Movement of properties and properties of movement

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Overview

- It is well-known that our semantic machinery generates many meanings that are not utilized in natural language.
- This paper contributes a novel argument that one way in which semantics is constrained is in the homomorphic mapping from syntax to semantics:
  - ➤ **Movement cannot create λ-abstractions over properties:**

    (1) *[DP_1 $\lambda f_{\langle e,t\rangle}$ … [… [$f_{\langle e,t\rangle}$]$_1$ …]]
  - ➤ **Traces cannot be type shifted into property-type meanings.**
- Evidence for these arguments comes from a detailed investigation of movement that targets property-denoting DPs.
- This thus provides a novel argument for the economy hypothesis:

  (2) *No Higher-Type Variables Constraint* (Landman 2006)
  Variables in the LFs of natural languages are only of individual types, e.g. entities (*e*), situations/worlds (*s*), and degrees (*d*).

Π-positions

Postal (1994) observes that there are syntactic environments in English that can be targeted by only some types of A′-movement, such as *wh*-movement but not topicalization. I will refer to these environments as **Π-positions**:

❶ **Existential constructions:**

(3) a. There is **a book** on the table.
b. ✓**What$_1$** is there ___$_1$ on the table?
c. *__A book$_1$__, there is ___$_1$ on the table.

❷ **Change-of-color verbs:**

(4) a. Megan painted the house **magenta**.
b. ✓**What color$_1$** did Megan paint the house ___$_1$?
c. *__Magenta$_1$__, Megan painted the house ___$_1$.

❸ **Naming verbs:**

(5) a. Helen called the cat **Snowball**.
b. ✓**What name$_1$** did Helen call the cat ___$_1$?
c. *__Snowball$_1$__, Helen called the cat ___$_1$.

❹ **Predicate nominals:**

(6) a. Erika became **a teacher**.
b. ✓**What kind of teacher$_1$** did Erika become ___$_1$?
c. *__A math teacher$_1$__, Erika became ___$_1$.

Generalization I: Properties

☞ **DPs in Π-positions denote properties $\langle e,t\rangle$.**

- Existential constructions (Milsark 1974; Heim 1987; McNally 1997, 1998)
- Change-of-color verbs (resultatives) (Kratzer 2005)
- Naming verbs (Matushansky 2008)
- Predicate nominals (Williams 1983; Partee 1986)

Generalization II: Scope

☞ **Scope-shifting movement cannot target a Π-position.**

Topicalization

- The movement types that **cannot** target Π-positions, e.g. topicalization, shift scope obligatorily:

  (7) *Everyone* likes **a (different) TV show**. ✓∀ ≫ ∃; ✓∃ ≫ ∀

  (8) **A (#different) TV show$_1$**, *everyone* likes ___$_1$. *∀ ≫ ∃; ✓∃ ≫ ∀

Wh-movement

- The movement types that **can** target Π-positions, e.g. *wh*-movement, shift scope optionally:

  (9) **How many books$_1$** should Nina read ___$_1$?
  a. *Wide:* For what *n*: There are *n*-many particular books *x* such that Nina should read *x*. how many ≫ should
  b. *Narrow:* For what *n*: It is necessary for there to be *n*-many books *x* such that Nina reads *x*. should ≫ how many

- Crucially, these movement types can only target Π-positions when they do not shift scope:

  (10) *how many ≫ should; ✓should ≫ how many
  a. **How many books$_1$** should there be ___$_1$ on the table?
  b. **How many colors$_1$** should Nina paint the house ___$_1$?

Quantifier Raising (QR)

- This generalization is further supported by Π-positions prohibiting QR over the subject or negation from a Π-position:

  (11) There are*n't* **two books** on the table. ✓not ≫ two; *two ≫ not

  (12) *A (#different) contractor* painted the house **every color**. ✓∃ ≫ ∀; *∀ ≫ ∃

Analysis

Scope-shifting movement → Trace of type *e*

- Scope-shifting movement, under standard assumptions, must leave a trace of type *e* in order to shift scope.
- An *e*-type trace does not denote a property and therefore is incompatible with the property-type requirement of a Π-position.
- This incompatibility yields a type mismatch and hence ungrammaticality:

(13) *[DP_1 λx_e … [… [x_e]$_{\Pi\text{-pos}}$ …]]

Non-scope-shifting movement → Reconstructs

- Movement that does not shift scope instead reconstructs syntactically.
- Therefore, if a DP would not ordinarily violate the property-type requirement of a Π-position, then it will not do so under reconstruction either:

(14) ✓[___$_1$ … [… [DP_1]$_{\Pi\text{-pos}}$ …]]
reconstruct

Generalization III: Weak definites

☞ **Definites in Π-positions must be weak definites.**

- The important difference between weak and strong definites is that strong definites are anaphoric (i.e. have an index/variable) and weak definites are not (Schwarz 2009):

  (15) $[\![\text{the}_{\text{WEAK}}]\!] = \lambda P\,.\,\iota x[P(x)]$

  (16) $[\![\text{the}_{\text{STRONG}}]\!] = \lambda y\,\lambda P\,.\,\iota x[P(x) \wedge x = y]$ (*y*: index; *x*: index)

- Definites in Π-positions cannot be anaphoric, as shown below with quantificational covariance with an indefinite:

  (17) Every time Irene picks out *a new color* for the bathroom,
  a. #Helen has to paint the room [**the color**]$_{\Pi\text{-pos}}$.
  b. Helen complains that **the color** is too bright.

Type shifting and traces

- Property denotations can be achieved via type shifting (Partee 1986):

  (18) $\mathcal{BE} = \lambda\mathcal{P}_{\langle et,t\rangle}\,\lambda x_e\,.\,\mathcal{P}([\lambda y\,.\,y = x]) = \lambda\mathcal{P}_{\langle et,t\rangle}\,\lambda x_e\,.\,\{x\} \in \mathcal{P}$

  (19) I painted the house [$\mathcal{BE}$(the darker shade of green)]$_{\Pi\text{-pos}}$.

- Traces are interpreted via Trace Conversion (TC), the LF rule that interprets traces under the Copy Theory of Movement (Fox 2002):

  (20) $DP_1\ \lambda x \ldots [\,D^0\ NP\,]_1 \rightsquigarrow_{TC} DP_1\ \lambda x \ldots [[\text{the } x]\ NP\,]_1$ (*x*: index)

Proposal

- Crucially, TC requires the strong definite determiner because it must have access to the index to be bound by the λ-abstraction created by movement.
- **Nominal type shifting and strong definites are in complementary distribution.** This accounts for both the ban on scope-shifting movement targeting Π-positions and Generalization III.
- This complementarity is **syntactic**: [D^0 [n^0 NP]]
  - the_{STRONG} occupies D^0.
  - Nominal type shifters occupy D^0 as well.
  - the_{WEAK} occupies some lower functional head, say n^0.
- ➤ Type-shifted definites in Π-positions are always weak definites:

  (21) [$_{DP}$ ($\mathcal{BE}$) [$_{nP}$ the_{WEAK} NP]] ⇝ Weak definite; ✓type shifting

  (22) [$_{DP}$ $\text{the}_{\text{STRONG}}$ [$_{nP}$ n^0 NP]] ⇝ Strong definite; ✗type shifting

- ➤ TC and type shifting cannot apply to the one and the same DP:

(23) * DP_1 λx … [[$_{DP}$ $\mathcal{BE}$ [$_{nP}$ the_{WEAK} NP]]$_1$]$_{\Pi\text{-pos}}$ — ?? *no variable to bind* — ✓Property ✗Quantification

(24) * DP_1 λx … [[$_{DP}$ $\text{the}^{\text{STRONG}}_{x}$ [$_{nP}$ n^0 NP]]$_1$]$_{\Pi\text{-pos}}$ — ✗Property ✓Quantification

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