Big Differences: The standard for `big' as used by adults and children

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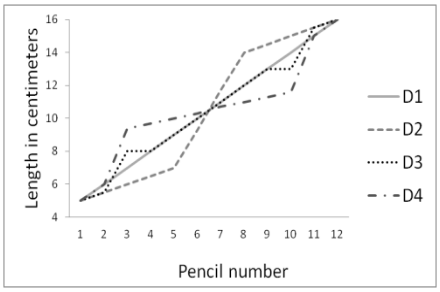
Every time a relative adjective such as *tall/short* is used, it divides the domain of discourse – from candles to mountains – into those items that may be called, e.g. *tall* and the rest of them. To make communication possible, a hearer must know where the cutoff point between *tall* and non-*tall* entities lies. The relevant information must be extracted from the distribution of lengths among the entities in the comparison class. The question this study investigates is: *What is this relevant information*? One hypothesis (H1) is that a certain *degree*, dependent on range, but fixed across different distributions, is the standard. According to a second view (H2), speakers use the *rank ordering* of entities by their length, selecting as *tall* the n% tallest entities (Barner & Snedeker 2008). An even more widespread intuition, going back to Vennemann & Bartsch (1972), is that speakers make more complex calculations: the standard is based on e.g. the average in the domain, with a potential effect of the standard deviation as well (Solt 2011); e.g., those entities are *tall* which are taller than the average length plus a certain proportion of the standard deviation (H3).

We addressed these options, with special attention to a fourth one, whereby *leaps* in the distribution trigger cutoff points. The importance of leaps was already noted by Kennedy (2007) and Van Rooij (2011a), who discuss their role in the analysis of implicit comparison, as in *This pencil is long, compared to that one*, where the distinction between the two pencils must be easy to observe. Gaifman (2010) and Van Rooij (2011b) highlight the merits of leaps as means to avoid the Sorites paradox, by ‘breaking’ Sorites series. However, no previous studies have aimed to test how likely leap midpoints are to be chosen as standards, as opposed to, e.g. averages.

Following Booij (2012), we hypothesized that the use of gradable adjectives is subject to a principle of *discriminatory economy*. One consequence is that distinctions that are *easy to make* are privileged, for they minimize the risk of being wrong. A cutoff point for e.g. *tall* that coincides with a *leap* in the distribution, meets this condition. It reduces uncertainty, as most of the items will be conspicuously shorter or taller.



Methods: Two groups of Dutch-speaking subjects were tested, 28 adults and 26 primary school children. The adjective to be tested was the Dutch word *groot* (En.: big, large), as applied to *pencils*. Each subject was presented with two out of four randomly assigned sets of 12 pencils, one after another, and was asked to put the *big* pencils in a basket. The length distributions of the four sets, D1-D4, are displayed in Figure 1. The distributions were all symmetrical, and had the same average (10.5 cm), but differed in shape and standard deviation ($SD_{D2} > SD_{D1} \approx SD_{D3} > SD_{D4}$). Pencil length in D1 was linearly increasing; D2 was clustered into two sets separated by a leap in the middle (bimodal); D3 was like D1, except for two leaps; D4 had one large cluster in the middle.

Predictions: If the criterion for *big* is to be bigger than a fixed size (H1), then the *transition midpoint*, i.e. the point in between the length of the first big pencil and that of the last non-*big* one (our estimate of the 'real' cutoff point), should be expected to be relatively invariant across distributions (P1). If the criterion for *big* is to be among a fixed percentage of the biggest pencils (H2), then *the transition rank*, i.e. the number of the first *big* pencil (counting from the smallest to the biggest) must be expected to be relatively invariant across distributions (P2). If the criterion for *big* is to be of a size beyond the average plus *a* times the standard deviation (*m* + *a***sd*) (H3), then, since the average is constant, the transition midpoint should be farther from the average when the standard deviation is bigger (P3). Finally, if the cutoff point for *big* should coincide with a leap (H4), then leaps in the distribution should enhance the likelihood for the transition midpoint (of the transition from non-big to big), to fall in that region (P4).

Results and discussion: Adults All respondents were consistent in their response, i.e. no *big* pencil was smaller than any non-*big* pencil in the same test. Mann-Whitney U tests yielded that, except for the combinations D1-D3 and D3-D4, the differences between the transition ranks for the four distributions were highly significant ($p < .01$). With respect to the transition midpoint, the difference was only significant for the combination D2-D4. Thus, predictions P1-P2 were not borne out, contra the fixed size hypothesis (H1), and, in particular, the fixed-rank hypothesis (H2). P3 was not borne out, either: the transition midpoint was roughly *closer* to the average with bigger standard deviation, contra the average plus *a* times standard deviation hypothesis (H3).

The difference between D1 and D3 is of special interest because the mean and standard deviation of both are almost the same, but D3 has leaps, the rightmost of which is between 13 cm and 15.5 cm. As predicted, a peak of respondents had their transition from non-*big* to *big* in this interval. If we take the results for D1 (where there are no leaps) to be a fair estimate of the 'background' likelihood of the transition to be between 13 cm and 15.5 cm, then a binomial test gives a significance of $p < .054$ for the peak associated with the leap in D3. Thus the leap indeed appears to trigger a cutoff point where it would otherwise have been less probable, in support of H4.

This result suggests that standard selection is affected by leaps, over and above any effect of average or deviation. This may be explained by a preference for distinctions that are easy to make, so as to minimize communication errors. Moreover, standard selection based on leaps may be less costly than one based on average, if, instead of using degrees, speakers encode the information by means of semi-orders (van Rooij 2011a,b). If so, the use of leaps is a natural consequence, appealing also in terms of processing costs.

Children In all four cases the results for the children differed significantly from those for the adults ($p < .05$, except for D2 where $p < .085$). The children, unlike the adults, in several cases showed a transition *below* the average length of the pencils. None of the comparisons of the transition midpoints/ranks in D1-D4 proved significant. Leaps did, however, affect the results for the transition rank, especially in D4 vs. D1, contra the fixed-rank hypothesis (H2). In contrast to what was seen with the adults, children tended to locate the transition at the scale midpoint, as a fixed-size hypothesis (H1) predicts. Leaps did not affect the transition midpoint, so the leap hypothesis (H4) found no support for children. Possibly, the tendency to minimize communication errors by using distinctions that are easy to make (leaps) develops later than age 8.

References: **Solt, Stephanie (2011)** Notes on the comparison class. In R. Nouwen, R. van Rooij, U. Sauerland & H.C. Schmitz (eds.): Vagueness in Communication: 189-206; **van Rooij, Robert (2011a)** Implicit versus Explicit Comparatives. In P. Egre & N. Klinedinst (Eds.), Vagueness and Language Use: 51–72; **van Rooij, Robert (2011b)** Vagueness and Linguistics. In G. Ronzitti (Ed.), Vagueness: A guide: 123–170; **Venneman, Theo & Renate Bartsch (1972)** Semantic Structures: 47–86.