

Ad hoc kind formation by similarity

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Demonstratives of Manner, Quality and Degree (*mqd*)

Demonstratives modifying verbal / nominal / degree expressions

e.g., German *so/solch*, English *such*, Polish *tak*, and Turkish *böyle*

- (1) a. (speaker pointing to someone dancing):
So tanzt Berta auch.
'Berta dances like this, too.' manner
- b. (speaker pointing to a table):
So einen Tisch hat Berta auch.
'Berta has such a table / a table like this, too.' quality
- c. (speaker pointing to a person):
So groß ist Berta auch.
'Berta is this tall, too.' degree

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What is the meaning of *mqd* demonstratives?

- (i) *mqd* demonstratives are (more or less) uniform across categories;
- (ii) *mqd* demonstratives are directly referential (König & Umbach, to appear) while serving as modifiers;
- (iii) *mqd* demonstratives include a deictic component and a similarity component -- "like this";
such a table – a table like this

Option 1:
Kind-referring analysis

Carlson (1980)
Anderson & Morzycki (2015)

Option 2:
Similarity analysis

(Umbach & Gust 2014)

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Outline of the talk

- problems for the kind-referring analysis
- basic outline of the similarity analysis
- three major issues:
 - a) the implementation of the similarity relation;
 - b) restrictions on features of comparison, the ad-hoc generation of kinds;
 - c) equative comparison based on similarity.

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Option 1: The kind-referring analysis

"The target of the demonstration / antecedent is a kind"

Carlson (1980):

English (anaphoric) *such* is a pronoun referring to a sub-kind of the kind denoted by the noun.

Anderson & Morzycki (2015):

adapt Carlson's analysis to Polish *tak* (and German *so*)

assuming the existence of

- nominal kinds (of individuals) *such a table*
- event kinds (of events) *dance like this*
- degrees as kinds (of states of individuals) *this tall*

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Option 2: The similarity analysis

"The target of the demonstration is an individual or event."

The relation between the target of the demonstration and the referent of the phrase is **similarity** instead of identity (cf. Kaplan 1989, Nunberg 1993, 2004).

E.g., when pointing to a table uttering *so ein Tisch*, a similarity class is created including *tables like this one*.

In the nominal and verbal case, but not in the adjectival case, similarity classes establish **ad hoc generated kinds**.

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Difference in meaning compared to definite generic NPs

Context: William B. Shockley invented the transistor. He did not invent other electronic components.

(2) Speaker points to a transistor:

a. *Diesen Baustein hat Shockley erfunden.* true
'This component was invented by S.'

b. *So einen Baustein hat Shockley erfunden.* not true
'Such a component / a component like this was invented by S.'

p.c. Manfred Krifka

→ Nominal *so* phrases and definite generic NPs are not equivalent.

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No well-established kinds required

Generic readings of definite NPs require "well-established kinds" (*the coke bottle* vs. *the green bootle*, Krifka et al. 1995).

(3) (speaker points to a car in the street):

- a. *Dieses Auto will Anna kaufen.* (token / type)
'Anna wants to buy this car.'
- b. *So ein Auto will Anna kaufen.*
'Anna wants to buy a car like this.'

(4) (speaker points to a table in flea market):

- a. *Diesen Tisch will Anna kaufen.* (token only)
'Anna wants to buy this table.'
- b. *So einen Tisch will Anna kaufen.*
'Anna wants to buy a table like this.'

→ *so* phrases do not require previously established kinds

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Restrictions

(5) a. *Anna hat ein Fahrrad mit Gangschaltung. Berta hat auch so ein Fahrrad (nämlich eins mit Gangschaltung).*

b. *Anna hat ein neues Fahrrad. Berta hat auch so ein Fahrrad (*nämlich ein neues).*

'Anna has a bike with gears / new bike. Berta has such a bike, too (namely one with gears / a new one).'

Carlson (1980): *people in the next room ... *such people*

→ "... modifiers apparently referred back to by *such* must be modifiers that delineate a KIND of the nominal modified."

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The similarity relation

SIM(x, t, \mathcal{F}) x NP referent
t target of the demonstration
 \mathcal{F} representation, including a set of **features of comparison**

Nominals – multiple features of comparison
e.g. for *table* HEIGHT, MATERIAL, COLOR, NUMBER OF LEGS ...
– relating to ratio / ordinal / nominal scales
– selected by the context, restricted by the noun

Adjectives – (mostly) one feature of comparison
– relating to a ratio scale
– given by the adjective's meaning

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The semantics of adnominal *so* / *solch*

$[_{NP} [_{DET} \textit{ein}] [_{N'} \textit{solcher Tisch}]]$ ('lit: a such table')

$[[\textit{solch}]]$ = $\lambda P. \lambda x. P(x) \ \& \ \text{SIM}(x, t, \mathcal{F})$

$[[\textit{solcher Tisch}]]$ = ...

$[[\textit{ein solcher Tisch}]]$ = $\lambda Q. \exists x. \text{table}(x) \ \& \ \text{SIM}(x, t, \mathcal{F}) \ \& \ Q(x)$

$[_{NP} [_{DET} \textit{so ein}] \textit{Tisch}]]$ ('such a table')

$[[\textit{so}]]$ = $\lambda D. \lambda P. D(\lambda x. P(x) \ \& \ \text{SIM}(x, t, \mathcal{F}))$

$[[\textit{so ein}]]$ = ...

$[[\textit{so ein Tisch}]]$ = $\lambda Q. \exists x. \text{table}(x) \ \& \ \text{SIM}(x, t, \mathcal{F}) \ \& \ Q(x)$

Problem: *jede solche Tasse* but **so jede Tasse*

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The semantics of adverbial / ad-adjectival *so*

$[_{VP} [\textit{so tanzen}]]$ ('dance like this')

$[[\textit{so}]]$ = $\lambda P. \lambda e. P(e) \ \& \ \text{SIM}(e, t, \mathcal{F})$

$[[\textit{so tanzen}]]$ = $\lambda e. \text{dance}(e) \ \& \ \text{SIM}(e, t, \mathcal{F})$

$[_{AP} \textit{so groß}]]$ ('this tall')

$[[\textit{so}]]$ = $\lambda f. \lambda x. \text{SIM}(x, t, \mathcal{F}(f))$

$[[\textit{so groß}]]$ = $\lambda x. \text{SIM}(x, t, \mathcal{F}(\text{height}))$

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How to spell out the SIM relation?

Notion of similarity

- qualitative (Tversky 1977) rather than geometrical (Gärdenfors 2000)
- integrated into referential semantics

Joint work with Helmar Gust, Institute of Cognitive Science, Osnabrück

Similarity makes use of

- multi-dimensional attribute spaces
- classification functions on attribute spaces (providing granularity)
- generalized measure functions (mapping individuals to attribute spaces)

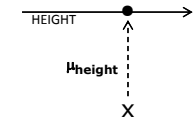
Similarity is defined as indiscernability (cf. Pawlak 1998)

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Generalized measure functions

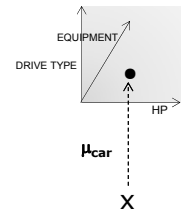
Measure function associated with *tall*
(Kennedy 1999):

$$\mu_{\text{height}}: U \rightarrow \mathfrak{R}$$



Suppose, relevant dimensions of comparison for *car* are

- DRIVE_TYPE: {diesel, gasoline, natural gas, electric}
- HORSEPOWER: \mathfrak{R}^+
- DOORS: {1 ...5}
- EQUIPMENT: \wp {rear assistance, lane guide, park pilot, ...}



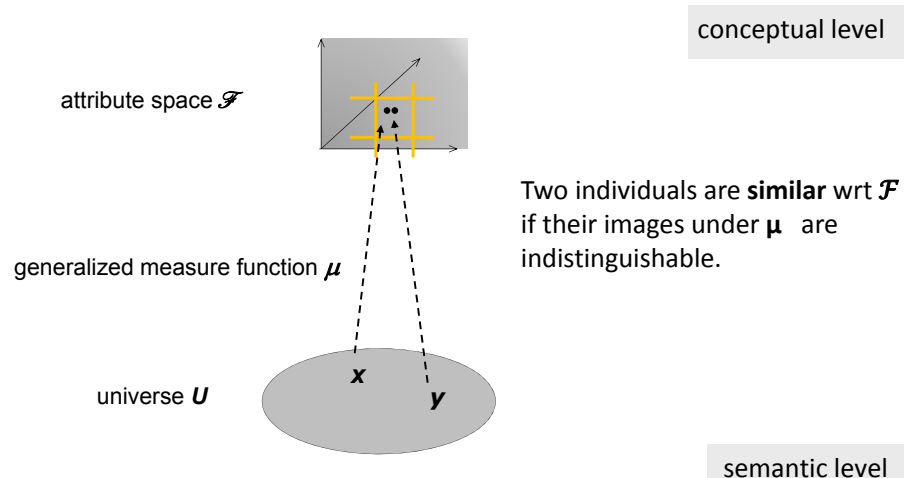
Generalized measure function associated with *car*

$$\mu_{\text{CAR}}: U \rightarrow \text{DRIVE-TYPE} \times \text{HP} \times \text{DOORS} \times \text{EQUIPMENT}$$

$$\text{where } \mu_{\text{CAR}}(x) = \langle \mu_{\text{DRIVE-TYPE}}(x), \mu_{\text{HP}}(x), \mu_{\text{DOORS}}(x), \dots \rangle$$

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The framework (simplified)



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Representations

A **representation** $\mathcal{F} = \langle F, \mu, \cdot^*, \mathcal{D} \rangle$ of a domain $\mathcal{D} = \langle D, \cdot^+, \cdot^-, P \rangle$ is given by

- an **attribute space** F
- a **measure function**
 $\mu: D \rightarrow F$ with $\mu(p_i^+) \cap \mu(p_i^-) = \emptyset$
- **classification functions**
 $\cdot^*: P \rightarrow \Omega^F$
- $p^*(\mu(p_i^+)) = \{\text{true}\}$
 $p^*(\mu(p_i^-)) = \{\text{false}\}$

we call p^* an **approximation** of $p \in P$

(consistency)

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Similarity as indiscernable

Given a representation $\mathcal{F} = \langle F, \mu, \cdot, \cdot^*, \mathcal{D} \rangle$ with domain $\mathcal{D} = \langle D, \cdot, \cdot^*, \cdot^-, P \rangle$

- points x, y in F are **indiscernable** in \mathcal{F}
 $x \sim_{\mathcal{F}} y$ iff $\forall q \in P^{\sim} : q(x) \leftrightarrow q(y)$
- elements x, y in \mathcal{D} are **similar** with respect to \mathcal{F}
 $\text{sim}(x, y, \mathcal{F})$ iff $\mu(x) \sim_{\mathcal{F}} \mu(y)$
- **order** on representations
 $\mathcal{F}_j \geq \mathcal{F}_i$ iff $P_j \subseteq P_i$ & $\forall x, y \in F : x \sim_{\mathcal{F}_i} y \rightarrow x \sim_{\mathcal{F}_j} y$
- a representation \mathcal{F}_j is **coarser** than \mathcal{F}_i iff $\mathcal{F}_j \geq \mathcal{F}_i$ but not $\mathcal{F}_i \geq \mathcal{F}_j$

(for details see Gust & Umbach 2015)

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 - a) the implementation of the similarity relation;
 - b) restrictions on features of comparison, the ad-hoc generation of kinds;

Do similarity classes generated by *so* establish kinds?

so ein Tisch ('such a table') – may serve as a generic NP

– not require well-established kinds

... consider restrictions for adnominal and adverbial *so*

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Restrictions – nominal cases

- | | |
|--|---|
| (6) <i>Anna hat</i> 'Anna has ...' | <i>Berta hat auch</i> 'Berta also has ...' |
| a. ... <i>ein Rad mit Gangschaltung.</i> | ... <i>so ein Rad</i> _{gears} |
| b. ... <i>ein elektrisches Rad.</i> | ... <i>so ein Rad</i> _{electric} |
| c. ... <i>ein Mountain Bike</i> | ... <i>so ein Rad</i> _{mountain bike} |
| '... bike with gears /electric /mountain bike ... such a bike' | |
| d. ... <i>ein griechisches Rad.</i> | ?? ... <i>so ein Rad</i> _{Greek} |
| e. ... <i>ein neues Rad.</i> | # ... <i>so ein Rad</i> _{new} |
| '... Greek/new bike ... such a bike' | |
| f. ... <i>ein neues iPhone.</i> | ... <i>so ein iPhone</i> _{new-version} |
| '... a new iPhone ... such an iPhone' | |

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Restrictions – nominal cases

- | | |
|--|--|
| (7) <i>Anna hat</i> 'Anna has ...' | <i>Berta hat auch</i> 'Berta also has ...' |
| a. ... <i>ein neues Mountain Bike</i> | ... <i>so ein Rad</i> _{mountain bike} |
| b. ... <i>ein altes verrostetes Rad</i> | ... <i>so ein Rad</i> _{old+rusty} |
| '... new Mountainbike / old and rusty bike' ... such a bike.' | |
| (8) a. <i>Anna's Auto ist ziemlich verbeult. Berta hat auch so ein Auto.</i> 'Anna's car is heavily dented. Berta has such a car, too.' | |
| b. <i>Anna's Auto hat einen CD-Spieler. ?? Berta hat auch so ein Auto.</i> | |
| c. <i>Anna's Auto hat ein Ticket. ?? Berta ...</i> 'Anna's car has a CD player / parking ticket.' | |

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Restrictions – verbal cases

- (9) *Anna hat das Huhn* *Berta hat die Ente auch*
'Anna prepared the chicken 'Berta prepared the duck
- a. ... *im Wok zubereitet.* ... *so zubereitet*_{in the wok}
b. ... *gebraten.* ... *so zubereitet*_{fried}
'... in the wok / fried it. ... like this, too.'
- c. ... *im Garten zubereitet.* # ... *so zubereitet*_{in the garden}
d. ... *heimlich zubereitet.* # ... *so zubereitet*_{secretely}
'... in the garden / secretely ... like this, too.'

→ analogous effects in the nominal and in the verbal case

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Restrictions – verbal cases

- (10) *Anna hat das Huhn schnell zubereitet.*
a. # ... *Berta hat die Ente auch so zubereitet.*_{fast}
b. ... *Berta hat die Ente auch so schnell zubereitet.*_{fast}
'Anna prepared the chicken quickly. Berta did it this way / quickly, too.'
- (11) a. *Anna hat laut / *forte die Arie gesungen.*
.... *Berta hat sie auch so gesungen.*
b. *Anna hat die Arie laut / forte gesungen.*
.... *Berta hat sie auch so gesungen.*
'Anna sang the aria loudly/forte. Berta sang it like this, too.'

(Schäfer 2013, Stolterfoht 2015)

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The puzzle

Assume that

- adnominal / adverbial *so* create similarity classes
- these similarity classes constitute ad-hoc kinds

→ Why do *electric* and *with gears* but not *new* qualify as features of comparison in establishing subkinds of bikes?

And why does *new* qualify as a feature of comparison when combined with *iPhone*?

→ Why do *in the wok* and *fry* but not *in the garden* qualify as features of comparison in establishing subkinds of preparing chicken events?

And what is the role of the surface position?

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Event semantics

external vs. *-internal* event modifier
(Maienborn 2003, Schäfer 2013)

Locative modifiers are potentially ambiguous

- external reading: modifying the event
- internal reading: modifying a manner dimension of the event

- (12) a. *Anna hat laut die Arie gesungen.*
 $\exists e$ [... & SING(e) & LOUD(e)]
- b. *Anna hat die Arie laut/forte gesungen.*
'Anna sang the club song / the aria loudly / forte.'
 $\exists e$ [... & SING(e) & $\exists m$ [MANNER_{MUSIC}(m,e) & FORTE(m)]]

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Syntactic position

External adverbial modifiers precede internal ones:
(Maienborn 2003, Frey 2003):

- (13) a. ... *weil sie das Huhn im Garten in Zitrone gekocht hat.*
b. # ... *weil sie das Huhn in Zitrone im Garten gekocht hat.*
'because she cooked the chicken in lemon in the garden.'

Duden (1984): number < time/space < quality/color < material/origin

- (14) a. *ein neues japanisches Auto*
b. # *ein japanisches neues Auto*
'a new Japanese car / a Japanese new car'

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Cognitive psychology: Prasada & Dillingham (2006)

- **Principled** vs. **statistical** connections between kinds and properties.
 - Principled connections involve properties an entity has because it is the kind of thing it is.
- (15) a. *Dogs, in general, are four-legged.*
b. *Dogs are four-legged because they are dogs.*
c. *Dogs, by virtue of being the kinds of things they are, are four-legged.*
- (16) a. *Dogs, in general, are brown.*
b. # *Dogs are brown because they are dogs.*
c. # *Dogs, by virtue of being the kinds of things they are, are brown.*

see also Carlson (2010)

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Greenberg (2003)

Indefinite singular generics, but not bare plurals, require **principled connections between the kind and the predicated property.**

- (12) a. *Carpenters in Amherst give all their sons names ending with 'a' or 'g'.*
b. ?? *A carpenter in Amherst gives all his sons names ending with 'a' or 'g'.*

(Greenberg 2003, p.33)

With a principled connection the indefinite singular generic is acceptable (even if low frequency):

- (13) a. *Bananas that have been sat on by a rhinoceros are flat.*
b. *A banana that has been sat on by a rhinoceros is flat.*

(Carlson 2010, 17/18)

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Features of comparison

Licit features of comparison establish subkinds:

- (14) a. *Ein Rad mit Gangschaltung ist eine Art von Fahrrad.*
b. # *Ein neues Rad ist eine Art von Fahrrad.*

'A bike with gears / a new bike is a kind of bike.'

Licit features of comparison are principally connected to their subkinds:

- (15) a. (Anna hat ein Rad mit Gangschaltung. Berta hat auch so ein Rad.)
Bertas Rad hat eine Gangschaltung, weil es so eines wie Annas ist.
b. (Anna hat ein neues Rad. Berta hat auch so ein Rad.)
Bertas Rad ist neu, weil es so eines wie Annas ist.

'Berta's bike has gears / is new because it is a bike like Anna's.'

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Experimental studies

Which properties qualify as features of comparison?

Series of experimental studies:

- Stimuli as in (6) – (9)
- Naturalness ratings (5 point scale from *clumsy* to *smooth*)
- Prediction: nominal bad: indexicals (broad sense), evaluatives
nominal good: non-indexicals, non-evaluatives
verbal good: manner / method
verbal bad: locatives, mental attitude

Results were more or less as predicted.

How do the good/bad modifiers relate to kinds?

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Stimuli

(16) *In Margots Schlafzimmer steht ein Schminktisch*

a. ... *mit drei großen Spiegeln*

good

b. ... *mit den Initialen der verstorben Großmutter Elisabeth.*

bad

Ihre Freundin hatte auch so einen Schminktisch, ...nämlich einen mit drei großen Spiegeln / mit den Initialen der verstorbenen Großmutter Elisabeth

'In Margot's bedroom there is a dressing table with three big mirrors / with the initials of Grandma Elisabeth. Her friend had **such a table**, too. ... namely one with three big mirrors / with the initials of Grandma Elisabeth'

(17) *Ein Schminktisch*

a. ... *mit drei großen Spiegeln*

good

b. ... *mit den Initialen der verstorben Großmutter Elisabeth.*

bad

ist eine Art von Schminktisch.

'A dressing table with three big mirrors / with the initials of Grandma Elisabeth is **a kind of dressing table.**'

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Interviews

Subjects were asked to "repair" bad stimuli – "Can you imagine a situation in which this sentence is fine?"

(18) *In Margots Schlafzimmer steht ein Schminktisch*

bad

b. ... *mit den Initialen der verstorben Großmutter Elisabeth.*

Ihre Freundin hatte auch so einen Schminktisch, ...nämlich einen mit den Initialen der verstorbenen Großmutter Elisabeth

'In Margot's bedroom there is a dressing table with the initials of Grandma Elisabeth. Her friend had **such a table**, too. ... namely ...

Typical repair: "Grandma Elisabeth had a dressing table production and put her initials on all of them."

→ Bad stimuli, nominal as well as verbal ones, turn into good ones by choosing contexts in which the modifiers provide sub-kinds.

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Do similarity classes generated by *so* establish kinds?

In the nominal and the verbal case: **yes**

(19) a. *so ein Fahrrad* ≈ *diese Art von Fahrrad*

b. *such a bike* ≈ *this kind of bike*

(20) a. *So Huhn zubereiten* ≈ *diese Art Huhn zuzubereiten*

b. *Prepare chicken like this* ≈ *prepare chicken in this way*

In the adjectival case: **no**

– they cannot be combined with the nominal *Art* / *kind*

(21) a. *So groß* ≠ *diese Art von groß sein*

b. *This tall* ≠ *this kind/way of being tall*

a. *So groß* = *diese Größe*

b. *This tall* = *this size*

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Comparing option 1 and option 2

| | Option 1 directly kind-referring (Anderson & Morzycki 2015) | Option 2 similarity-based (Umbach & Gust 2014) | |
|--|--|--|----------------------------------|
| <i>so ein Tisch</i> <i>such a table</i> | nominal kind (of individuals) | similarity class (of individuals) | nominal kind (of individuals) |
| <i>so tanzen</i> <i>dance like this</i> | event kind (of events) | similarity class (of events) | event kind (of events) |
| <i>so groß</i> <i>this tall</i> | degree kind (of states of individuals) | similarity class (of individuals) | ----- |

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Conclusion

- Demonstratives of manner, quality and degree – e.g. German *so* – express similarity instead of identity .
- Spelling out similarity in multi-dimensional attribute spaces includes **conceptual aspects** into **referential semantics**.
- For manner and quality:
Features of similarity require **principled connections** to the (superordinated) kind.
- For manner and quality, but not for degree, similarity classes establish **ad hoc subkinds**.

(One of many) open question:

How to account for **equative comparison** based on similarity?

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