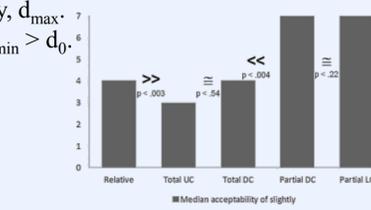


Granularity shifting: Experimental evidence from adjectives and degree modifiers

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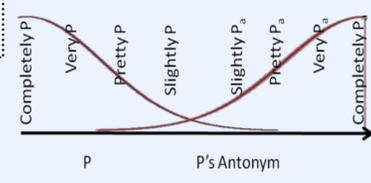
Scale based Inferences (Kennedy & McNally 2005)

Total adjectives – *clean, closed, healthy* – refer to objects with a **maximum** amount of a property, d_{max} .
Partial adjectives – *dirty, open, sick* – refer to objects with a **minimum** amount of a property, $d_{min} > d_0$.
Minimizers: [slightly G]_g = $\lambda x \in C: g(x) > d_0$. Question: d_0 or d_s ?



Level-of-fit Inferences (cf. Krifka 2007; Paradis 2006)

Adjectives are associated with a probability distribution over the scale range they denote, representing the level of fit of each scale point.
 Peaks of antonyms are near opposite scale endpoints: Even partial adjectives like *dirty* typically refer to (≈) *rather dirty/ completely dirty* points, not to *slightly dirty* ones.



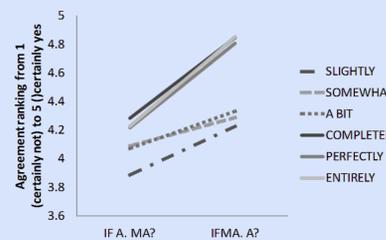
Experiment 1: Scalar Implicatures & Licensed Granularity Shifts

Participants: 25 native speakers of English per item.
Methodology: Truth Value Judgment Task, 5-points Likert scale: certainly not 1 2 3 4 5 certainly
Targets: -slightly/a bit/somewhat + 17 Partial Adjectives; completely/entirely/perfectly + 17 Total Adjectives.
Examples: If A, MA, Minimizer (C1) *Nick says that the room is dirty. Nick's mother thinks that it's slightly dirty. Would Nick agree that it's slightly dirty?*
 If MA, A, Minimizer (C2) *Nick says that the room is slightly dirty. Nick's mother thinks that it's dirty. Would Nick agree that it's dirty?*
 If A, MA, Maximizer (C3) *Nick says that the table is clean. Nick's mother thinks that it's completely clean. Would Nick agree that it's completely clean?*
 If MA, A, Maximizer (C4) *Nick says that the table is completely clean. Nick's mother thinks that it's clean. Would Nick agree that it's clean?*

Questions:
 1. Implicatures: Is *slightly dirty* interpreted as 'at least slightly dirty and possibly dirty' ($M_{Min} > 3$) or 'at most slightly dirty' (< 3)? Is *clean* interpreted as 'at least clean and possibly completely clean' ($M_{Max} > 3$) or 'at most clean'? (< 3)
 2. Lewis 1979: If A, MA: ☺ shifting from coarse (*dirty/clean*) to fine (*slightly dirty/completely clean*) granularity. If MA, A: ☹ shifting from fine (*slightly dirty/completely clean*) to coarse (*dirty/clean*) granularity. Thus, *dirty/clean* will be affected by the shift to pedantic granularity. **Prediction:** If MA, A \gg If A, MA.

Examples of fillers: 4 types of true fillers (ex. F1) and 4 types of false fillers (ex. F2).
(F1) *Nick says that the still-life is more beautiful and colorful than the landscape. Nick's mother thinks that it is more colorful than the landscape. Would Nick agree that it is more colorful than the landscape?*
(F2) *Nick says that the still-life is more beautiful and colorful than the landscape. Nick's mother thinks that it is less colorful than the landscape. Would Nick agree that it is less colorful than the landscape?*
Procedure: 204 target sentences consisting of 6 versions of 34 texts (per 34 adjectives), and 272 fillers. The filler and target texts were counterbalanced into 34 lists of 8 fillers and 6 target texts each (with 6 different modifiers, 3 of each inference form). The lists and items in a list were presented in a randomized order except that all lists began with at least one filler.

Results:
 Most answers are more than half a point above the scale middle 3 (not so in false fillers) => implicatures ('at most slightly dirty', 'at most clean') are relatively minor.
 A two-way factorial ANOVA for 2 blocks (partial adjectives with minimizers, total adjectives with maximizers) with 2 repeated measures (inference types) yields:
 • adjective+modifier type effect ($P < .0001$): Maximized total A's \gg Minimized partial A's.
 • inference type effect ($P < .0001$): If MA, A \gg If A, MA (fine to coarse \gg coarse to fine).
 • an interaction ($P < .0001$): The inference effect is stronger in maximized total A's.



Literature: Kennedy, C. and L. McNally. 2005. Scale Structure and the Semantic Typology of Gradable Predicates. *Language* 81.2. Lewis, D. 1979. Scorekeeping in a language game. *Journal of Philosophical Logic* 8. Krifka, M. 2007. Approximate interpretation of number words: A case for strategic communication. In G. Bouma, I. Krämer, J. Zwarts (eds.), *Cognitive foundations of interpretation*: 111-126.

Granularity shifting (cf. Lewis 1979; van Rooij 2011)

Default (coarse) granularity g: When using *The car is dirty/clean* it is normally appropriate to ignore almost invisible dirt.
Pedantic (fine) granularity g_p: *The car is completely clean/slightly dirty*: Every dust grain counts.
 $\forall g, g_p \in D_{x,d}, g_p$ is finer than g iff $\exists x, y \in D_x, (g(x) = g(y)) \& \neg(g_p(x) = g_p(y))$, & $\neg \exists x, y \in D_x, (g_p(x) = g_p(y)) \& \neg(g(x) = g(y))$.
 For example, ☹, ☹ are in [=]_g but in [$<$]_{g_p}.
 $[G_{partial}]_g = \lambda x \in C: g(x) > d_0$
 $[G_{total}]_g = \lambda x \in C: g(x) = d_{max,g}$
 $[slightly G]_g = \lambda x \in C: g_p(x) > d_s$, for g_p finer than $g: >_g < >_{g_p}$.
 $[completely G]_g = \lambda x \in C: g_p(x) = d_{max,g_p}$, for g_p finer than $g: =_g \supset =_{g_p}$.



Experiment 2: Level-of-fit Inferences

Methodology: Truth Value Judgment Task, 7-points Likert scale: certainly not 1 2 3 4 5 6 7 certainly.
Targets: *slightly/completely* × 30 adjectives of 5 types: Lower/Doubly-closed Partial, Upper/Doubly-closed Total, Relative.
Examples: As in experiment 1 but also with, e.g., *slightly full* and *completely dirty*.
Questions:
 1. Maximizers \gg Minimizers (predicted from peak locations) OR totals \gg partials (contra our prediction)?
 2. Do minimizers refer to scale minimum or denotation minimum: X is slightly full \Rightarrow X is full/ not full?
 3. Do partial/relative adjectives refer to points maximizers typically refer to: X is dirty \approx X is completely dirty?
Examples of fillers: TYPE 1: ROUND AND PRECISE NUMERALS (ROUND NUMBERS: 10 VS. 100 VS. 1000)
Nick thinks he has 10 shirts. Nick's mother thinks he has 9 shirts. Would Nick agree that he has 9 shirts?
Nick thinks that the temperature outside is 9.33 C°. Nick's mother thinks it is 10 C°. Would Nick agree that it's 10 C°?
 TYPE 2: COMPARATIVE CONSTRUCTIONS WITH RELATED ADJECTIVES (TRUE OR FALSE)
Nick thinks that the girl is more vivid than the boy. Would Nick agree that the girl is more emotional than the boy?
Procedure: 120 target texts, 120 type-1 fillers, and 126 type-2 fillers; a randomized order except that each two target texts were separated by two fillers.

Results: replicated; new predictions born out.
 • Most answers are (much) above the scale middle – plausibly in the positive range. (even $M_{slightly\ total} > 4$ – *slightly* relates to high degrees near/at the extension).
 • an inference type effect ($P < .0001$): If MA, A \gg If A, MA.
 • modifier type effect ($P < .0001$): Maximizers (*completely*) \gg Minimizers (*slightly*).
 • adjective type effect ($P < .0003$): (Slightly) partial \gg (Slightly) total
 • an interaction ($P < .0001$): Inference effect stronger in maximized A's.
 Not sig' in slightly + total A's, as the peak of 'slightly total' is outside $[total]_{g_p}$.

Results fillers – Numerals:
 • Opposite inference effect (coarse to fine \gg fine to coarse).
 • Account (assuming upper bound interpretations): If 100 ("about 100"), we tend to agree that "99" ("exactly 99"), but if 99 ("exactly 99"), then not 100 ("exactly 100").
 • Still most answers are at scale middle and more (due to upper open readings?)
 • This holds neither for false fillers, nor for "If 10, ..." with precise numbers too far from 10.

Experiment 3: Entailment task: "If _ does it follow that _? Prediction: Reduced peak effect
Results Slightly partial > Completely partial; Reversed inference effect for "slightly total".