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 very 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 \textit{(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 \textit{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