

# Report on the 35th Annual Cognitive Science Conference

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■ *CogSci 2013, the 35th annual meeting of the Cognitive Science Society and the first to take place in Germany, was held from 31 July to 3 August. Cognitive scientists with varied backgrounds gathered in Berlin to report on and discuss expanding lines of research, spanning multiple fields but striving in one direction: to understand cognition with all its properties and peculiarities. A rich program featuring keynotes, symposia, workshops, and tutorials, along with regular oral and poster sessions, offered the attendees a vivid and exciting overview of where the discipline is going while serving as a fertile forum of interdisciplinary discussion and exchange. This report attempts to point out why this should matter to artificial intelligence as a whole.*

The 35th annual cognitive science conference took place at Humboldt University in Berlin, Germany. Although the conference has been the major international venue for cognitive science research for a long time, appealing to all seven discipline pillars — anthropology, artificial intelligence, education, linguistics, neuroscience, philosophy, and psychology — this year's edition topped every past meeting in terms of number of participants. An impressive figure of more than 1000 accepted contributions, divided among oral presentations (274), posters (685), symposia, workshops, and tutorials, could be accommodated in the program only by increasing the number of parallel sessions to 11 and enlarging the three poster sessions. Despite the large number of more than 1300 attendees, it was still possible to hold the conference at the university's historical building on Unter den Linden, right in the ever-modernizing heart of Germany's capital. Humboldt University used to be the most important university in East Germany, and in many corners the visitor was reminded of its excellent fellows, from Fichte and Hegel to Helmholtz, Einstein, and Planck. In this inspiring context attendees were welcomed from nearly 50 countries, the most conspicuous contingents coming from Europe (40 percent) and the USA (30 percent).

The four German chairs, Markus Knauff, Michael Pauen, Natalie Sebanz, and Ipke Wachsmuth, with the help of the organizing and program committees, successfully managed both the deluge of submissions and the logistically challenging scheduling of the multiple thematic sessions, while allowing a great variety of topics to be represented and discussed from the different disciplines' perspectives.

## Program Highlights

The conference topic for 2013 was cooperative minds: social interaction and group dynamics, supporting the spreading vision of the continuity of mind (in Michael Spivey's terms) from perception and action to language and shared cognition. The five invited plenary presentations touched this theme, each one settled in a different context.

On the neuroscientific side, John Duncan (recipient of the Heineken Prize) presented some results on how the brain works in assembling cognitive episodes by means of fluid intelligence, while the developmental psychologist Elisabeth Spelke talked about core social cognition.

Of greater direct interest to the AI community probably were the other three talks. Cynthia Breazeal, champion of sociable robots, presented some guiding principles for achieving cooperative machines, capable of interacting both with people and other agents. Breazeal stressed that it seems critical in this respect that robots be endowed with a theory of mind that can represent the behaviour and the internal workings of the self and of other partners.

On similar lines, the philosopher of action — and notably the author of the belief desire intention model — Michael Bratman elaborated on the nature of shared agency and in particular on how we approach cooperative planning, based on both reciprocal intentions and expectations.

Linda Smith was the 2013 recipient of the Rumelhart Prize for Contributions to the Theoretical Foundations of Human Cognition. Her lecture showed how a developmental approach to cognitive science allows to establish and investigate the links between perception, body control, and word learning during sensory-motor exploration for object learning in shared attention scenarios. Such themes are not only critical for understanding cognitive development, but certainly also for making progress in developmental robotics and bio-inspired approaches to learning eye-hand coordination in artificial systems.

As to the regular sessions, the program proceeded as follows. On the first

day, Wednesday, half or whole day tutorials and workshops took place. Nine tutorials provided methodological and in some cases hands-on introductions to state-of-the-art techniques, many of them aimed at facilitating the cross-field interaction of computer and cognitive scientists with the goal of improving modeling capabilities. To this category can be ascribed, for example, the tutorials on Computational Complexity Analysis for Cognitive Scientists, Dynamic Field Theory, Quantum Probability, and the SPAUN spiking neuron architecture to model cognition,

Nine workshops were held, in particular featuring embodied interpersonal coordination for humans and agents, mental model ascription by agents, and integrative models of human cognition, among others.

On Thursday the conference officially was opened. The Marr prize for the best student paper was given to N. Dorfman (first student author of a paper with D. Harari and S. Ullman), while Computational Modeling prizes were awarded for the categories Perception/Action (to G. Layher, M. Giese, and H. Neumann), Language (to R. Richie, C. Yang, and M. Coppola), and Higher-Level Cognition (to J. V. McDonnell, P. Tsividis, and B. Rehder) and Applied Cognition (to M. Khajah, R. Lindsey, and M. Mozer). The Cognitive Science Society and the Glushko-Samuelson Foundation also awarded five dissertation prizes to young researchers in cognitive science.

Thursday, Friday, and Saturday the schedule consisted of invited symposia sessions (on Joint Action, Language and Gesture Evolution, and New Frameworks of Rationality) in the morning, followed by parallel contributed symposia, while regular talk sessions mostly took place in the afternoon. Poster sessions were held nearby at Maritim proArte Hotel Berlin, which showcased more than 200 posters each day in a huge banquet hall, allowing attendees to take a walk along the poster aisles while enjoying the lunch buffet.

The thematic sessions offered insights in virtually any niche of cognitive science — many with strong appeal also to the artificial intelligence

community. Four sessions on cognitive modeling showed how the modeling approach may be one of the most prominent and fertile fields in cognitive science and probably the one most beneficial to both computer scientists and neuro and behavioural scientists alike, for assessing cognitive theories, predicting behavioral and cognitive traits, and implementing cognitive mechanisms. Neural networks, Bayesian and quantum probability models, Act-R, and hidden Markov models were some of the approaches proposed for a wealth of cognitive processes. Reasoning as a core cognitive function was tackled in three sessions, while as many dealt with decision making, language acquisition, induction, concept acquisition, and learning. Two spatial cognition sessions presented new results on navigation, spatial information representation, and verbalization.

## Outlook

At the Rumelhart reception on Friday evening in the courtyard of the main building, the winner of next year's prize was publicly announced. Ray Jackendoff, prominently known for his work on generative and cognitive linguistics and in musical cognition, will be giving the Rumelhart Lecture at CogSci 2014, which will be held in Québec City, Canada, conveniently colocated with the AAAI conference. Next year's special theme will be "cognitive science meets artificial intelligence: human and artificial agents in interactive contexts."

The wide spectrum of themes and the important implications for the evolution of cognitive artificial systems make this conference an inspiring venue for anyone interested in understanding cognition and human intelligence.

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