

Structural Alignment Facilitates Discovering Differences

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What can differences tell us about the process of comparison? The structural alignment model posits that psychologically salient differences arise out of commonalities (Markman & Gentner, 1993). This leads to the counterintuitive prediction that high similarity pairs (e.g., bicycle/tricycle) should elicit more differences than low similarity pairs (e.g., broom/ambulance), since high similarity pairs have more commonalities from which to derive differences.

Gentner and Markman (1994) tested this prediction using a *speeded difference task*. Participants were asked to list one difference for as many word pairs (of high and low similarity) as possible in 5 minutes. As predicted, participants listed a difference for more high similarity pairs than low similarity pairs. The authors concluded that the high similarity pairs have a difference advantage because they have a larger common system from which to derive differences. However, another possible explanation is that many high similarity pairs (e.g., hotel/motel) have been compared in the past, resulting in a stock of pre-stored differences. Experiment 1 addresses this alternative by directly testing whether producing commonalities facilitates listing differences.

Forty-eight participants first listed a commonality for high and low similarity pairs. They were then given a speeded difference task, as described above. Half of the pairs were “old” (i.e., used in the commonality task), and half were “new.” Differences were produced for more old pairs ($M=5.9$) than new pairs ($M=5.4$, $p<.04$), as predicted. This effect was obtained despite the presence of word pairs that were unlikely to have pre-stored differences (low similarity). However, we still needed to rule out other explanations—e.g., that the difference facilitation was a general result of recent co-activation of the two terms.

In Experiment 2, half of the 48 participants performed a commonality task and the other half performed a thematic connection task on the same word pairs (which were chosen to facilitate either task). For example, the pair “tree/child” could elicit the commonality “both grow” or the thematic connection “a child climbs a tree.” After this setting task, all participants were given the speeded difference task. Sample responses are presented in Table 1. The results showed the predicted interaction ($p=.004$): for the Commonality group, differences were easier to list

for old pairs ($M=8.5$) than for new pairs ($M=7.1$); but this was not the case for the Thematic group ($M(\text{old})=6.1$; $M(\text{new})=7.2$). If anything, their prior exposure to the word pairs appears to have hampered their efforts to later generate differences between the same pairs.

The current experiments demonstrate that recent structural alignment of two items increases the ease of finding their differences. This effect cannot solely be accounted for by alternate causes such as mere exposure or interaction with the pairs. Thus, an advantage for listing differences results specifically from structural alignment.

Table 1: Sample responses from Experiment 2.
(Word pair: Locket/Safe deposit box)

<u>Commonality Subjects</u>
<i>Consensus Commonalities:</i> both close, lock for privacy; keep things of value safe
<i>Consensus Difference:</i> one holds things of emotional value; other holds things of financial value
<u>Thematic Subjects</u>
<i>Consensus Thematic Connections:</i> locket may be placed in a safe deposit box
<i>Consensus Difference:</i> [varied, no consensus] one larger; one more expensive; you can wear one

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References

- Gentner, D., and Markman, A.B. (1994). Structural alignment in comparison: No difference without similarity. *Psychological Science*, 5, 152-158.
- Markman, A.B., and Gentner, D. (1993). Splitting the differences: A structural alignment view of similarity. *Journal of Memory and Language*, 32, 517-535.