

Nominal Hierarchies: Hierarchical information interacts with shape on a novel word task

We investigate semantic inferences drawn by adults interpreting novel words. In children and adults, word learning is constrained by a shape bias (extend a novel word to other same-shape objects [1],[2]). We consider a previously-uninvestigated bias--the strict hierarchy bias (SHB)--and test whether SHB also influences how adults process novel words.

In strict hierarchies, subordinate terms (e.g.,dog) refer to a subset of what superordinate terms (e.g.,animal) refer to--All dogs are animals. Many words for natural kinds follow strict hierarchies (SH) and SHs support both bottom-up and top-down inferences--thus, SHs could aid word learning.

EXPERIMENT-1 is an eye-tracking study that pits SHB against the shape bias, to test which is more powerful in guiding adults' interpretation of novel words.

NAMING--Participants (n=16) saw, on a computer screen, two novel objects with novel names. The objects differed in shape and incidental properties (e.g.,color, patterning). However, both had the SAME STYLE (e.g.,curvy, cf.[3]). Objects were normed to ensure the styles--pointy/blocky/curvy/bulbous--were distinguishable. As objects were displayed, participants heard (i-ii). The superordinate hierarchical property uniting the objects--style--was not mentioned.

TESTING--Participants saw three objects and heard the instructions in (iii,iv). Instruction order alternated. The basic-level instruction ("Choose the dax") is crucial for testing whether participants exhibit SHB, and thus we focus on the "basic-level instruction/basic-first" situation.

Test objects were: (i)an unrelated distractor, (ii)[+shape|-style] object (same shape as dax presented during naming, different style), (iii)[-shape|+style] object (different shape from dax, same style). The [-shape|+style] object matched the dax in style (Style-Only) or both style and incidental properties (Style+IP). We analyzed participants' object-choices and eye-movements.

PREDICTIONS--SHB predicts that when asked to choose another dax, participants will prefer the STYLE-match [-shape|+style] over the shape match. However, if the shape bias is most powerful, participants are predicted to prefer the SHAPE-match [+shape|-style].

RESULTS--Object-choices and eye-movements in the Style+IP condition showed a preference for [-shape|+style] over [+shape|-style] (83%/17%, $p < .05$), supporting SHB. In contrast, in the Style-Only condition, participants rarely chose [-shape|+style], instead preferring [+shape|-style] (9%/91%, $p < .05$), but eye-movements (200-900ms after word onset) reveal equal consideration of [+shape|-style] and [-shape|+style]. This indicates SHB guides on-line interpretation of novel words.

EXPERIMENT-2, an off-line study, tested what happens when people receive no superordinate/hierarchy information--i.e., when SHB is not applicable. Participants (n=16) saw a novel object labeled with a nonsense name (e.g.,dax). Participants were shown the same test objects as Exp1 (but all had the same IPs), and asked to select another dax. Results reveal a bimodal distribution: Participants opted fairly consistently for either [-shape|+style] or [+shape|-style]. This contrast between Exp1 and Exp2 shows that the results of Exp1 are attributable to the availability of hierarchy information, as predicted by SHB.

CONCLUSIONS--A previously-uninvestigated bias--strict hierarchy bias--influences semantic processing and guides adults' interpretations of new words during real-time processing. This finding is relevant for lexical acquisition taking place in adulthood, and also raises the possibility that children use SHB during word learning, something that needs to be investigated in future work.

- (i) This is a leedle. It is a kind of blicket.
- (ii) This is a dax. It is a kind of blicket.
- (iii) Choose the dax. (basic-level)
- (iv) Choose the blicket. (superordinate)

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- [3] Mervis, C. & Crisafi, M. (1982). Order of acquisition of subordinate-, basic-, and superordinate-level categories. *Child Development*, 53, 258-266.