Discussion of First Day's Presentations

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Dan's talk (Act-R since 2001)

- Dan's usual clear & thoughtful presentation
- I'd been all prepared to say *"there's a lot to take in"*, but really there isn't
- Just a few random remarks …

Continuity

- Struck mainly by the picture of continuity: a fairly short-lived Act-R 5, followed a longer-lived Act-R 6
- Maybe version 6 has converged on where should be, and is close to asymptote?
- Not to say there won't be a (short-lived?) version 7 followed by a version 8
- But clear that version 6 is giving people plenty to work with & make progress

Learning R_{ji}

- The default formula for learning associative strengths has gone
- Certainly problems with default mechanism, e.g. for scaling
- Something of a neglected area
- The R_{ji} play an important role in several models, and in the overall Act-R story
- So we need to know how they get learned
- Probably won't make progress until several models that really depend on associative learning
  - which probably means more long-lived models?

"Optional Components"

- Having proposed architectural modifications available to be played with, is surely the right way to proceed
- Variety of reasons for optionality
- Just a touch concerned about arch'l changes proposed on basis of a single experimental paradigm
  - e.g. base-level inhibition for recently recalled items
    - there may be better ways?

Topic for Investigation?

- “Semantics of slot names”
  - Just what is the theoretical significance of the names used for slots?
  - Has become relevant with advent of P*, with variablisation over slot names
- My own feeling is to be wary of carrying significant information in slot names
  - e.g. encourages “cute programming”

One Thing Missing

- Each year at the workshop we listen to Dan telling us about what's old, what's new, and what's coming up
- At the end, we politely clap and ask a few questions, but we never really get a chance to …
- publicly thank Dan for all the calm, helpful, effective, patient, courteous, supportive work he does behind the scenes

Thank you

Dan!

Niels's talk (Transfer of Skill)

- For this one, definitely ***is*** a lot to take in!
  - and the essential content is in the detail
- There is much to like
- But it will take time for the implications to become clear
- In the meantime, a few random thoughts

Continuum: Interpreted ↔ Proceduralised

- One thing to like: Picture of cognitive skill
  - as a flexible mixture of interpreted components and components proceduralised to varying degrees
- Contrast with idea of uniform task steps
  - all (fully) interpreted or (fully) proceduralised
- Picture of realistic, everyday skill
  - moment-to-moment fluctuation in level of compilation
  - borrowing components (productions) from other, related tasks

Detritus from Task Instruction

- Way that Niels uses prod'ns left over from (other) task instruction to aid (speed) learning of new task
- Reminds me of Soar work by Scott Huffman (~ 1992-3?)
  - Used detritus (learned prod'ns) from instruction interpretation (NL in this case) to help memorise instructions so that don't need to be told again

Validation of a Cool(font) Prediction!

- At Coolfont meeting (10 years ago?), I made a prediction (with help from Rick Lewis)
- In the context of (a) expert skill and (b) production compilation
- We would find productions whose only content referred to anonymous chunks
  - OK for the theory, but a challenge in practice
- Niels's P6564, only content is chunks AC42 and CD42

Compact Rep'n for Instructions

- Something else to like:
- The compact representation for task instructions
  - e.g. whole of counting model on one slide
- Is there perhaps the germ here of a new, more readable syntax for Act-R prod'ns?

Some Things I Don't Understand

- For example: the "task general" rules
  - isn't there a fairly small, fixed number of them?
  - so that once they're learned, there would be no further cross-task transfer?
  - or am I wrong? (*"gazillion combinations"*)
- If prod'n is task-independent, what stops it applying when it shouldn't?
- Not sure that achieves one of the motivating aims
  - does it avoid complex interpretative prod'ns?

Glenn's talk (Scaling up)

- Must admit I had some difficulties with this talk
  - nothing to disagree with
  - my fault, not Glenn's
  - but I wasn't always sure what was really being talked about, or how specific it was to Act-R
- Discussion from the audience helped, and with some help from Glenn I think I now understand it better

C, S, I …

- I believe
  - ***comprehensiveness*** refers to the coverage of aspects of human cognition
  - ***scaling*** refers to ability to model real tasks, of real complexity, with realistic levels of knowledge, expertise, etc.
    - (but there's also a sense of scaling *down* that I still haven't grasped)
  - ***integration*** refers to putting thing A together with thing B
    - but seemed to be a wide range of possible As & Bs

Random points

- I notice Glenn pushing the boundaries of what counts as cognition
- I noticed — and was impressed by — Glenn's including *fatigue* along with other familiar components of Act-R's coverage
  - reminds us of impressive work Glenn presented before
- Glenn saying *"Act-R has the details"*
  - agree that can't capture the fit to/simulation of human behaviour if retreat to a broader level of analysis
- Agree with Frank's question:
  - what follows? what is Glenn saying we should be doing differently?

Niels's talk (Free-running modules)

- A much less-developed proposal
- Again, definitely some things to like
  - especially sympathetic to some of the problems being addressed
- But at this stage, does seem an odd choice of where to go
- Random thoughts …

Another Cool(font) Prediction Come True!

- Niels's opening slide mentions *knowledge-rich tasks*
- Which is another one of the foci of new work I was predicting at Coolfont
- Unfortunately, Niels doesn't mention it again ☹

Attention and Choice of Task

- This work beginning to deal with questions of *attention*, and of how agent *chooses what to do*
- Neither of which have really been tackled in Act-R work before (to my knowledge)

Free-running DM

- I think this is a v interesting proposal
  - though possibly for different reasons than Niels's
- A while back I was thinking about two tasks:
  - *extended (LT) mem retrieval*; *category generation*
  - both of which want to keep DM retrieval busy
- I was idly wondering about using the chunk that's retrieved as the cue for next retrieval
- Sounds like one would just get the same chunk again?
  - well, one can take measures to prevent that, but …

Role of Request Buffer and R_{ji}

- We tend to think of contents of DM request buffer as "cueing" the retrieval
- But that's arguably a wrong way to look at it
- Instead, DM buffer serves a ***negative*** role
  - i.e. to ***filter*** the retrieval: block unwanted items
  - hence, serves to ***narrow down*** the retrieval
    - e.g. to a goal (cf. MfG/TC)
- The ***positive*** cueing comes via R_{ji}
  - i.e. to make items (possibly) retrieved that otherwise won't be

Free-wheeling DM retrieval

- So proposal is *(and this will date me: I think in terms of Act-R 5)*
  - whenever DM is not otherwise engaged
  - most recent retrieved chunk serves as cue
    - by being copied to another buffer, which acts as source of spreading activation
    - and leave the request buffer ~empty (again, cf. MfG/TC)
- This can (maybe?) lead to
  - (1) day-dreaming, where one thought leads to another
  - (2) "semantic richness"
    - e.g. someone mentions *elephant*; and we move on ("lexical")
    - or if we pause on it, we begin to be aware of appearance, size, features (e.g. trunk), Indian vs African, etc.
- ??? do away with the retrieval-request buffer???

Free-running Modules

- Overall…
  - certainly, the issue of bottom-up control of attention needs to be addressed, and free-running modules is one place to start
  - it does strike me as a bit of an odd choice
  - for example, there are challenges facing Threaded Cognition

Version control

- Presented at Act-R post-graduate summer school, White Mountain Hotel, North Conway NH, 17 July 2011