Scope-taking Determiners and Continuations

Deborah J.M. Wong
University of California, Los Angeles
deborah.jm.wong@ucla.edu

The Puzzle

The argument-adjunct asymmetry (Freidin 1986, Lebeaux 1988) is as follows:

(1) a. *Which claim [that Mary$_i$ was a thief] was she$_i$ willing to discuss?
b. Which claim [that Mary$_i$ had made] was she$_i$ willing to discuss?

- In (1a), 'Mary' is c-commanded by 'she' in its base position, which results in a Condition C violation.
- In (1b), 'Mary' is contained within an adjunct, which is merged late, hence we don't see any "reconstruction" effects.

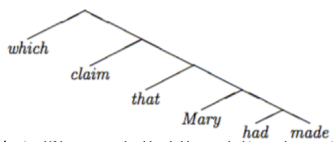
(2) a. *Eat food [that Mary$_i$ cooks], she$_i$ knows I never would.
b. Food [that Mary$_i$ cooks], she$_i$ knows I would never eat.
c. Eat food [at Mary$_i$'s party], she$_i$ knows I never would.

VP fronting in Landau (2007) suggests that adjuncts' exemption from reconstruction effects only occurs if they attach at the root of the front constituent.

Conflict between semantics and syntax

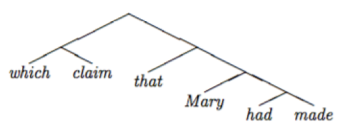
- Semantic construction of DP with relative clauses requires the relative clause to be part of the restrictor of the determiner.

(3)



- Data in (2) suggests that the relative clause is attached to the full DP.

(4)



Analysis: Scope-taking through Continuations

Proposal: The relative clause is part of the restrictor semantically but attaches syntactically as the sister to a DP. Determiners are scope takers: The determiner's restrictor is a constituent that the determiners take scope over.

- A quantifier such as 'everyone' combines "non-locally" with λx. see x j.

(5) John saw everyone yesterday.
$\forall x$. *John saw x yesterday* $\approx$ *everyone + John saw __ yesterday*

- The determiner combines with its restrictor in the same "non-local" way as 'everyone' in (5).

(6) which claim that Mary had made
which + [[__ claim] that Mary had made]

What is a Continuation?

A continuation is a part of the context surrounding an expression. The word *continuation* is only meaningful relative to an expression.

- In (5), the continuation of the generalized quantifier in 'everyone' is 'John saw __ yesterday.'

According to the continuation hypothesis (Barker and Shan 2014), these special kinds of contexts act as arguments for some expressions.

(7) **The continuation hypothesis**
Some natural language expressions denote functions on their continuations, i.e., functions that take their own semantic context as an argument.

Tower Notation

Barker and Shan (2008) introduces the tower notation, where the semantic type of a generalized quantifier is $\dfrac{t \mid t}{e}$.

- The notation is read counterclockwise starting from below the horizontal line. A generalized quantifier acts as type *e* in its surface syntactic position that takes scope over type *t* to form a type *t*.

For *wh*-words, we assume that the semantic type is $\dfrac{Q \mid t}{e}$.

Illustration of the derivation of scope taking with an echo question:

(8) John saw who?

- In (8), 'who' is in a syntactic lower position than where it takes scope.

Lexical entry for 'who':

(9) $\begin{array}{cc} \dfrac{\text{who } (\lambda x.[\,])}{x} & \text{(semantic value)} \\ \text{who} & \text{(expression)} \\ \dfrac{Q \mid t}{e} & \text{(semantic type)} \end{array}$

- The hole in *who* $\lambda x.[\,]$ refers to the continuation of 'who' and the x below the line. The semantic value in (9) denotes the function $\lambda k.\, who(\lambda x.\, [kx])$.

To derive (8), we combine multiple towers as follows:

(10) $$\left(\begin{array}{c}\dfrac{([\,])}{\text{j}}\\ \text{j}\\ \dfrac{Q \mid Q}{e}\end{array}\left(\begin{array}{c}\dfrac{([\,])}{\text{saw}}\\ \text{saw}\\ \dfrac{Q \mid Q}{\langle e,\langle e,t\rangle\rangle}\end{array}\ \begin{array}{c}\dfrac{\text{who } (\lambda x.[\,])}{x}\\ \text{who}\\ \dfrac{Q \mid t}{e}\end{array}\right)\right) = \left(\begin{array}{c}\dfrac{\text{who } (\lambda x.[\,])}{\text{saw } x \text{ j}}\\ \text{j saw who}\\ \dfrac{Q \mid t}{t}\end{array}\right) \xrightarrow{Lower} \left(\begin{array}{c}\text{who } \lambda x.[\text{saw } x \text{ j}]\\ \text{j saw who}\\ Q\end{array}\right)$$

- The *Lower* operation takes a structure whose local type and the type at which it takes scope matches, and then returns something of the return type of the original structure.

Derivation of DP with Relative Clause

We illustrate the derivation with the constituency [[which claim] RC] while the relative clause is still interpreted as part of the restrictor. We use WH as abbreviation of the semantic type of *wh*-items.

- 'which' is first combined with 'claim'.

(11) $$\left(\begin{array}{c}\dfrac{\text{which}([\,])}{\lambda P.P}\\ \text{which}\\ \dfrac{WH \mid \langle e,t\rangle}{\langle\langle e,t\rangle,\langle e,t\rangle\rangle}\end{array}\ \begin{array}{c}\dfrac{[\,]}{\lambda x.claim(x)}\\ \text{claim}\\ \dfrac{\langle e,t\rangle \mid \langle e,t\rangle}{\langle e,t\rangle}\end{array}\right) = \left(\begin{array}{c}\dfrac{\text{which}([\,])}{\lambda x.claim(x)}\\ \text{which claim}\\ \dfrac{WH \mid \langle e,t\rangle}{\langle e,t\rangle}\end{array}\right)$$

- Although 'which' has now combined with 'claim', *Lower* does not apply until the relative clause attaches.

(12) $$\left(\begin{array}{c}\dfrac{\text{which}([\,])}{\lambda x.claim(x)}\\ \text{which claim}\\ \dfrac{WH \mid \langle e,t\rangle}{\langle e,t\rangle}\end{array}\left(\begin{array}{c}\dfrac{([\,])}{\wedge}\\ \text{that}\\ \dfrac{\langle e,t\rangle \mid \langle e,t\rangle}{\langle\langle e,t\rangle,\langle\langle e,t\rangle,\langle e,t\rangle\rangle\rangle}\end{array}\ \begin{array}{c}\dfrac{([\,])}{\lambda x.RCx}\\ \text{RC}\\ \dfrac{\langle e,t\rangle \mid \langle e,t\rangle}{\langle e,t\rangle}\end{array}\right)\right) = \left(\begin{array}{c}\dfrac{\text{which}([\,])}{\lambda x.claim(x) \wedge RCx}\\ \text{which claim that RC}\\ \dfrac{WH \mid \langle e,t\rangle}{\langle e,t\rangle}\end{array}\right)$$

- Lowering (12) allows 'which' to take scope over the entire restrictor including the relative clause.

(13) $$\left(\begin{array}{c}\dfrac{\text{which}([\,])}{\lambda x.claim(x) \wedge RCx}\\ \text{which claim that RC}\\ \dfrac{WH \mid \langle e,t\rangle}{\langle e,t\rangle}\end{array}\right) \xrightarrow{Lower} \left(\begin{array}{c}\text{which}(\lambda x.claim(x) \wedge RCx)\\ \text{which claim that RC}\\ WH\end{array}\right) \equiv \left(\begin{array}{c}\dfrac{\text{which}(\lambda x.claim(x) \wedge RCx)(\lambda y.[\,])}{y}\\ \text{which claim that RC}\\ \dfrac{Q \mid t}{e}\end{array}\right)$$

- 'which' takes scope over [[__claim] RC] because *Lower* only applies after the relative clause attaches. This is how 'which' takes scope to form something with the same type as 'who'

References

Barker, C. and Shan, C.-c. (2008). Donkey anaphora is in-scope binding. *Semantics and Pragmatics*.
Barker, C. and Shan, C.-c. (2014). *Continuations and natural language*, volume 53. Oxford Studies in Theoretical Linguistics.
Freidin, R. (1986). Fundamental issues in the theory of binding. In *Studies in the acquisition of anaphora*, pages 151–188. Springer.
Landau, I. (2007). Constraints on partial vp-fronting. *Syntax*, 10(2):127–164.
Lebeaux, D. (1988). *Language acquisition and the form of the grammar.* PhD thesis, University of Massachusetts, Amherst.

Acknowledgements

Many thanks to Tim Hunter and Dylan Bumford for their discussion and input, and to UCLA Semantics tea and CUSP 10 audience for comments and suggestions.