Deterministic mapping and the nature of dependencies: an interface account of weak(er) crossover

Weak crossover challenges  The current view of crossover effects as quantifier-dependent phenomena (Chomsky 1976) raises two fundamental questions, ultimately bearing on the nature of dependencies and of the syntax/semantics mapping. Theoretically, in an optimal grammar we would expect the existence of crossover to follow from the tools for obtaining bound variable (BV) readings. But the syntactic rule of Quantifier Raising (QR) and the semantic rule of Predicate Abstraction (PA) (Heim & Kratzer 1998: p. 186) derive deviant weak crossover (WCO) structures as well as perfectly legitimate BV readings: the agrammaticality of WCO configurations is completely unexpected. The descriptive generalization that the trace/copy of the quantifier has to c-command the pronoun in order to license a BV reading of the latter remains an unjustified stipulation. This leads to a familiar question: why should semantic binding entail syntactic binding? Empirically, some fine-grained distinctions in the WCO paradigm have been shelved as a consequence of the bipartition between quantificational and referential antecedents. WCO is systematically present with quantifiers and operators moved in covert syntax (1-a) and with non-specific wh-phrases (1-b), however it can be circumvented by overtly-moved specific wh-elements (1-c) (weaker crossover) (Falco 2007). The issue arises of how to account for these fine-grained distinctions. More directly: why can overtly-moved specific wh-elements circumvent WCO?

(1)  
\[ \begin{align*}
  & \text{a. } ?^*H_i \text{ mother loves } e\text{very baby} \\
  & \text{b. } ?^*W_i \text{ho the hell do } [h_i \text{s constituents}] \text{ des}
  \text{ipe } t_i \\
  & \text{c. } ?^*W_i \text{hich famous senator do } [h_i \text{s constituents}] \text{ despise } t_i
\end{align*} \]

Specific quantifier

A new perspective on dependencies  Crossover is usually thought of as a syntactic dependency failure: for some reason, the pronoun fails to be dependent on the trace. The direction of this dependency is represented in (2) through the arrow connecting the dependent pronoun to the trace on which it depends.\(^1\)

(2)  
\[ \begin{align*}
  & ?^* \tilde{\lambda}_i \ldots [pro_i] \ldots t_i \\
\end{align*} \]

Standard perspective

I propose to look at WCO configurations from the mirror perspective: it is the Q-trace that must enter into a dependency relation with the pronoun (3). In itself this dependency is well-formed, but, in WCO configurations, it leads to a redundancy with PA, the interpretive mechanism that is at stake in these structures. The claim that the Q-trace is better conceived of as dependent on the pronoun follows naturally if we adopt semantically motivated hypotheses concerning indexing of pronouns and Q-traces. While it is sound to assume that pronouns are endowed with a referential index (cf. Elbourne 2005), Q-traces, due to their quantificational nature, are better conceived of as underspecified for such an index (under the copy-theory of movement). Therefore, technically, the insertion of an index in trace position proper to Trace Conversion (TC) rules (Fox 1999; Elbourne 2005) is quite stipulative. The index underspecification is expressed by $\emptyset$.

(3)  
\[ \begin{align*}
  & ?^* \lambda_i \ldots [pro_i] \ldots t_0 \\
\end{align*} \]

New perspective

Crossover can now be seen as a consequence of the process of index-valuation on the Q-trace, having two potential assigners: the intervening pronoun, through linking (Higginbotham 1983), and the predicate abstractor, through PA (4). Linking of the Q-trace to the local pronoun to resolve index-underspecification on the Q-trace satisfies obvious locality requirements (resolve underspecification as soon as possible), but crucially does not affect in any way the result of the successive application of a generalized version of PA, providing the same result when applied to specified or underspecified indexes. Crossover is thus a case where locality constraints interfere with optimal mapping between syntactic representations and interpretation (Delfitto & Fiorin 2009). This is the principled solution I provide to the theoretical challenge.

(4)  
\[ \begin{align*}
  & ?^* \tilde{\lambda}_i \ldots [pro_i] \ldots t_0 \\
\end{align*} \]

WCO as redundancy

The deep conceptual justification of this reversing of the pronoun/Q-trace dependency emerges from inspecting the nature of the empirical challenge.

Deterministic syntax/semantics mapping  From the point of view proposed, the possibility to escape WCO for specific wh-element reduces to the possibility of their trace/copy to be endowed with a referential index, so that the intervening WCO pronoun would not count as a potential antecedent and the redundancy causing WCO would not arise (5).

(5)  
\[ \begin{align*}
  & \checkmark \lambda_i \ldots [pro_i] \ldots t_i \\
\end{align*} \]

No redundancy

Intuitively, in a semantically motivated theory of referential indexes, there are two types of indexes. On the one hand we have the index on object-referring DPs denoting an entity; crucially in Q-phrases this index is underspecified (through a minimal adaptation of Elbourne’s (2005) system). On the other hand, following

\(^1\)Arrows legend: dotted = dependency failure; single-line = linking; dashed = $\lambda$-abstractor dependency.
Enç (1991), we may assume that an index denoting a set is present on the ‘familiar’ NP-restriction of DPs. Therefore specific Q-phrases have the following format: \([\text{DP } Q \{\text{NP}\}]_0\). It is this second NP index \(j\) that can be ‘transmitted’ to the whole DP-trace when it is a specifically overtly moved wh-element. This basic insight can be neatly captured by Rizzi’s (2001) syntactically justified representation for specific vs. non-specific chains. Consider the abstract LF configurations in (6-a) and (6-b), where traces/copies are expressed by angled brackets. According to Rizzi (2001), if the wh-phrase is specific, a chain limited to the restriction of the wh-element is formed, since the restriction alone is moved, due to its topical nature, to the relevant position in the left-periphery (6-a). Conversely, non-specific wh-phrases never form a chain that is limited to the restriction, since the latter has not to be interpreted in the left-periphery, and consequently does not move in syntax (6-b). Rizzi’s configurational definition of chains enforces a shrinking mechanism that redefines the portion of structure that counts as a trace, as illustrated in the LFs below.

(6) a. \([\text{TOP } \text{NP}]_0 \ldots [Q \{\text{NP}\}_j]_0 \ldots [\text{pro}]_0 \ldots \{[Q \{\text{NP}\}_j]_0\}\) Specific LF chain  

b. \([Q \{\text{NP}\}_j]_0 \ldots [\text{pro}]_0 \ldots \{[Q \{\text{NP}\}_j]_0\}\) Non-specific LF chain

In the specific case (6-a), the restriction coincides with the portion of structure that counts as a trace; the specificity index is no longer embedded (it qualifies as the index of a chain present in the Q-trace position), and it is thus available as an index for the whole DP (strictly local index inheritance). The index-underspecification on the Q-trace is resolved ‘in-situ’ in this case, by using the index of the NP-restriction, which is directly available in the same syntactic position as an effect of Rizzi’s shrinking. Crucially, the LF-mechanism of index-inheritance is excluded with operators moved after Spell-Out - overtly or covertly restricted quantifiers (1-a) and wh-in-situ - because the grammar does not allow successive cyclic movement in covert syntax: the restriction, if present, is frozen in the DP it belongs to, after the first covert movement step (Luigi Rizzi p.c.). In any case, the insight concerning index-underspecification of Q-traces receive additional empirical support from the proposed treatment of specific wh-phrases (Delfitto & Falco 2009).

A fine-grained semantics for Q-traces

More technically, I reinterpret Enç’s (1991) index \(j\) as the same referential index, in strictly semantics terms, that Elbourne posits for referential DPs: \(\text{THE } i \{\text{NP}\}\). It has logical type \(\langle \epsilon, t \rangle\) and gets interpreted as \(\lambda x. g(j) = x\). As emphasized above, I assume that TC is not allowed to ‘value’ the index slot: TC is defined as the minimal set of operations that is necessary for type-shifting (from type \(\langle \epsilon, t \rangle\), \(t\) to type \(\epsilon\)). We end up with the following enriched syntactic format for non-specific phrases: \(\text{THE } i \{\text{NP}\}_j\). \(j\) can be interpreted as property-like, exactly as Elbourne’s (2005) first index, used with definite descriptions, including copies of quantificational DPs. In fact, whenever a DP is interpreted specifically, the NP-restriction is redefined as being constrained by a contextually relevant implicit property. This property is what \(j\) expresses, to the effect that the restriction receives the following logical format: \(\lambda x. \text{NP}(x) \land g(j) = x\). This amounts to interpret \(\text{NP}\) by means of the usual Predicate Modification rule (Heim & Kratzer 1998: p. 95). When \(j\) is freed from its original embedded position (6-a), it qualifies as the most local potential antecedents for \(\emptyset\). This process of index-copying in-situ does not face any semantic obstacle, since \(j\), due to its logical type, can be correctly interpreted in both positions. We thus end up with \(\text{THE } j \{\text{NP}\}_j\) interpreted, within this extended Elbourne’s framework, as “the unique individual \(x\) that \(g\) assigns to \(j\) and is such that is NP and is assigned to \(j\) by \(g\)”. Elbourne’s (2005) TC is thus modified making a non-arbitrary insertion of indexes:

(7) a. \([\text{Det } \text{NP}]_j \Rightarrow [\emptyset \{\text{NP}\}]\) LF-sensitive TC - No shrinking  
b. \([\text{Det } \text{NP}]_j \Rightarrow [\text{the } j \{\text{NP}\}]\) LF-sensitive TC - Shrinking

Underspecified indexes, can lead to legitimate BV readings, under the generalized version of PA in (8): the semantics maps underspecified indexes into the same variable associated to the index created by movement and encoding \(\lambda\)-abstraction.

(8) Let \(\alpha\) be a branching node with daughters \(\beta\) and \(\gamma\), where \(\beta\) dominates only a numerical index \(i\). Then, for every variable assignment \(a\), \([\alpha]^a = \lambda x. [\gamma]^a[\beta]^{i=x/0}\). Generalized PA

Conclusions

The overall result is that a fine-grained theory of index-underspecification and underspecification resolution yields a new perspective on pronominal anaphora and WCO, by means of a natural adaptation of Elbourne’s view of referential indexes. More particularly, a theoretically principled and empirically adequate account of WCO is shown to follow from conflicting requirements on local index-resolution and economy of interpretation at the interface.

References