Scalar (Non-)Identity and Similarity

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1 Introduction

A common view of *different* and *the same* takes these to express non-identity and identity between individuals.

(1) a. My new car is different from my last one.
b. Water is the same as H_20.

Goals for today's talk:

- identify two ways in which an identity-predicate analysis of *different* and *the same* is inadequate (§2)
- develop the view that some uses of *different* and *the same* express relations of similarity, rather than identity (§3)
- show how the similarity-predicate analysis of *different* and *the same* solves the problems identified for the identity-predicate analysis (§4)
- consider the relation between *different* and *the same* as similarity predicates, and as identity predicates (§5)

2 *Different* and *the same* as identity predicates

2.1 A simple view of different *and* the same

There is a substantial body of work on such uses of *different* and *same* as those in (2) (e.g., Dowty 1985, Heim 1985, Carlson 1987, Moltmann 1992, Beck 2000, Barker to appear).
- *different* and *same* occur NP-internally
- dependent upon distributive operator occurring elsewhere in sentence

(2) a. Every student read a different book.
b. The same salesman sold me these two magazine subscriptions.

Two assumptions that are made in much of this work:
- *different* expresses non-identity, while *same* expresses identity
- *different* and *same* denote relations between individuals

Perhaps all uses of *different* and (*the*) *same* express (non-)identity between individuals?

(3) a. My new car is different from my last one.
b. Water is the same as H_20.

Simple denotations for predicative uses of *different* and *the same* in (3) (see Beck 2000 for a version of (4)):

(4) [[**different**]] = $\lambda x.\lambda y.x \neq y$ (non-identity relation b/w individuals)

(5) [[**(the) same**]] = $\lambda x.\lambda y.x = y$ (identity relation b/w individuals)

The logical complementarity of *different* and *the same* follows straightforwardly.

(6) Contentment isn't the same as happiness. ⇔
Contentment is different from happiness.

2.2 Two problems for the simple view

2.2.1 Scalar uses of different *and* the same

(Non-)identity between individuals cannot hold to varying degrees, but the relations expressed by *different* and *the same* can (Huddleston & Pullum 2002; see also Laca and Tasmowski 2003 on French *différent*).

(7) a. My new car is {a bit, quite, very, really} different from my previous one.
b. Jack and Diane turned out to be more different than I had expected.

(8) Frozen fish is {almost, nearly, just about, not quite, roughly} the same as fresh fish.

2.2.2 Logical relations with similarity predicates

There is no reason to expect *different* and *the same* to enter into any logical relations with similarity predicates, e.g., (*a*)*like*, when in fact both do.

- *a and b are more different than c and d* is logically equivalent to *c and d are more alike than a and b*

(9) a. English and Spanish are more alike than English and American Sign Language. ⇔
English and American Sign Language are more different than English and Spanish.
b. Oranges and apples are more different than oranges and tangerines. ⇔
Oranges and tangerines are more alike than oranges and apples.

- such equivalence is a canonical property of scalar antonyms, e.g., *tall* vs. *short*

(10) Shaquille is taller than Kobe. ⇔
Kobe is shorter than Shaquille.

- *like* is logically subordinated to *the same*, as demonstrated by their behavior in *if not* and *or at least* appositives (on which, see Carlson 1981)

(11) Humanism is rather like, if not the same as, atheism.
(cf. *Most, if not* {*all*, **some*}, *of us enjoy our beer served warm.*)

(12) Humanism is the same as, or at least rather like, atheism.
(cf. *Most, or at least* {**all*, *some*}, *of us enjoy our beer served warm*.)

3 *Different* and *the same* as similarity predicates

Claim: *different* and *the same* are logically related to similarity predicates because (at least some times) they <u>are</u> similarity predicates.

An immediate question: how is similarity between two individuals computed?

A simple answer: similarity is measured in terms of properties
- a property counts as a similarity between two individuals if it does not distinguish between them; it either applies to both or to neither
- a property counts as a difference between two individuals if it distinguishes between them by applying to one but not the other

Preliminary logical forms for predications of similarity/difference:

- *a is like b* asserts that some degree of similarity exists between a and b, i.e., there is some property that counts as a similarity between a and b

(13) *My new car is like my previous one* is true in *w*
iff $\exists P[P_w(n) \leftrightarrow P_w(p)]$.

- *a is different from b* asserts that some degree of difference exists between a and b, i.e., there is some property that counts as a difference between a and b

(14) *My new car is different from my previous one* is true in *w*
iff $\exists P[\neg(P_w(n) \leftrightarrow P_w(p))]$.

- *a is the same as b* asserts that maximal similarity obtains between a and b, i.e., every property counts as a similarity between a and b (see Nunberg 1984 for a closely related view of *the same*)

(15) *My new car is the same as my previous one* is true in *w*
iff $\forall P[P_w(n) \leftrightarrow P_w(p)]$.

Support for such logical forms comes from the form and interpretation of comparative constructions involving *different*, *the same*, and *like* (Alrenga 2005):

(16) a. Paris looks much different than it used to (look).
b. Paris looks just about the same as it used to (look).
c. Paris still looks much like it used to (look).

Restrictions on *in that S* clauses occurring with *different* and *like* provide further evidence for the relevance of shared or distinguishing properties (McCawley 1970).

(17) Jack is like Diane in that . . .
a. . . . they both have red hair.
b. #. . . he has red hair.
c. . . . he has red hair too.

(18) Jack is different from Diane in that . . .
a. . . . he has red hair, while hers is blonde.
b. #. . . he has red hair.
c. . . . only he has red hair.

An *in that S* clause must entail the existence of a similarity or difference when occurring with *like* or *different*.

A potential problem: how is it that (19), (20) can ever be taken as true?

(19) a. After I tired of Shanghai, I moved on to Beijing. Unfortunately, Beijing is no different from Shanghai, and I soon moved on again.
b. Humans are animals, and in this respect we are no different from the rest: we are bodies, with brains, and a world to interact with.

(20) (In all relevant respects,) Beijing is the same as Shanghai.

Solution: quantification over properties is contextually restricted (see also Nunberg 1984).

(21) *Beijing is no different from Shanghai* is true in w relative to a set of contextually relevant properties C iff $\neg\exists P{\in}C[\neg(P_w(b) \leftrightarrow P_w(s))]$.

(22) *Beijing is the same as Shanghai* is true in w relative to a set of contextually relevant properties C iff $\forall P{\in}C[P_w(b) \leftrightarrow P_w(s)]$.

4 Similarity and scales

4.1 Logical relations with similarity predicates, Part I

Like the identity-predicate analysis, the similarity-predicate analysis also predicts logical complementarity between *different* and *the same*.

(23) Contentment isn't the same as happiness. ⇔
Contentment is different from happiness.

Complementarity now follows from the logical equivalence of ¬∀ and ∃¬:

(24) *Contentment isn't the same as happiness* is true in w relative to a set of contextually relevant properties C iff $\neg\forall P\in C[P_w(c) \leftrightarrow P_w(h)]$.

(25) *Contentment is different from happiness* is true in w relative to a set of contextually relevant properties C iff $\exists P\in C[\neg(P_w(c) \leftrightarrow P_w(h))]$.

Logical subordination of *like* to *the same* also follows straightforwardly.

(26) Humanism is rather like, if not the same as, atheism.
(cf. *Most, if not* {*all*, **some*}, *of us enjoy our beer served warm.*)

(27) Humanism is the same as, or at least rather like, atheism.
(cf. *Most, or at least* {**all*, *some*}, *of us enjoy our beer served warm*.)

Given a non-empty domain of quantification, ∀ asymmetrically entails ∃:

(28) *Humanism is like atheism* is true in w relative to a set of contextually relevant properties C iff $\exists P\in C[P_w(h) \leftrightarrow P_w(a)]$.

(29) *Humanism is the same as atheism* is true in w relative to a set of contextually relevant properties C iff $\forall P\in C[P_w(h) \leftrightarrow P_w(a)]$.

Accounting for antonymy between *different* and *like* first requires an account of their scalarity.

4.2 Scalar uses of different *and* like

A common approach to the semantics of scalar adjectives (e.g., von Stechow 1984, Rullmann 1995, Kennedy 1999):

- an adjective A is associated with a scale, a set of points S_A ordered by a reflexive, asymmetric, transitive relation (a linear order)
- the members d_i, d_j, d_k of S_A are typically called "degrees"

(30) ——————d_i—————— d_j —————— d_k——————>

- the meaning of A involves a measure function which maps individuals onto members of S_A , e.g., *tall* is associated with the measure function TALL

(31) ——————d_i—————— d_j —————— d_k——————>
↑ ↑ ↑
$\text{TALL}_w(a)$ $\text{TALL}_w(b)$, $\text{TALL}_w(c)$ $\text{TALL}_w(e)$

- the denotation of A is a relation between degrees and individuals

(32) $[\![\textbf{tall}]\!]^w = \lambda d.\lambda x.\text{TALL}_w(x) \geq d$

- "absolute" constructions like (33) are interpreted relative to a contextually-supplied degree d_s (the "standard" value in a context)

(33) *Kobe is tall* is true in w iff $\text{TALL}_w(k) \geq d_s$

(34) ——————d_s——————d——————>
↑
$\text{TALL}_w(k)$

Scalar denotations for *different* and *like*:

- *different* and *like* denote relations between degrees and pairs of individuals

(35) $[\![\textbf{different}]\!]^{C,w} = \lambda y.\lambda d.\lambda x.\text{DIFF}_{C,w}(x)(y) \geq d$

(36) $[\![\textbf{like}]\!]^{C,w} = \lambda y.\lambda d.\lambda x.\ \text{LIKE}_{C,w}(x)(y) \geq d$

- DIFF and LIKE are measure functions that map pairs of individuals to degrees and satisfy the conditions in (37) and (38)

(37) For any individuals *a*, *b*, *c*, *e*, world *w*, and set of contextually relevant properties *C*, $\text{DIFF}_{C,w}(a)(b) > \text{DIFF}_{C,w}(c)(e)$ iff
$|\{P \in C : \neg(P_w(a) \leftrightarrow P_w(b))\}| > |\{P \in C : \neg(P_w(c) \leftrightarrow P_w(e))\}|$
(i.e., $\text{DIFF}_{C,w}(a)(b)$ is ordered above $\text{DIFF}_{C,w}(c)(e)$ iff there are more differences between *a* and *b* in *C* than there are between *c* and *e*)

(38) For any individuals *a*, *b*, *c*, *e*, world *w*, and set of contextually relevant properties *C*, $\text{LIKE}_{C,w}(a)(b) > \text{LIKE}_{C,w}(c)(e)$ iff
$|\{P \in C :\ P_w(a) \leftrightarrow P_w(b)\}| > |\{P \in C :\ P_w(c) \leftrightarrow P_w(e)\}|$
(i.e., $\text{LIKE}_{C,w}(a)(b)$ is ordered above $\text{LIKE}_{C,w}(c)(e)$ iff there are more similarities between *a* and *b* in *C* than there are between *c* and *e*)

- logical forms for absolute constructions involving *different* and *like*:

(39) *My new car is different from my previous one* is true in *w* relative to a set of contextually relevant properties *C* iff $\text{DIFF}_{C,w}(n)(p) \geq d_s$.

(40) *My new car is like my previous one* is true in *w* relative to a set of contextually relevant properties *C* iff $\text{LIKE}_{C,w}(n)(p) \geq d_s$.

- the requirement that $\text{DIFF}_{C,w}(n)(p)$ (or $\text{LIKE}_{C,w}(n)(p)$) be ordered ahead of d_s amounts to the requirement that there exist a sufficient number of differences (or similarities) between my new car and my previous one in *C*

4.3 Logical relations with similarity predicates, Part II

Given (37) and (38), it follows that:

(41) For any individuals *a*, *b*, *c*, *e*, world *w*, and set of contextually relevant properties *C*, $\text{DIFF}_{C,w}(a)(b) > \text{DIFF}_{C,w}(c)(e)$ iff $\text{LIKE}_{C,w}(c)(e) > \text{LIKE}_{C,w}(a)(b)$.

The logical equivalence in (42) then follows straightforwardly.

(42) Oranges and apples are more different than oranges and tangerines. ⇔
Oranges and tangerines are more alike than oranges and apples.

Simplified logical form for scalar comparisons:

(43) *a is more A than b* is true in w iff $\text{MEAS}_w(a) > \text{MEAS}_w(b)$.
(MEAS is the measure function associated with *A*.)

(44) *Oranges and apples are more different than oranges and tangerines* is true in w relative to C iff $\text{DIFF}_{C,w}(o)(a) > \text{DIFF}_{C,w}(o)(t)$.

(45) *Oranges and tangerines are more alike than oranges and apples* is true in w relative to C iff $\text{LIKE}_{C,w}(o)(t) > \text{LIKE}_{C,w}(o)(a)$.

4.4 Scalar uses of the same

Recall that *the same* also undergoes degree modification.

(46) Frozen fish is {almost, nearly, just about, not quite, roughly} the same as fresh fish.

These modifiers also occur with universal quantifiers.

(47) a. {Nearly, almost, roughly, just about} everyone you meet in Santa Cruz has a tattoo.
b. I'm sure that not quite everyone would agree with that statement.

I assume that the modification properties of *the same* follow from the fact that its semantics involves universal quantification over properties.

Note that *the same* also occurs with exceptive phrases, another feature of universal quantifiers.

(48) Except for its expensive leather interior, my new car is the same as my last one.

(49) Except for John, everyone in this room can dunk a basketball.

Question: should *the same* be assimilated to "total" scalar adjectives like *dry*, *clean*, *complete*, etc. (see Rotstein and Winter 2004, Kennedy and McNally 2005), to superlative expressions, or to neither?

(50) a. The towel is nearly dry.
b. The poem is complete except for the last stanza.

(51) a. Mount Rainer isn't quite the tallest mountain in the United States, but it's close.
b. Except for maybe Wilt Chamberlain, Michael Jordan was the most prolific scorer that basketball has ever seen.

5 Final observations

Given similarity-predicate denotations for *different* and *the same*, is there evidence for identity-predicate denotations as well?

Some possible evidence for identity-predicate denotations comes from modified, NP-internal occurrences of *different* and *the same*:

(52) a. I will not be directly comparing the two products, as they aim to solve very different problems.
b. "Product A aims to solve a problem, and product B aims to solve a problem, and the problem that A aims to solve is qualitatively very different from the problem that B aims to solve." (similarity reading)

(53) a. The two micro-organisms cause slightly different symptoms (though each results in diarrhea).
b. "The set of symptoms that micro-organism A causes differs slightly in its membership from the set of symptoms that micro-organism B causes." (identity reading)

(54) a. The '56 DeSoto Diplomat and the '56 Plymouth are almost the same car.
b. "The '56 Desoto Diplomat and the '56 Plymouth are both cars, and they share almost all relevant properties." (similarity reading)

(55) a. Interestingly, both too little iron and too much iron can cause almost the same symptoms.
b. "The set of symptoms caused by insufficient iron is almost identical in its membership to the set of symptoms caused by excess iron." (identity reading)

The preferred interpretations of (53) and (55) involve (non-)identity between pluralities, rather than similarity. (see also Matushansky and Ruys 2005)

Here's one way to unify the identity-predicate and similarity-predicate uses of *different* and *the same*:

(56) *a and b cause different symptoms* is true in *w* iff $\exists x[\neg(x \in \{y: y \text{ is a symptom caused by } a\} \leftrightarrow x \in \{z: z \text{ is a symptom caused by } b\})]$

(57) *a and b cause the same symptoms* is true in *w* iff $\forall x[x \in \{y: y \text{ is a symptom caused by } a\} \leftrightarrow x \in \{z: z \text{ is a symptom caused by } b\}]$

Compare the logical forms in (56) and (57) to those given in (14) and (15); note the similarities and the differences!

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