<u>Shifting shades: A study of granularity effects with basic- and subordinate-level color terms</u>

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Summary: We show that the interpretation of basic-level color terms, but not subordinate color terms, shows scale-granularity effects: Sometimes we use 'red' to refer to a particular shade of red, and sometimes to a broader class of red hues, but we suggest this granularity shifting does not occur with subordinate color terms like 'crimson'. We provide new evidence that scale granularity effects, previously observed with number words, also occur in another domain, and contribute to understanding of scale structure by showing that cognitively privileged concepts–focal colors–can act as 'anchors' in multidimensional space to create a coarse-grained 'scale.'

 Puzzle: Dialogs with certain kinds of color terms exhibit a seemingly odd property: The same statement can be construed as agreement (1a,b) or disagreement (1c,d). We call this **Variable Agreement**. As explained below, we propose that this is a diagnostic for variability in the granularity of interpretation (Subscripts indicate hypothesized granularity level; coarse/fine).

	Colors	Category labels	Relative gradable adj
[agree] basic-sub	(1a) A: That's red$_{coarse}$. B: [ok]Yes, it's crimson.	(2a) A: That's a dog. B: [ok]Yes, it's a poodle.	(3a) A: That man is tall. B: [ok]Yes, he is 7 ft 2.
[agree] sub-basic	(1b) A: That's crimson. B: [ok]Yes, it's red$_{coarse}$.	(2b) A: That's a poodle. B: [ok]Yes, it's a dog.	(3b) A: That man is 7 ft 2. B: [ok]Yes, he is tall.
[disagree] basic-sub	(1c) A: That's red$_{fine}$. B: [ok]No, it's crimson.	(2c) A: That's a dog. B: #No, it's a poodle.	(3c) A: That man is tall. B: #No, he is 7 ft 2.
[disagree] sub-basic	(1d) A: That's crimson. B: [ok]No, it's red$_{fine}$.	(2d) A: That's a poodle. B: #No, it's a dog.	(3d) A: That man is 7 ft 2. B: #No, he is tall.

Table 1. (The subordinate expression (eg crimson, poodle, 7 ft 2) is chosen so that, in a default context, it is clearly construable as 'counting as' a shade of red, a kind of dog, and as tall.)

Consider (1a-d), which involve a basic-level color term (e.g. red, blue, green) and a subordinate member of that basic-level color (*crimson* is a type of *red*). Basic-level (focal) colors are perceptually salient and cognitively privileged (e.g. Berlin & Kay 1969, Kay & McDaniel 1978). **Agreement**: In (1a,b), Speaker B answers *yes* and presents her color term as compatible with Speaker A's color term. This yields a felicitous exchange, regardless of whether the terms are in basic-subordinate (*red-crimson*, 1a) or sub-basic order (*crimson-red*, 1b). **Disagreement**: In (1c,d), B answers *no* and presents her color term as incompatible with A's color term. This again yields a felicitous exchange in both basic-sub (1c) and sub-basic order (1d): The same statement can be construed as agreement or disagreement, with both basic- and subordinate-level color terms. (We report an experiment below supporting these judgments.)

 Variable Agreement: Diagnostic of variable granularity. What drives the Variable Agreement effect? Let's first consider what this effect is *not*: We suggest it is not simply due to a basic/subordinate relation, as it does not occur in dialogs with *non-color* category labels like *dog-poodle:* These cannot be easily treated as disagreements (2c, 2d). Nor is Variable Agreement reducible simply to a pairing of 'general characterization+specific realization' (e.g. 'scalar adjective+specific degree'), as it does not arise straightforwardly with predicates like *tall* when paired with a particular (clear) degree of tallness (3c,3d). (We note that a possible 'repair strategy' for (2/3c,2/3d) could be to construe B as being overly pedantic/specific/funny, but we suggest that (1c,d) do not seem to trigger these inferences in the same way.) Nor is Variable Agreement reducible to subjectivity: Predicates of personal taste can be treated as agreements and disagreements only in basic-sub order (A: *That's tasty*. B: *{Yes/No}, it's delicious.*), not sub-basic order (A: *That's delicious*. B: *{Yes/#No}, it's tasty.)* (Faultless disagreement, with opposing

predicates, only allows disagreement: A: *That's tasty.* B*: {#Yes/No}, it's disgusting.*)

Instead, we propose that the Variable Agreement effect is diagnostic of one of the two expressions being **granularity-ambiguous** – interpretable at both a coarse and fine grain. Krifka (2002, 2007) notes that round numbers can be interpreted in a more approximate way than non-round numbers: Someone could say 'It's 3pm' when the time is 3.03pm, but 'It's 3:06 pm' will not receive an approximate interpretation. According to Krifka, what triggers approximate interpretations is the fact that course-grained interpretations are more probable than fine-grained ones. (4) shows that the Variable Agreement pattern observed with **basic-level** and subordinate color terms seems to replicate with '***round***' and 'sharp' time expressions respectively:

(4a) A: John came at 3pm$_{coarse}$.   B: Yes, he came at 3:05.
(4b) A: John came at 3:05pm.   B: Yes, he came at 3pm$_{coarse}$.
(4c) A: John came at 3pm$_{fine}$.   B: No, he came at 3:05.
(4d) A: John came at 3:05.   B: No, he came at 3pm$_{fine}$.

We propose Variable Agreement effects are diagnostic of an expression being interpretable both on a fine- and a coarse-grained scale. But questions remain open about the nature of granularity shifting. Solt et al. (2017) provide experimental evidence that with time expressions, what matters is not mathematical roundness but *domain-specific scale granularity*. (E.g. 45min is 'rounder' than 40min, although in base-10, 40 is 'rounder' than 45.) This domain-specificity raises *the question of how granularity shifting works once we look beyond number words and beyond interval, numerical scales.* (See Sassoon & Zevakhina 2012 on modified adjectives.)

In the present work, we suggest that granularity shifts can occur (i) even with *unmodified adjectives*, and (ii) even *in the absence of any numerical granularity* – namely, with **basic-level (focal) color adjectives**, but not subordinate color adjectives. As shown in Table 1, the claim is that basic-level color terms are ambiguous between coarse- and fine-grained interpretation. We attribute this to the special perceptual and cognitive status of basic-level color terms.
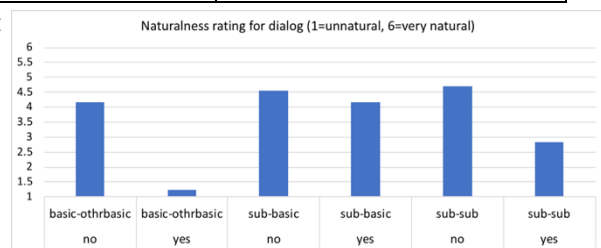
We conducted an **experiment** using Variable Agreement effects as a tool to detect granularity shifts (48 L1 English speakers, on MTurk; 30 targets, 40 fillers). The task was to rate the naturalness of dialogs like those in Table 2. We used the 11 focal colors (from Berlin & Kay, e.g. red, blue, green, purple) and associated subordinate colors (e.g. crimson, indigo).

Table 2. Example (2x3, Latin Square, 30 targets, 40 fillers)

	basic-otherbasic	sub-basic	sub-sub
No	**(5a)**A:That's red. B:No, it's black.	**(6a)**A:That's scarlet. B:No, it's red.	**(7a)**A:That's scarlet. B:No, it's crimson.
Yes	**(5b)**A:That's red. B:Yes, it's black.	**(6b)**A:That's scarlet. B:Yes, it's red.	**(7b)**A:That's scarlet. B:Yes, it's crimson.

The **results** corroborate the judgments in Table 1: Variable Agreement (when *both* yes *and* no responses are judged natural) only occurs with one basic-level and one subordinate-level term (ex.6a-b). Yes-responses are less natural in (5b,7b) than (6b) (lmer; z-scores, p<.001); (6a) and (6b) don't differ. (We tested basic-sub in Exp.2, not reported here.)

Naturalness rating for dialog (1=unnatural, 6=very natural)

Our results extend the domain of inquiry of granularity shifting beyond number words and beyond adjectival modifiers, support our analysis that basic-level color terms allow granularity shifting in the appropriate discourse context – thereby indicating that granularity shifts go beyond numerical and unidimensional scales – and present a new linguistic test, Variable Agreement, as a diagnostic for the availability of granularity shifting.

Selected references:

Berlin B. and Kay P. (1969). *Basic Color Terms: Their Universality and Evolution.* Berkeley & Los Angeles: University of California Press

Kay, Paul & McDaniel, Chad. (1978). The Linguistic Significance of the Meanings of BasiColor Terms. *Language*, 54:610-646

Krifka, M. (2002). Be brief and vague! And how bidirectional optimality theory allows for verbosity and precision. In D. Restle and D. Zaefferer (eds.), Sounds and Systems. Studies in Structure and Change:A Festschrift for Theo Vennemann, 439–458. Berlin: Mouton de Gruyter.

Krifka, M. (2007). Approximate interpretation of number words: A case for strategic communication. In G. Bouma, I. Krämer and J. Zwarts (eds.), Cognitive Founda tions of Interpretation, 111–126. Amsterdam: Koninklijke Nederlandse Akademie van Wetenschapen.

Sassoon, G. & Zevakhina, N. (2012). *Granularity shifting: Experimental evidence from degree modifiers*. Proceedings of SALT 22.

Solt, S., Cummins, C. & Palmović, M. (2017). The preference for approximation. *International Review of Pragmatics 9: 248–268*