

Resolving null and overt pronouns in Italian: An experimental investigation of syntax-semantics interactions

Anaphoric forms vary in their referential biases (e.g. Gundel et al.'93). In Italian, according to Carminati'02's syntactic approach, *null pronouns* refer to preverbal subjects, and *overt pronouns* to antecedents in other syntactic positions (e.g. objects). However, this may be an oversimplification (Serratrice'07); a growing body of work suggests that verb semantics and coherence relations play a key role (e.g. Kehler et al.'08). Crucially, much of the work on semantic effects has focused on English. It is not yet fully understood to *what extent different pronominal forms in languages with richer anaphoric paradigms are influenced by semantic factors*. We tested this for Italian. We conducted two written sentence-continuation studies manipulating **pronoun form** (null/overt) and **verb bias** (using NP1 and NP2 implicit causality verbs, well-known to show subject and object biases respectively in because-continuations, e.g. Garvey/Caramazza'74, Hartshorne/Snedeker'12).

In Exp1 (n=36), *perché* ('because') connected two clauses (ex.1). Exp2 (n=30) used the same stimuli, separated into two sentences, with no connective (ex.2). (*Avere* 'have' was used to signal presence of null pro.) Participants' continuations were analyzed to see if they are guided by *verb semantics* (NP1 verb=>sub, NP2 verb=>obj) or *syntactic biases* of pronominal forms (null=>sub, overt=>obj), or both.

EXP1 ('because'): As expected, nulls show a stronger subject preference than overts ($p's < .05$). Crucially, both show a *verb effect*: **NP1 verbs** elicited mostly subject continuations with both null and overt pronouns (null: 85% sub, 11% obj; overt: 67% sub, 20% obj; $p's < .05$); **NP2 verbs** elicited mostly object continuations with both (null: 34% sub, 60% obj; overt: 23% sub, 66% obj, $p's < .05$). Although the verb effect is stronger with overts (formXverb interaction), it is significant for both forms. Thus, contrary to the common view that nulls refer to subjects and overts to non-subjects, we find that *once verb semantics are taken into account, nulls can refer to objects and overts to subjects*. Furthermore, the semantic effects are stronger with overts than nulls (cf. form-specific approach; Kaiser/Trueswell'08).

EXP2 (two sentences): Exp2 tested if the verb effect holds across sentences. Miltsakaki'02 claims verb-semantic effects are weaker across sentences: She claims verb effects arise with subordinate clauses because these are not independent processing units, unlike sentences. Exp2 tested this. To be comparable to Exp1 with 'because', we report here only continuations with 'explanation' relations (the most frequent). Unlike Exp1, null and overt pattern asymmetrically: Nulls overwhelmingly elicit *subject continuations*, regardless of verb (NP1: 90%; NP2: 71%). However, overts flip from object to subject based on verb bias, like Exp1: NP1 verbs elicit more subject continuations (63%); NP2 verbs more object continuations (63%; $p's < .05$). There is a significant effect of 'experiment' (Exp1vs2) for null but not overt: The verb effect from Exp1 persists for overts but weakens for nulls in Exp2.

Our results suggest prior characterizations of null vs. overt pronouns are insufficient, and neither a purely form-based/syntax-oriented approach nor a purely verb-semantics-based approach is enough. We argue for an alternative approach that can capture effects of verb semantics and discourse structure for different types of referring expressions.

Examples:

(1a) *Lo studente ha deluso_{NP1} / criticato_{NP2} lo chef perché lui ha...*
The student has disappointed/criticized the chef because he has....

'The student has disappointed_{NP1} / criticized_{NP2} the chef because he has...' [overt]

(1b) *Lo studente ha deluso_{NP1} / criticato_{NP2} lo chef perché ha...*
The student has disappointed/criticized the chef because has....

'The student has disappointed_{NP1} / criticized_{NP2} the chef because has...' [null]

(2a) *Lo studente ha deluso_{NP1} / criticato_{NP2} lo chef. Lui ha...*
The student has disappointed/criticized the chef. He has....

'The student has disappointed_{NP1} / criticized_{NP2} the chef. He has...' [overt]

(2b) *Lo studente ha deluso_{NP1} / criticato_{NP2} lo chef. Ha...*
The student has disappointed/criticized the chef. Has....

'The student has disappointed_{NP1} / criticized_{NP2} the chef. Has...' [null]

References:

Carminati, Maria Nella. (2002). The Processing of Italian Subject Pronouns. Ph.D. dissertation, University of Massachusetts, Amherst.

Garvey, C., & Caramazza, A. (1974). Implicit causality in verbs. *Linguistic Inquiry*, 5, 459-464

Gundel, Jeanette, Hedberg, Nancy, and Zacharski, Ron. (1993). Cognitive Status and the Form of Referring Expressions in Discourse. *Language*, 69, 274-307.

Hartshorne, Joshua K. & Jesse Snedeker. (2013). Verb argument structure predicts implicit causality: The advantages of finer-grained semantics. *Language and Cognitive Processes*, 28(10), 1474-1508.

Kaiser, Elsi, and Trueswell, John, C. (2008). Interpreting Pronouns and Demonstrative in Finnish: Evidence for a Form-Specific Approach to Reference Resolution. *Language and Cognitive Processes*, 23, 709-748.

Kehler, Andrew, Kertz, Laura, Rohde, Hannah, and Elman, Jeffrey, L. (2008). Coherence and Coreference Revisited. *Journal of Semantics*, 25, 1-44.

Miltsakaki, Eleni. (2002). Toward an Aposynthesis of Topic Continuity and Intrasentential Anaphora. *Computational Linguistics*, 28, 319-355.

Serratrice, Ludovica. (2007). Cross-Linguistic Influence in the Interpretation of Anaphoric and Cataphoric Pronouns in English-Italian Bilingual Children. *Bilingualism: Language & Cognition*, 10, 225-238.