

# Getting beyond function application

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Based on joint work with Sandra Chung

Chung and Ladusaw 2004  
*Restriction and Saturation.*  
*LI Monograph #42.*  
MIT Press.

*The talk has two threads:*

Empirical thread:

Two Maori indefinite determiners

Theoretical thread:

Develop a cross-linguistically useful inventory (typology) of semantic composition operations

What does it mean to have linguistic knowledge about how an expression behaves in semantic composition?

## *Maori he and te:tahi*

Maori (Polynesian) has two indefinite articles, *he* and *te:tahi* which

- do not contrast truth-conditionally
- have clearly contrastive distribution
- “felt” by native speakers to be different in meaning

*What's Function Application got to do with it?*

The prototypical Montagovian composition operation.

Feeling the edges of the PTQ box.

Asking: what is composition like after the dynamic turn?

## Related enterprises

- ✓ Literature on “semantic incorporation”:  
van Geenhoven, Dayal, Farkas and de Swart
- ✓ Surface compositionality as recursive context change potential:  
Bittner

## The Plot

Maori indefinite determiners are semantic incorporees which are discourse transparent.

Consider that the contrast directly reflects an “intensional” distinction between modes of composition syntactic predicates with their arguments.

Why this looks out of the PTQ box.

Some other things that might lie out there.

## *The C&L Analysis of he and tetahi*

Argue that the distinction is NOT:

- Quantificational vs referential (GQ vs entity denoting)
- Discourse dynamism (both introduce discourse referents)
- Specific / non-specific in any of the customary flavors
- Not *simply* a scope difference, but correlated with scope

Propose that:

- They have the same content (a property), but
- Compose differently as arguments to predicates

# Semantic similarities between them:

- Take wide scope in episodic sentences (and support later discourse reference)
- Subject to the novelty condition
- Can take narrow scope with respect to logical operators:
  - ✓ Antecedents of conditionals (and support donkey anaphora)
  - ✓ Universal quantifiers (both determiner and adverbial)
  - ✓ Negation (which is expressed by negative verb)
  - ✓ Modals, questions, generics with general meaning

## Semantic differences between them:

*te:tahi* CAN take wide scope with respect to other operators, but *he* is necessarily narrow scope.

*he* can appear as the pivot of an existential sentence, but *te:tahi* cannot.

## Argue that the distinction is NOT:

- Quantificational vs referential (GQ vs entity denoting)
- Discourse dynamism (both introduce discourse referents)
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## *C&L Analysis*

Both have properties as their semantic content.

The way in which they compose with predicates as arguments is different.

*He* composes with *RESTRICT*, a non-saturating composition operation.

*Te:tahi* composes with *SPECIFY*, a necessarily saturating composition operation.

What does that mean?

RESTRICT is an operation that combines a relation R with a property P, targeting one of the relata, whose value is the subrelation with the targeted relatum restricted to the extension of P.

$\text{RESTRICT}(2, \lambda x \lambda y \lambda e [\text{feed}(x, y, e)], \text{dog}) =$

$\lambda x \lambda y \lambda e [\text{feed}(x, y, e) \wedge \text{dog}(y)]$

SPECIFY is an operation that combines a relation R with a property P, targeting one of the relata, whose value is the result of fixing the targeted relata to be an individual with the property P.

$\text{SPECIFY}(2, \lambda x \lambda y \lambda e [\text{feed}(x, y, e)], \text{dog}) =$

$\lambda x \lambda e [\text{feed}(x, \text{CF}(\text{dog}), e)]$

How does the predicate get saturated when RESTRICT is used?

Existential closure (over a certain syntactic domain)

*How does that account for the similarities?*

John fed *he* dog vs. John fed *te:tahi* dog

- Truth-conditionally equivalent, but via different routes.
- Both are like “restricted free variable” indefinites subject to the novelty condition  
(But how is this related to the content claim?)
- Both may fall in scope of other operators.

## *How does this account for the differences?*

- *he* has no scope independent of the predicate. Hence it is caught by existential closure of operator scope.
- *te:tahi* must denote an entity, and so is banned from the pivot of an existential by the “definiteness effect”

What is knowledge of scope preferences?

What does it mean for part of your linguistic knowledge of some expression to determine how it behaves in semantic composition?

An example? *each* and *all*

Do we know that *each* prefers wide scope or do we know something about the meaning of *each* (e.g. that it must distribute over a “share”) that entails that it has wide scope?

**What's the point of calling this "mode of composition"?**

A heuristic strategy for developing a cross-linguistically useful inventory of composition operations that we can recognize independently of the morphosyntactic properties of structures that realize them.

Keeping track of what functional incompleteness and function-argument application are modeling.

The PTQ box

# Montague's "Universal Grammar"

Formal definition of a language as a set of expressions based on some algebra of basic expressions and combinatorics.

A theory of *meaning*: relating context to semantic *content*

Theory of *reference*, the theory of contents that expressions have relative to models/situations.

Compositionality: the definition of the *meaning/content/reference* of the infinite range of expressions based upon the *meaning/content/reference* of its *constituents* relative to its *structure*.

Compositionality realized by a syntax semantics interface in which the algebra of syntactic expressions is homomorphically mapped into an algebra of **meanings/ contents/ references**.

An expression  $\alpha$  with components  $\beta$  and  $\gamma$  constructed with a syntactic operation  $F$ :

$$\alpha = F(\beta, \gamma)$$

has an interpretation determined by the application of a semantic composition operation  $G$ :

$$\llbracket \alpha \rrbracket = \llbracket F(\beta, \gamma) \rrbracket = G(\llbracket \beta \rrbracket, \llbracket \gamma \rrbracket)$$

# Generality

Nothing stipulated about how to model contents.

Hence nothing follows about what the composition operations are.

# MG BoK

(The Montague Grammar Body of Knowledge)

Essentially PTQ

1. Set of (extensional) types (e, t,  $\langle \square, \square \rangle$ )
2. Intensions as a “lift” with world indices:  $\langle s, \square \rangle$
3. Syntactic categories generated by Name, Sentence
4. Mapping from categories into types
5. DPs as  $S/(S/N)$ ;  
Generalized Quantifiers as  $\langle \langle e, t \rangle, t \rangle$

## **Some consequences/effects**

The main composition operation is function-application.

Syntactic Saturation is tied to semantic saturation.

Incomplete contents can saturate.

The temptation to ignore composition operations because they are predictable: “type-driven translation”.

# Some responses

Type shifting operations

Provide with multiplicity of content while maintaining apparent simplicity of type assignments.

(Must be happy with all possibilities)

Multiply contents to do the work of composition operations.

(Assimilate everything to function application.)

(?'s Law: the smaller the word, the more lambdas)

Indefinites as “restricted free variables” as the alternative to GQs and entities.

Existential closure (of various kinds)

**Indefinites:**

Referential (type  $e$ )

Predicational (type  $\langle e, t \rangle$ )

Quantificational (type  $\langle \langle e, t \rangle, t \rangle$ )

Property (type  $e$ , new sort)

## *Compositionality after the dynamic turn*

Are context-change potentials compositional? Are they formulated by “lifting” a propositional content into the type of CCPs? **Do only sentences have CCPs?**

Are there reflections of discourse-level effects within subsentential composition?

**Bittner 2001. Surface composition as bridging.**

All constituents have context-change potentials.

Composition is (mostly) serial application of CCPs with topic/comment bridging.

Can't be the whole story.

Certainly beyond function application.

# Composition following Restriction

Doubling of incorporees (The Chamorro chapter of C&L)

I daughter-have (Anicia)

I priest-have a cousin.

# A sketch of the types of operation

Restrict: **providing** a restriction, the domain of selection for “a parameter”. One argument is a property and the other is a (semantically incomplete) relation. The result has the same degree of semantic incompleteness.

A parameter is not necessarily a syntactic argument, but it does correspond to what is meant when we talk of “the internal argument” or “the external argument”.

Specify: A compound of two operations: Select (the choice function) and Saturate (the elimination of semantic incompleteness.)

Specify “presupposes” restrict.

Extensionalization (vs. intensional context)

Function application has represented “saturate”.

## *Supplying a restriction vs. Restrictive modification*

Modify: further restriction of a domain.

Modify (Q, P) = Treat Q as the domain of a partitioning relation in which P names a cell. Replace Q with P.

Creates implicit alternatives (focal dimension) within the original domain.

## *Heads as restrictors*

### Vague cardinals

- There are(n't) many doctors who are brain surgeons.
- There are(n't) many brain surgeons who are doctors.

### Intensional objects

- John wants to marry a woman who is a pilot.
- John wants to marry a pilot who is a woman.

