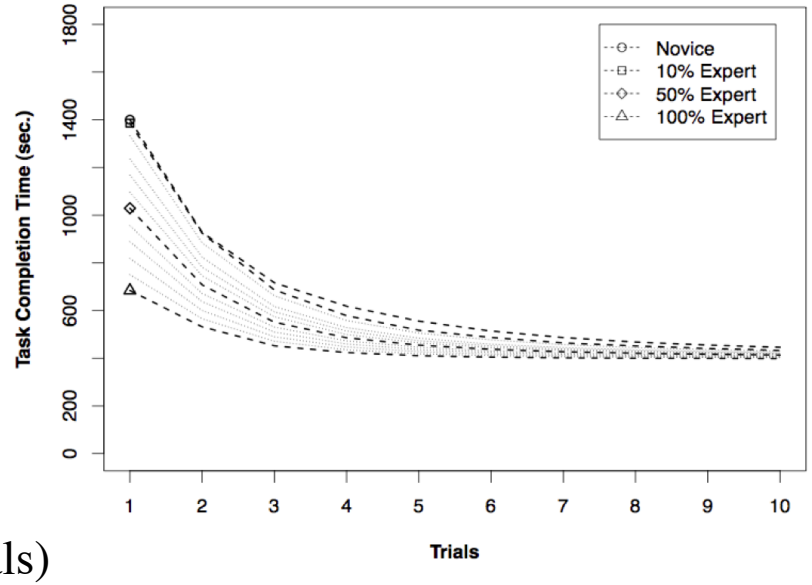


- (looks like relearning is why menus are liked, not use or learning, Kim & Ritter, 2015)

Model Sizes

		Models with Expertise					
	Novice	**0%**	**10%**	**...**	**50%**	**...**	**100%**
Decl. mem. elements used	1,152	1,152	1,091	...	845	...	538
Production rules	29	617					

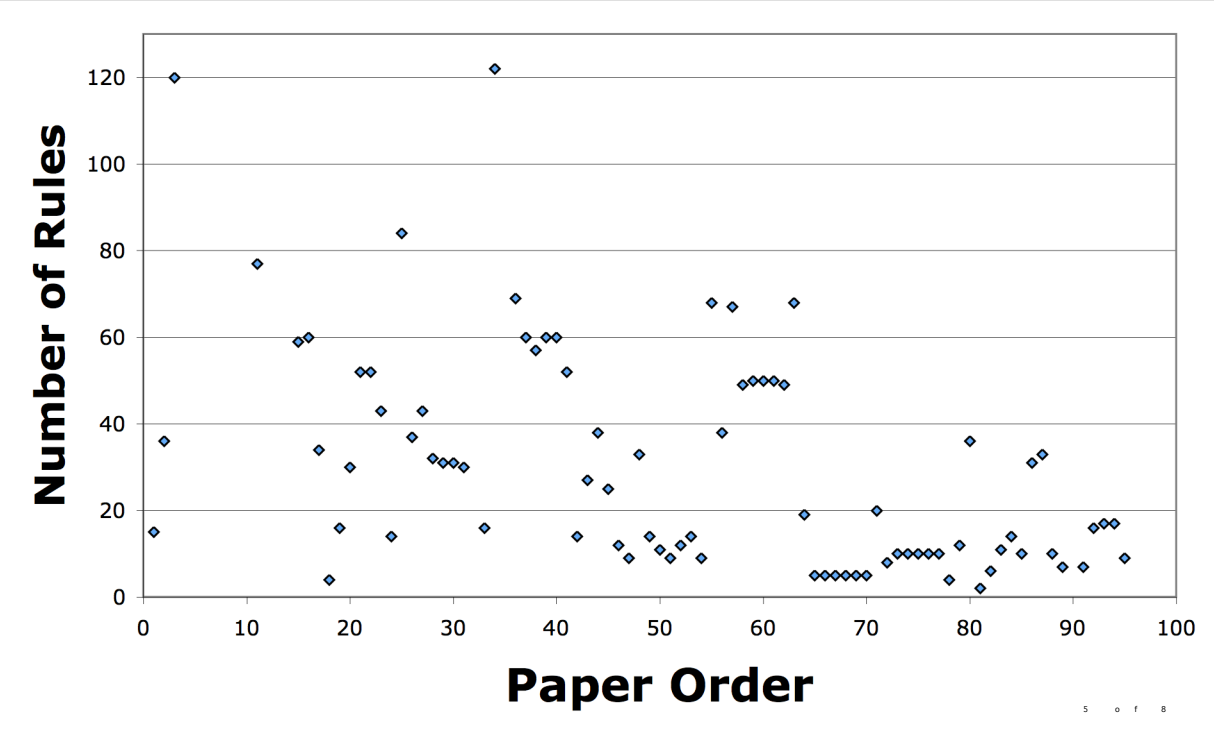
Total, about 6,000 rules
12 rules/min. vs. 5 min./rule
(0.78 min/rule conservatively)



- Several ways to create models
  - (a) a simple model from DM tree,
  - (b) Compiled model from a DM tree
  - (c) intermediate expert models (N=∞)
  - (d) Learned models (500 to 1000 rules over 100 trials)

Summary of Previous Models

- All models in act.psy.-cmu.edu/models) (late May 2015)
  - useful resource, by the way, and thanks to those who have documented their code
- 53 papers with 82 rule-based models.
  - mean = 30.3 rules
  - mode = 19.5
  - max = 122
- So, some models
  - Not a lot
  - Not reused
  - Best set
  - Useful



Recommendations for Models

- 1. Label the model file/folder appropriately.
  - suggest <first author last name><further initials><year or other ID>, e.g., paikKRR-tochi *or* paikKRR15. There were many badly named, hard to use files and directories e.g, 'model'.
- 2. Document the code/files, and format and author them clearly.
  - Include contact details & date
  - readme.txt, and note version of ACT-R
- 3. Document the paper that used the code in the code
  - I have a directory of code but can't always place the paper it came from!
- 4. Include
  - modified architecture bits
  - analysis functions/macros/etc. (such as matlab),
  - raw data (labeled very well)
  - appendixes, etc.
  - trace of the run
- 5. zip files for large sets (vs. DMG or separate links), but YMMV
- 6. Be helpful and inclusive, but 420M seems too helpful, but YMMV
- 7. Would be nice to have papers numbered on web site, with 50 it would help to keep track when working through them

References

- Cohen, M. A., Ritter, F. E., & Haynes, S. R. (2010). Applying software engineering to agent development. *AI Magazine, 31*(2), 25-44.
- Kim, J. W. (2008). *Procedural skills: From learning to forgetting.* Unpublished PhD thesis, Industrial Engineering, Penn State University, University Park, PA.
- Kim, J. W., & Ritter, F. E. (2015). Learning, forgetting, and relearning for keystroke- and mouse-driven tasks: Relearning is important. *Human-Computer Interaction, 30*(1), 1-33.
- Paik, J., Kim, J. W., Ritter, F. E., & Reitter, D. (in press). Predicting user performance and learning in human-computer interaction with the Herbal compiler *ACM Transactions on Computer-Human Interaction*.

How was the fit?

(29 r's > .9, and one r=.569)