

Production of Referring Expressions (PRE-CogSci) 2009: Bridging the gap between computational and empirical approaches to reference

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Outline

How do speakers refer to entities? This question has been addressed by both psycholinguists and computational linguists. A *referring expression* is typically defined as one which is produced in order to *identify* an object or set of objects for a listener or reader, in a relevant domain of discourse. In spite of several decades of research on the topic, our understanding of it is still incomplete, in part due to a lack of communication between psycholinguists and computational linguists, a remarkable state of affairs given the substantial overlap in the topics that these practitioners have investigated. Among these topics, the following have stood out in recent years:

Over- and underspecification: Why and how do speakers overspecify when they produce referring expressions? Under what conditions do they underspecify?

Constraints on form: When are which types of reference (pronouns, descriptions, etc.) most appropriate?

Interactivity: To what extent is there evidence of audience design and/or alignment? In what ways do speakers collaborate when referring?

Shared vs. private information: How do speakers manage information in the common ground, as compared to private information. To what extent do speakers evince cooperative behaviour and negotiation?

Multimodality: What is the relationship between spoken reference and gestures such as pointing?

Visual scene perception: Does the way in which humans perceive and process visual information have an impact on how they refer to objects in visual scenes?

Data collection/evaluation: How should computational models of reference generation be evaluated against data? How should adequate data be obtained?

Vagueness: Do referring expressions containing vague (e.g. gradable) properties work in the same way as those which do not?

Sets: Is the process of referring to a *set* of objects qualitatively different from that of referring to a single object?

These topics have been addressed in the computational and psycholinguistic literature, with important contributions from theoretical linguists, especially those with an interest in discourse structure, and in cognitively grounded models of human language. However, practitioners in one field are often insufficiently aware of work in the other. We argue that the time is ripe to bridge the gap between these disciplines. Psycholinguistics offers important insights into the cognitive mechanisms underlying the production of referring expressions, through carefully controlled experiments. Computational linguistics has a well-established approach involving corpus analysis and computational modeling. The goal of this workshop is to foster greater understanding and collaboration between psycholinguists, computational linguists, and researchers in related fields, by making research results available and accessible to both.

The computational perspective

In computational linguistics, the production of referring expressions is studied in the subfield known as Natural Language Generation (NLG) (Dale & Reiter, 1995; Krahmer, van Erk, & Verleg, 2003; van Deemter, 2006). The focus is usually on generating a distinguishing description of a target object, by singling it out from the other objects. NLG researchers have proposed different interpretations of what makes a referring expression optimal, a popular one being that references should contain just enough information to identify the target, in line with Grice's Maxim of Quantity ('only be as informative as necessary'). However, there is a growing awareness that the descriptions produced by these algorithms are rather different from the ones produced by human speakers (Krahmer & van der Sluis, 2003). As a result, there has been a growing interest in empirical methods to evaluate different computational models against human-produced data using corpus-based and experimental methods (Gatt, van der Sluis, & van Deemter, 2007; Gatt & Belz, 2008; Viethen & Dale, 2008). Such work would benefit greatly from more interaction with members of the psycholin-

guistic community.

The human perspective

One current debate in psycholinguistics concerns the extent to which speakers are collaborative and take the addressee into account (Brennan & Clark, 1996; Metzging & Brennan, 2003) or whether their capacity for this is limited (Horton & Keysar, 1996; Keysar, Lin, & Barr, 2003). The former view is compatible with Clark's *language-as-action* perspective (Clark, 1996), while the view that speakers are egocentric is more consistent with the idea that discourse production involves automatic alignment of situational representations between the speaker and the addressee (Pickering & Garrod, 2004). Related to the question of cooperativeness is the question of whether speakers avoid referential ambiguity. While research shows that they usually do (Sedivy, 2003), questions are raised as to how they do this (Brown-Schmidt & Tanenhaus, 2006) and why, in particular instances, they fail to do so (Engelhardt, Bailey, & Ferreira, 2006; Ferreira, Slevc, & Rogers, 2005). Another open question is why human speakers sometimes produce overspecified expressions rather than unambiguous minimal expressions that conform to Gricean principles (Maes, Arts, & Noordman, 2004; Engelhardt et al., 2006).

Other research has focused on the influence of discourse on speakers' choice of referring expressions (Arnold, 2001; Ariel, 2001). This research has raised the question of whether the same linguistic factors affect *what* speakers refer to and *how* they refer. Finally, recent work has started to explore the link between language production and perception and action (Roy, 2005).

The potential for collaboration

Many psycholinguistic models rely on intuitive but complex notions such as *audience design* and *alignment*. A common criticism is that they would greatly benefit from 'explicit computational modeling' (Brown-Schmidt & Tanenhaus, 2004), precisely what the computational perspective has to offer. A workshop bringing these communities together therefore seems both timely and interesting. Further information about the workshop can be obtained from the following URL: <http://pre2009.uvt.nl/>

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