

Pointing and reference reconsidered

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Abstract

Current semantic theory on indexical expressions claims that demonstratively used indexicals such as *this* lack a referent-determining meaning but instead rely on an accompanying demonstration act like a pointing gesture. While this view allows to set up a sound logic of demonstratives, the direct-referential role assigned to pointing gestures has never been scrutinized thoroughly in semantics or pragmatics. We investigate the semantics and pragmatics of co-verbal pointing from a foundational perspective combining experiments, statistical investigation, computer simulation and theoretical modeling techniques in a novel manner. We evaluate various referential hypotheses with a corpus of object identification games set up in experiments in which body movement tracking techniques have been extensively used to generate precise pointing measurements. Statistical investigation and computer simulations show that especially distal areas in the pointing domain falsify the semantic direct-referential hypotheses concerning pointing gestures. As an alternative, we propose that reference involving pointing rests on a default inference which we specify using the empirical data. These results raise numerous problems for classical semantics–pragmatics interfaces: we argue for pre-semantic pragmatics in order to account for inferential reference in addition to classical post-semantic Gricean pragmatics.

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1. Introduction

The collection of essays on pointing edited by Kita (2003) reveals how complex the interaction of pointing and speech in different contexts of use is. The prototypical pointing gesture, at least in Western cultures, is a bodily behavior which is constituted by an outstretched index finger of one hand. If not stated otherwise, this is also the standard form of pointing we assume throughout this article, although we are aware that there are many ways to perform a pointing act (see for instance Enfield, 2001; Cooperrider and Núñez, 2012). In general, any extended body part or artifact will do the job.

An in-depth reading of the contributions in Kita (2003) shows that little is known about the exact interaction of the pointing gesture with the semantics and pragmatics of the speech it accompanies. It is thus apparent that there is a foundational problem here to be dealt with. Various research traditions (see below) tie pointing closely to reference; hence one might be led to think that unifying pointing and reference research provides a solution to the problem. However, new things are happening in reference research at present, as Herbert Clark and Adrian Bangarter make clear: the assumptions underlying research on reference change, if evidence “from the armchair, laboratory and field” (Clark and Bangarter, 2004:29) is considered. We investigate pointing from the armchair, laboratory and field here. The laboratory and field data we use come

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from experiments and corpus investigations as well as from computer simulation. These will be confronted with the tradition of philosophizing on pointing and reference, and here too, a wealth of new findings is to be considered. This is especially due to the discussion of the semantics–pragmatics interface starting with Relevance Theory, minimalism, and truth-conditional pragmatics (Recanati, 2004a,b). Thus, our investigation is in the spirit of a methodological framework that can be labeled “experimental semantics and pragmatics”. We derive hypotheses from philosophical reasoning about reference and make them an object of empirical falsification. The result of the experimental evaluation is then tied back to theories of grammar. This article, therefore, is in particular of relevance for readers with a background in formal linguistics and analytical philosophy of language as well as for readers with an interest in empirical, methodological approaches to language and its use.

In section 2, we start with a short discussion of pointing from the point of view of various Cognitive Sciences. Based on these results, we then specify semantic and pragmatic hypotheses concerning pointing and reference to be investigated in section 3 in an empirical study which is based on an innovative method relying on motion capturing technology. In section 4, we focus on the empirical study, describing setting, subjects, the annotation techniques and the associated reliability measures. The results of the study are then presented in section 5 where we argue against the semantic hypotheses concerning pointing and reference and opt for pragmatic ones. The discussion is based on various styles of operationalizing the semantic and pragmatic hypotheses involved, above all on the notion of *pointing cone* (cf. Kranstedt et al., 2006a,b,c). In section 6, we discuss the impact of our findings concerning pointing and reference in complex demonstratives for a theory of grammar, especially for its semantics–pragmatics interface. Here, we argue for a revision of classical semantic–pragmatic interfaces extending them with a pre-semantic pragmatics. The next-to-last section (section 7) deals with semantic–pragmatic interfaces that incorporate a non-classic setup from the outset. We pinpoint mere stipulations in Relevance Theory and Situation Semantics and specify how they could be enriched with a mechanism for fixing the situation talked about by plugging in our empirically driven pointing model. Finally, we summarize the argument developed throughout the article in section 8.

2. Cognitive science views on pointing

Linguists claim that pointing is tied up with reference especially with regard to demonstrative pronouns and definite descriptions (Lyons, 1977; Levinson, 1983; Chierchia and McConnell-Ginet, 2000; Haviland, 2000). However, in formal linguistics the relation, if any, between pointings and words used is not investigated in great detail. The relation has been subject to much thought in philosophy, though. We want to emphasize that we cannot attempt to do justice here to the pointing and reference discussion as it has been carried out in philosophy since the Pre-Socratics. Instead, we concentrate on analytical philosophers who relate pointing to semantics, especially to the notion of reference and do so in the most rigid sense possible, e.g. using the tools of modern model theory. As soon will become clear below, this is needed in order to establish the hypotheses for our experimental studies which depend on a strictly defined relation between verbal token and object designated: Peirce (1965) and Wittgenstein (Anscombe and von Wright, 1969) consider pointing as part of the indexical symbol; for a similar point of view see Quine (1960). In the following, we refer to the authors Peirce, Wittgenstein, and Quine as PWQ. Finally, we will rely on the early Wittgenstein, Davidson (1967) and Kaplan (1989a) in order to establish hypotheses which in turn can be tested in our experiments.

At present, three general stances towards (complex) demonstrations show up:

- Farthest away from PWQ is the intentionalism of Kaplan's late work (Kaplan, 1989a). There, demonstration is seen as a mere externalization of intention. While neo-PWQ methodologies exist (see McGinn (1981), an early proponent of the idea that pointing is tied to a vector), there is no neo-PWQian attempt to frame pointings explicitly into some representational format, providing an explicit semantics for them. We observe positions in-between neo-PWQ and pure intentionalism, stressing the contribution of intention and of demonstration for demonstrative reference (Kaplan, 1989b; Braun, 1996, 1994).
- In the Cognitive Sciences, including psychology, research on pointing is frequently related to Kendon's (Kendon, 2000, 2004; Kendon and Versante, 2003) and McNeill's (McNeill, 1992, 2000) work. Extending the pointing notion, McNeill distinguishes pointing into abstract from pointing into concrete domains, defending the thesis that gesture and speech are conceived of as one process, causally linked to one 'growth point'. The 'one process issue' has been investigated in variants of Levelt's model of speech production (Levelt, 1989), for example in work by de Ruiter (2000) or Krauss et al. (2000). Coming from the psychology of social interaction, Clark treats pointing as information on a separate dialog tier (Clark, 1996) and, along with placing, as an attention getter in Clark (2003).
- A research line which has similarities with the one presented below was delineated in Bangerter (2004) and in Bangerter and Oppenheimer (2006), where the detection bias of subjects' pointings was investigated. Clark's attention-centered research on pointing and reference and Bangerter's results on pointing precision and pointing success were brought together in Clark and Bangerter (2004), a paper which unifies attentional and referential research lines concerning pointing.

We draw on all these traditions except on pure intentionalism.

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