Parasitic Scope: The Case of *Same* and *Different*

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June 20, 2012

A Multiplicity of Same/Different (S/D) Constructions

1. Anaphora

   a. Chris saw a pangolin in Westerville. Then Michael saw the (very/exact) same pangolin in Hilliard.

   b. Chris saw a pangolin in Westerville. Then Michael saw a (completely) different pangolin in Hilliard.

2. Associate-Remnant

   a. MANJUAN saw the same pangolin as TYLER.

   b. MANJUAN saw a different pangolin than/from TYLER.

3. Ellipsis

   a. Michelle patted the same pangolin that/as Murat kicked.

   b. Michelle patted a different pangolin than Murat kicked.

4. Plural Associate (Parasitic Scope)

   a. MAX AND ALEX saw the same pangolin.

   b. MAX AND ALEX saw different pangolins.

S/D Expression and Associate in Different Positions

5. YUSUKE AND BOB reviewed the same abstract/different abstracts.

6. The same donkey/different donkeys kicked PEDRO AND JUAN.

7. Kerry voted FOR AND AGAINST the same bill/different bills.

8. The same professor/different professors WROTE AND REVIEWED this hoax article.

9. The same pangolin/different pangolins PAWED CRAIGE AND LICKED JUDITH.

10. Ambiguity

    a. KIM AND SANDY gave the same present/different presents to Kevin and Dana.

    b. Kim and Sandy gave the same present/different presents to KEVIN AND DANA.

SD Construction with Plural Plurals

11. [KIM AND SANDY] AND [KEVIN AND DANA] met on the same day/different days.

SD Construction with Exotic Coordinations

12. Nonconstituent Coordination

    The same pangolin/different pangolins pawed JUSTIN TIMBERLAKE ON MONDAY AND JUSTIN BIEBER ON TUESDAY.

13. Right Node Raising

    KIM SUBMITTED, AND SANDY REVIEWED, the same grant proposal/different grant proposals.

14. Gapping

    $*$ KIM gave the same present/different presents TO SANDY, AND KEVIN TO DANA.

The Gist of the Analysis (1/3)

As an example, we analyze

16. Mo and Jo saw the same cat.

- Every S/D sentence is made up of three pieces:
  - the **S/D expression**, here *the same cat*, which in turn is made up of *the same* (treated as a single lexical item) and its (first) argument N *cat*
  - the **associate**, always a plural (or a quantifer ranging over plurals), here the plural NP *Mo and Jo*.
  - the **continuation**, a functional abstraction of the rest of the sentence, i.e. a constituent of type NP $\multimap$ NP $\multimap$ S formed by introducing traces (hypothetical NPs) in the positions of the S/D expression and the associate) and then binding them using hypothetical proof.

    Here, the transitive verb *saw* is already such a constituent to begin with.

The Gist of the Analysis (2/3)

- The analysis is driven by the lexical entry for *the same*, which takes as arguments, in this order:
  - the N *cat*
  - the NP $\multimap$ NP $\multimap$ S continuation *saw*
  - the plural associate NP *Mo and Jo*

- This is the lexical entry:

  $\vdash \lambda_{srt}.r\ t\ \mathrm{the} \cdot \mathrm{same} \cdot s; \mathrm{N} \multimap (\mathrm{NP} \multimap \mathrm{NP} \multimap \mathrm{S}) \multimap \mathrm{NP} \multimap \mathrm{S}; \mathbf{same}$

  where s and t are variables of type s (string) and r is a variable of type $\mathrm{s} \to \mathrm{s} \to \mathrm{s}$.

- Here **same** is a semantic term of type

  $(\mathrm{e} \to \mathrm{t}) \to (\mathrm{e} \to \mathrm{e} \to \mathrm{t}) \to \mathrm{e}' \to \mathrm{t}$

  where e' is the type of plural entities (for each semantic type A there is a type A' for the A-pluralities).

The Gist of the Analysis (3/3)

- In our example, the three arguments taken by *the same* are:

  $\vdash \mathrm{cat}; \mathrm{N}; \mathsf{cat}$

  $\vdash \lambda_{st}.s \cdot \mathrm{saw} \cdot t; \mathrm{NP} \multimap \mathrm{NP} \multimap \mathrm{S}; \mathsf{see}$

  $\vdash \mathrm{mo} \cdot \mathrm{and} \cdot \mathrm{jo}; \mathrm{NP}; \mathsf{m} + \mathsf{j}$

- Successively applying *the same* to these three arguments by three modus ponens steps results in the sign

  $\vdash \mathrm{mo} \cdot \mathrm{and} \cdot \mathrm{jo} \cdot \mathrm{saw} \cdot \mathrm{the} \cdot \mathrm{same} \cdot \mathrm{cat}; \mathrm{S}; \mathsf{same\ cat\ see\ m} + \mathsf{j}$

- All that remains is to provide the right definition of the term same.

- Once that (and many lambda conversions) are done, it will be clear that (16) is true just in case there is a constant function f from the doubleton set of Mo and Jo to the set of cats such that for each member x of the former set, x saw $f(x)$.

The Meaning of *the same* (1/3)

Here and henceforth, A and B are metavariables ranging over semantic types.

- By an **(extensional) relation** between A and B, we mean something of type $A \to B \to \mathrm{t}$.
- For expository simplicity, we consider only relations between e and e.
- The functions defined below are all polymorphic with respect to the type parameters A and B, but (again for expository simplicity) we give the definitions only for the case $A = B = \mathrm{e}$.
- In these definitions, the variable s is of type $A \to B \to \mathrm{t}$ (here, $\mathrm{e} \to \mathrm{e} \to \mathrm{t}$).

The Meaning of *the same* (2/3)

$\mathbf{parfun} =_{\mathrm{def}} \lambda_S.\forall_{xyz}.((S\ x\ y) \wedge (S\ x\ z)) \to (y = z))$

parfun S says that the relation S is (curry of the characteristic function of the graph of) a (partial) function.

$\mathbf{dom} =_{\mathrm{def}} \lambda_{Sx}.\exists_y.S\ x\ y$

dom S is the (characteristic function of the) domain of S.

$\mathbf{ran} =_{\mathrm{def}} \lambda_S.\lambda_y.\exists_x.S\ x\ y$

ran S is the (characteristic function of the) range of S.

$\mathbf{const} =_{\mathrm{def}} \lambda_S.\exists_z.(\mathbf{ran}\ S) = \lambda_x.x = z$

const S says that S is constant, i.e. its range is a singleton.

$\mathbf{inj} =_{\mathrm{def}} \lambda_S.\forall_{xyz}.((S\ x\ z) \wedge (S\ y\ z)) \to (x = y)$

inj S says that S is injective, i.e. each member of the range is related to exactly one member of the domain.

The Meaning of *the same* (3/3)

- We assume there is a polymorphic function $\mathbf{at}_A : A' \to A \to \mathrm{t}$ that maps each plurality to the (characteristic function of) the set of its atoms.
- For example:

$$\vdash (\mathbf{at}\ \mathsf{m} + \mathsf{j}) = \lambda_x.(x = \mathsf{m}) \vee (x = \mathsf{j})$$

- $\textbf{same} =_{\text{def}} \lambda_{PRX}.\exists_S.(\textbf{parfun}\ S) \wedge (\textbf{const}\ S) \wedge ((\textbf{dom}\ S) = (\textbf{at}\ X)) \wedge \forall_{xy}.(S\ x\ y) \rightarrow ((P\ y) \wedge (R\ x\ y))$

  Here the types of the variables are: x, y : e; X : e′; P : e → t; and R, S : e → e → t.

- It's easy to verify that the meaning term ($\mathsf{same\ cat\ see\ m} + \mathsf{j}$) reduces to:

  $\exists_S.(\textbf{parfun}\ S) \wedge (\textbf{const}\ S) \wedge (\textbf{dom}\ S) = (\lambda_x.x = \mathsf{j} \vee x = \mathsf{m}) \wedge \forall_{xy}.(S\ x\ y) \rightarrow ((\mathsf{cat}\ y) \wedge (\mathsf{see}\ x\ y))$

Extensions (1/2)

- The other *the same* examples in (5—9) are handled by varying the type B for the plurality type B'.

- Examples with *different* instead of *the same* are analyzed analogously, with the following lexical entry for *different*:

  $\vdash \lambda_{srt}.r\ t\ \text{different} \cdot s; \text{N}' \multimap (\text{NP} \multimap \text{NP} \multimap \text{S}) \multimap \text{NP} \multimap \text{S}; \textbf{diff}$

  where N′ is the category of plural common nouns and

  $\textbf{diff} =_{\text{def}} \lambda_{PRX}.\exists_S.(\textbf{parfun}\ S) \wedge (\textbf{inj}\ S) \wedge ((\textbf{dom}\ S) = (\textbf{at}\ X)) \wedge \forall_{xy}.(S\ x\ y) \rightarrow ((P\ y) \wedge (R\ x\ y))$

- This is the same as the definition of **same** with **const** (constant) replaced by **inj** (injective).

Extensions (2/2)

- Smith and Pollard (2012) show how to adapt this analysis to cover internal readings of superlatives such as

  (Of all the dogs) FIDO chased the most cats.

  where the *Fido* is the member of the contextually determined set of alternatives that maximizes the function mapping each member to the number of cats that it chased.