Workshop Proposal: PRE-CogSci 2013 – Bridging the gap between cognitive and computational approaches to reference

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Outline

This full-day workshop explores the *Production of Referring Expressions* (PRE) from different perspectives. It follows two earlier workshops on the same theme, which were associated with two earlier CogSci conferences. The first of these, PRE-CogSci 2009, focussed on the interplay between computational and empirical methods.[1] The second, PRE-CogSci 2011, broadened this theme to include work on dialogue and linguistic theory.[2] Both events were highly successful, with each containing over 20 presentations and an audience of over 60 participants. Following the first workshop, the *Topics in Cognitive Science* journal published an issue containing 8 peer-reviewed articles selected from 28 full paper submissions (Krahmer et al. 2012). Following the second workshop, we are finalising a Special Issue of the journal *Language and Cognitive Processes*; accepted papers are expected to appear in 2013-14. A survey of research, by 2 of the organisers, on the generation of referring expressions that came out in the journal *Computational Linguistics* in March 2012 has since been downloaded over 700 times.

This third PRE workshop is part of CogSci 2013. It will be different from its predecessors in two ways. Firstly, a range of new intellectual themes will be explored that have emerged in recent years. Second, the workshop will be coupled with a satellite event, which will be separately funded, and which will be devoted to the role of reference in practical applications. We expand on these issues below.

Workshop overview

Interest and significance As the earlier workshops demonstrated, there is abundant scope for cross-disciplinary research on reference. Recent advances (see below) have caused the interest in PRE-CogSci 2013 to increase further.

Importance The boundaries between the different disciplines working on reference are starting to shift, with computational methods (e.g., stochastic and Bayesian methods; ACT-R) permeating theoretical and experimental work. Increased collaboration between computational linguists and psycholinguists is bound to be mutually beneficial: computational work will benefit from a greater awareness of psycholinguistic methods and findings; psycholinguistic models (which often underdetermine the phenomena) have the potential to benefit from precise and explicit algorithmic models. The importance of this cross-disciplinary collaboration has been acknowledged though the award of two recent projects, namely the (Dutch) NWO-VICI project *Bridging the gap between psycholinguistics and computational linguistics: the case of Referring Expressions* (Krahmer, 2009 – 2013), and the (British) EPSRC project REFNET *An Interdisciplinary Network Focussing on Reference*, (Bard and van Deemter, 2012-2015). Four new themes have recently emerged in this area, which will be explored during the workshop:

- **Collaborative reference.** Referring expressions are often produced collaboratively, as when one speaker says "The hill just north of us" and the other adds "You mean with the tower on top?" We believe the time has come to address collaborative reference using the combination of computational and empirical methods that have become mainstream in the study of reference. Research that takes off from a view of language as a social and collaborative phenomenon has the potential to shift the goal of production models away from the aim of identifying a referent uniquely towards effective communication.
- **Nondeterminism in production.** Evidence suggests that a given speaker, confronted with a given situation, will not always produce the same utterance (just like a marksman doesn't always hit the same area of a target). Recent models have started to model algorithmically what variation is found in the production of referring expressions.
- **Interaction between comprehension and production.** Work on comprehension (i.e., interpretation) and production (i.e., generation) has typically proceeded separately. Recent work on reference, however, has started to study comprehension and production jointly, seeking to exploit their common mechanisms and discover their differences.
- **Combinations with research on vision.** Recently, researchers in Natural Language Generation and researchers in Computer Vision have joined forces (e.g., EPSRC's *Vision & Language Net* in the UK, Belz and Makris 2010-2013) for example to allow computers to describe a picture and refer to objects in it. This has raised new questions concerning the way in which visual information is represented in the human brain, and how this may be modelled computationally.

Relevance to CogSci 2013 Apart from its relevance to language comprehension and production, the workshop's focus on *collaborative* reference – in which a sequence of actions by two or more agents achieves an effect that none of them might have achieved on her own – will make it directly relevant to the modelling of social interaction. Our satellite event (see below) will lend further emphasis to social aspects of reference, focussing on real-life situations.

[1] See `http://pre2009.uvt.nl/` for the website and proceedings of the first workshop.

[2] See `http://pre2011.uvt.nl/` for the website and proceedings of the second workshop.

Suitability of organisers Apart from their success in organising the first two PRE-CogSci workshops, the organisers are leading researchers in the field of reference, and their backgrounds range from psycholinguistics to theoretical and applied computing science.

Proposed format and funding For the main event, we envisage a full-day workshop, consisting of two half-sessions, each starting with an address by a keynote speaker. We envisage 8-10 oral presentations and a poster session. Travel expenses of the keynote speakers will be split between the above-mentioned projects NWO-VICI and EPSRC-REFNET.

As a satellite, probably on the day before the workshop, we envisage a Cross-pollination meeting in which researchers will interact with practitioners in Human-Computer Interaction, Robotics, and Geographical Information Systems, to discuss challenges involving reference that come from real applications. The satellite event will not be part of the workshop and will be financed by the RefNet project (see above), but we expect the two events to dovetail well, thus adding to the number of people likely to want to come to CogSci.

Likely audience and attendees The workshop will be of interest to a variety of cognitive scientists, including psycholinguists with an interest in computational modelling; computational linguists with an interest in experimental methods; and a limited number of others who will be attracted to the event because of the (satellite) Cross-pollination event; these will probably include a number of representatives from industry. Based on the experience of the first two editions of the workshop, we expect 50-70 participants.

Two keynote speakers have agreed to speak at the workshop: Professor Herb Clark, and Dr Noah Goodman. Professor Clark (Stanford) is a psycholinguist whose longstanding experimental work on reference has been more influential than anyone else's; his work has often stressed collaboration and other social aspects of communication. Dr Goodman (MIT, then Stanford) works in a new area where computer science overlaps with psychology; he has done extensive work in concept learning and has recently turned his attention to the modelling of reference using stochastic algorithms, integrating models of interpretation with models of production. Both speakers' work is highly relevant to the workshop. (See the themes mentioned under the header Importance.) In addition, the following people have agreed to form part of the programme committee:

- Mira Ariel, Tel Aviv University, Israel;
- Jennifer Arnold, University of North Carolina, USA;
- Adrian Bangerter, Univ. of Neuchâtel, Switzerland;
- Dale Barr, University of Glasgow, UK;
- Eva Belke, Ruhr-University Bochum, Germany;
- Holly Branigan, University of Edinburgh, UK;
- Susan Brennan, Stony Brook University, USA;
- Sarah Brown-Schmidt, Univ. Illinois, Urbana-Champaign
- Herb Clark, Stanford University, USA;
- Victor Ferreira, University of California, USA;
- Jeanette Gundel, University of Minnesota, USA;
- Martijn Goudbeek, Tilburg University, The Netherlands;
- Markus Guhe, University of Edinburgh, UK;
- Daphna Heller, University of Toronto, Canada;
- John Kelleher, Dublin Institute of Technology, Ireland;
- Frank Keller, University of Edinburgh, UK;
- Ralf Klabunde, Ruhr University Bochum, Germany;
- Danielle Matthews, University of Sheffield, UK;
- Margaret Mitchell, Johns Hopkins University, USA;
- Paul Piwek, Open University, UK;
- Massimo Poesio, University of Trento, Italy;
- Ehud Reiter, University of Aberdeen, UK;
- Amanda Stent, AT&T Labs and Stony Brook Univ., USA;
- Matthew Stone, Rutgers University, USA;
- Takenobu Tokunaga, Tokyo Inst. of Technology, Japan;
- Mariët Theune, Twente University, Netherlands.

Publicity and impact A dedicated website, `http://pre2013.uvt.nl/`, links to the sites of the previous editions of PRE-CogSci, and will (eventually) contain the electronic workshop proceedings, in the form of extended abstracts. The workshop has been advertised on several emailing lists in experimental psychology, computational linguistics and theoretical linguistics. As in the case of the previous two workshops, we envisage a special issue in an appropriate scholarly journal.

List of Requirements The only requirements are a data projector and computer, preferably with internet connection.

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References

Krahmer, Van Gompel, Gatt and Van Deemter (2012). Topic "Bridging the Gap between Computational and Empirical Approaches to Reference", *TopiCS in Cognitive Science* **4** (2), pp.165-329. (Contains 8 peer-reviewed articles.)

[3] `http://homepages.abdn.ac.uk/k.vdeemter/pages/`
[4] `http://staff.um.edu.mt/albert.gatt/`
[5] `http://www.lel.ed.ac.uk/~ellen/`
[6] `http://www.dundee.ac.uk/psychology/rpgvangompel/`
[7] `http://www.emielkrahmer.nl/`