Indefinites, Choice Functions, and Discourse Anaphora

Jonathan Brennan, New York University

Choice functions are a widely accepted tool used to explain the scope properties of indefinite expressions (Reinhart, 1997; Kratzer, 1998; Winter, 2004, a.o.). Strikingly, however, this literature has not given much attention to the well known fact that indefinite expressions support discourse anaphora. This paper fills this gap using insights from von Heusinger (2004) and Elbourne (2005) to account for both the scope of indefinites and their interaction with anaphora.

The Problem: Indefinites can take wide scope out of syntactic islands (1). In recent work, such "exceptional" scope is captured using a *choice function* (CF), i.e. a function which maps an set onto an arbitrary individual within that set, which may be bound at an arbitrary distance from the indefinite NP (2) (Reinhart, 1997). In addition to exceptional scope, the example in (3) shows that an indefinite NP can be felicitously picked up by an anaphoric pronoun. If the (now standard) logical representation in (2) is on the right track, however, it is not at all clear how the pronoun connects with the same individual as the indefinite. Question 1: If the pronoun is anaphoric to the constituent *f(building)*), how do we guarantee that this f is the same f that chose a building in the antecedent clause? Question 2: If the pronoun is anaphoric to the CF variable (f), how do we guarantee that it has the same restriction (and chooses the same individual) as in the antecedent clause? The standard treatment offers no formal link between the choice of individuals in the second sentence and the first.

The Solution: In order to link a pronoun and an indefinite we need to guarantee, first, that the CF used to interpret the indefinite is also available for a pronoun in the following clause and, second, that the CF has the same restriction for the pronoun and the antecedent indefinite. The tools necessary to solve Question 1 are offered by von Heusinger (2000, 2004) where the wide-scope interpretation of (1) is represented as in (5a). The indefinite is represented with the *epsilon operator* (ϵ) where an expression $\epsilon x.Fx$ picks out an individual x belonging to the set F; the expression is interpreted by a 'global' CF, Φ. The semantic effect of the indefinite is that it updates the CF (formalized as a co-indexed update function), i.e. indefinites introduce a new way of picking an entity into the discourse (5b); wide scope follows from existential closure over the variable that indexes the update function. Unlike indefinites, definites do not update Φ but are epsilon expressions that are interpreted by Φ as it is given (indicated by a subscripted c); definites do not change how entities are chosen. Taking pronouns to be covert definite descriptions (*E-type pronouns*: Evans, 1977; Heim, 1990) guarantees that the CF used to interpret the indefinite is also used with the following pronoun.

Turning to Question 2, the possibility that the restriction of the antecedent is somehow recovered from context is challenged by evidence that highly circumscribed contexts alone are unable to support anaphora (4) (Heim, 1990; Elbourne, 2005). These data suggest that the E-type pronoun is not semantically 'bleached', but instead must have specific content (i.e. the pronoun does not resolve to *the thing*, contra von Heusinger, 2004). Further evidence for this is adduced from German data in (6) where the gender of the anaphor matches the grammatical gender of the discourse antecedent and not the gender of a bleached noun like *das ding* ('the thing' neut.). Such a result follows from the theory of Elbourne (2005, 2008) where a pronoun involves NP ellipsis (but cf. Breheny, 2008). Interpreting the pronoun with the NP set of the antecedent (e.g. *building*) ensures that the CF applies to the correct restriction and, also, offers indirect support for Elbourne's analysis of anaphora.

The proposed representation is given in (7).

(1) a. Every fireman thought that a building was unsafe.

b. "There was a building such that every fireman thought that building was unsafe."

(2) a. $\exists f.CF(f) \wedge \forall x[fireman(x) \rightarrow x\ thought\ f(building)\ is\ unsafe]$

b. "There is a way of choosing entities such that for all entities that are firemen, those entities thought that the chosen building is unsafe."

(3) Every fireman thought that a building$_i$ was unsafe. It$_i$ is in the Bronx.

(4) a. # I dropped 10 marbles but managed to find 9 of them. It must be under the bed.

b. # Every married man sits next to her.
(cf. Every man who has a wife sits next to her.)

(5) a. $\exists k \forall x.[fireman(x)] \rightarrow [thought.unsafe(x, \epsilon_k y\ building(y))]$

b. $[\![\exists k \forall x.[fireman(x)] \rightarrow [thought.unsafe(x, \epsilon_k y\ building(y))]]\!] = 1$ iff
there is an update function u_k with $u_k(\Phi) = \Phi'$ such that for all individuals x
$[(x : x \in [\![fireman]\!]), \Phi'([\![building]\!])] \in [\![thought.unsafe]\!]$

(6)

Die	Frau	sah	eine	Katze	im	Nebel.	Sie/*Er/*Es	war	riesig	gross.
The	woman	saw	a	cat(fem.)	in	fog.	She/*He/*It	was	gigantically	big

'The woman saw a cat$_i$ in the fog. It$_i$ was very big.'

(7) a. Every fireman thought that a building$_i$ was unsafe. [It ~~building~~]$_i$ is in Red Hook.

b. i. $\exists k \forall x.[fireman(x)] \rightarrow [thought.unsafe(x, \epsilon_k y\ building(y))]$

ii. $in(\epsilon_c x\ building(x), Red.Hook)$

c. i. $[\![\exists k \forall x.[fireman(x)] \rightarrow [thought.unsafe(x, \epsilon_k y\ building(y))]]\!] = 1$ iff is an update function u_k with $u_k(\Phi) = \Phi'$ such that for all individuals x
$[(x \in ([\![fireman]\!]), \Phi'([\![building]\!])] \in [\![thought.unsafe]\!]$

ii. $[\![in(\epsilon_c x\ building(x), Red.Hook)]\!] = 1$ iff $[\Phi'([\![building]\!]), ([\![Red.Hook]\!])] \in [\![in]\!]$

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