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Journal of Cognitive Systems Research 1 (2001) 251–252

**Cognitive Systems**  
RESEARCH

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## Book review

### Review of The Third International Cognitive Modelling Conference

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Accepted 6 November 2000

The Third International Cognitive Modelling Conference was held in Gronigen, the Netherlands, from 23 to 25 March 2000. As well as presented papers and a poster session, the conference included a tutorial on ACT-R. A listing of the 32 papers accepted (out of 61 papers submitted) and instructions to order the proceedings (50 guilders, about \$22 or £14) is available at [tcw2.ppsw.rug.nl/iccm](http://tcw2.ppsw.rug.nl/iccm).

The call for papers strongly encouraged submissions that reported both a running (i.e., implemented) computer model and empirical data against which the model was compared. Nearly all of the papers at the conference did this. There were a few exceptions where this criterion was not appropriate. Four presented model and data but no detailed comparison, two presented a model but no data, one presented neither. These papers dealt with highly related topics such as new example behaviors in a model such as consciousness and emotions, and how to test models.

The conference remains an international event, contributions to the programme came from nine different countries: the USA (18), UK (7), The Netherlands (3), Germany (3), France (2), Switzerland (2), Canada (2), Italy and Belgium (1 each). The invited talks this time were not detailed presentations of a single model, but were more like invited talks at other conferences. The two invited speakers were Axel Cleeremans from Belgium, who

spoke about how connectionist models can exhibit implicit memory and phenomena like consciousness, and John Anderson from the US, who spoke about the various time scales that models can be considered.

Most models were created within the context of existing architectures, and the standard for proposing new architectures remains high. The most common architecture was ACT-R (14 papers), PSI (3), CHREST (3), neural nets (3), Lisp (2), various agent architectures (2), and one model each in Soar, Weaver, and Apex. (One model's architecture, while available as a block diagram, was not classifiable.) There was a greater number of connectionist models at this conference than at previous instances of this conference, including one invited speaker who spoke about learning, consciousness and connectionist models. This was not and should not be seen as a rising tide, but an inclusion of related colleagues doing related work using a different formalism.

#### 1. Interesting work

As a group, the papers indicated that architectures are being used in new ways, for example, modifying the architecture to simulate fatigue, emotions and emotional effects, or cognitive development. Three sets of work were particularly intriguing to me.

Cognitive architectures continue to be developed. This happens within an architecture as more features

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and capabilities are added and new architectures are created. For example, the ACT-R architecture's extension to include perceptual and motor behavior, ACT-R/PM was evident in several models, and one of the related pieces of work to add eyes and hands to Soar was presented. The PSI architecture in particular, after being introduced at the last meeting, is now having its behavior tested. While it is not yet as well developed as ACT-R and Soar, it appears more maneuverable and is tackling some different issues such as how drives and emotions might be included on a fundamental level within an architecture.

Related to extending architectures, is that much of the work presented whether done within an architecture or not was considering interaction with the world. Nearly half of the models reported are either interacting with the real world or are interacting with model eyes and hands. This interaction pattern is changing the models, making them slightly more complex and much more concerned with the mechanics of interaction. The models are becoming more situated.

There were several pieces of work on modeling developmental data. This went past the simple regularity finding in early language acquisition and started to posit mechanisms for language learning using a variety of architectures. Work also was done on modeling developmental transition mechanisms with ACT-R. This offers the possibility of unifying learning and development. Perhaps the best piece of work that I saw was in this area. Deb Roy had a model that showed that words could be learned faster if vision inputs were provided at the same time that textual or spoken input was provided. This is an obvious result, for how else could it be so? But the pace and existence of such a model sets a new standard for work in this area. It should be able to make some nice predictions about how to teach early language acquisition in a more real world.

There was a model by Dario Salvucci that started to reuse multiple components created for the ACT-R architecture. This type of work is particularly interesting because it starts to reap value from using a cognitive architecture.

The conference now has an established audience and several established characteristics. Attendance is slowly growing as well. There is enough mass for an invisible college to form and conduct an enormous amount of business.

While most of the papers were complete enough, the demands of presenting a model, data, and the comparison led to terse prose in spots. The schema for presenting these papers is getting more practiced, but attention will continue to be needed to how to present these pieces of work and providing enough space in proceedings to report them clearly enough that the work can be replicated and built upon.

## 2. Future of the conference

There are several meetings that are related to this conference. The closest are the annual meetings of the Cognitive Science Society, the UK's Society for the Study of AI and the Simulation of Behaviour, and the German AI Society. Yet the flavor of these meetings are different. This is partly because they are indeed meetings of particular scientific societies, and in part because cognitive science and AI (as viewed by these societies) are broader fields, of which cognitive modeling is seen as just a small part. What makes this conference distinctive is the emphasis on the presentation of both an implemented model and its comparison against empirical data and on keeping a reasonable balance between the two. Coordinating this meeting with others will remain an ongoing topic of discussion. The next conference (<http://hfac.gmu.edu/iccm>) will be held at George Mason University, 26–28 July 2001. Wayne Gray ([gray@gmu.edu](mailto:gray@gmu.edu)) will be chair.

These matters and the future of cognitive modeling were discussed at a plenary session at the end of the conference. To judge from the papers and spirit at this conference, cognitive modeling is healthy and expanding.