Intensionality in sentence processing and anaphora resolution

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Backgrounds and aims

Intensional contexts are known to arise with clausal complements embedded under verbs of *propositional attitude* like *believe, know, think, fear, etc.* In these constructions: (a) substitution of coreferential terms potentially compromises the truth value of a sentence (*substitution failure*); (b) the normal existential commitments of referring expressions in the clausal complementation are suspended (*lack of existential import*); and (c) quantified noun phrases (NPs) in the clausal complementation may be ambiguous between unspecific (non-referential) vs. specific (referential) readings. The semantics of direct objects of transitive verbs does not suffer from (a), (b), and (c), and thus it is typically extensional. Such correlation between syntax and semantics, however, seems to be violated with so-called *Intensional Transitive Verbs* (e.g. *want*, *need*, and *seek*), which show superficial transitive syntax coupled with an intensional semantics.

Currently, there are four main proposals to account for the semantic nature of *Intensional Transitive Verbs*: 1) the propositional analysis (Quine, 1960); 2) the clausal analysis (Larson et al 1997, Larson, 2002); 3) the property analysis (Zimmerman, 1993; Van Geenhoven & McNally, 2005); 4) the type-coercion analysis (Pustejovsky, 1995). The four proposals tend to converge on the claim that intensional transitive constructions require richer semantic and/or syntactic representations than the extensional ones. Such representations make sentences such as *X wants Y* equivalent to *X wants [to have] Y*, or *X seeks Y* equivalent to *X tries [to find] Y*. The present study investigates the psychological reality of this claim.

Intensional verbs have been exploited for methodological purposes in psycholinguistic studies on inference generation and reference assignment (e.g. Haviland & Clark, 1974, Experiment 2; Dwivedi et al. 2006). However, they have never been investigated as an autonomous subject of research. Thus, the processes underlying the comprehension of intensional phenomena in language are virtually unknown. The aim of the present study was to plug this gap by investigating the on-line processing of intensional transitive constructions during reading and the way in which they may affect subsequent referential processes.

Method

Three experiments employing the eye-tracking technique will be presented. In the experiments, participants read sentence pairs such as those illustrated below (the average length and frequency of extensional verbs and intensional verbs were controlled):

1) John [drank/wanted] a beer after the walk. The beer was warm. (Experiment 1)
2) John [drank/wanted] a beer [after the walk/that was in his refrigerator]. The beer was warm. (Experiment 2)
3) John [wanted/wanted to drink] a beer after the walk. The beer was warm.

The aim of the first two experiments was to ascertain: (a) whether intensional transitive constructions (*wanted a beer*) are more costly to process than the extensional ones (*drank a beer*), and (b) which strategies readers exploit in order to assign a referent to the anaphoric definite NP at the beginning of the second sentence in each pair (*the beer*). In particular, do readers draw a bridging inference in order to infer the antecedent for the anaphoric expression (Haviland & Clark, 1974) or do they (re)analyze the potential antecedent (*a beer*) as specific (referential) in order to resolve the anaphoric expression on it (Dwivedi et al, 2006)?
The aim of the third experiment was to ascertain whether intensional transitive constructions (*wanted a beer*) elicit a processing cost with respect to their intensional intransitive counterparts (*wanted to drink a beer*).

Results and conclusions

Reading times data produced robust evidence that intensional transitive constructions require additional processing compared to the extensional ones, as demonstrated by longer reading times on intensional verbs and objects than on the extensional ones (Experiments 1 and 2). In Experiment 3, longer reading times on indefinite NPs in direct object position strongly support the claim that intensional transitive constructions require a richer semantic and/or syntactic representation than the intransitive ones. Finally, data on the second sentence in each pair did not produce any clear evidence either for bridging processes aimed at inferring a referent for the anaphoric definite NP, contrary to Haviland & Clark's (1974) findings, or for a reanalysis of the potential antecedent as specific (or referential), contrary to Dwivedi et al. (2006) findings. In fact, both in Experiment 1 and in Experiment 2 there were no significant differences in the reading time patterns on the second sentence across conditions. Thus, it seems that participants did not attempt to connect the intensional sentence pairs in a coherent text representation.
The cognitive processes underlying the comprehension of intensional constructions will be discussed in reference both to the already mentioned theoretical accounts of *Intensional Transitive Verbs* and to models of discourse comprehension relying on the notion of *standards of coherence*.

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