The role of feature correlation in conceptual processing: Evidence from the activation of false features

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Introduction

- Conceptual knowledge is represented in a distributed feature-based system, with feature correlation being a major factor influencing how conceptual information activates.
- Features tend to co-activate other features that they are highly correlated with (i.e. co-occur with).
- For example, the feature is hunted is true of both DEER and DUCK, but is more strongly correlated with the other features of DEER than of DUCK, and this stronger correlation facilitates faster feature activation (McRae, De Sa & Seidenberg, 1997).

- Reflecting in reaction times to target features in feature verification tasks (i.e. DEER = is hunted vs. DUCK = is hunted).

Question: does feature correlation influence activation of false features?

- To date, feature verification tasks have examined within-concept feature correlation. However, feature correlation should influence the whole network of features derived from concepts. This makes a strong prediction about feature activation: highly correlated features should activate even if they are not true of the target concept.
- For example, PENGUIN = does fly:
  - does fly should become highly activated because of the high occurrence of does fly with other bird characteristics, such as has feathers, has wings, has a beak, lays eggs, which are true of PENGUIN.

Evidence for feature correlation across all concepts will come in slower rejection RTs and higher errors with higher false feature correlation. We tested young and mature participants in a slow and speeded feature verification task. If feature correlation is a key organizing principle across the conceptual system, highly correlated false features will be associated with poorer performance, regardless of age of participant or the speed with which the feature is processed.

- We calculated the correlation between the false features (i.e. does fly) and the features in the presented concept (i.e. PENGUIN). We used this measure to investigate the extent to which feature correlation predicts rejection RTs and errors.

Feature Verification (Slow)

**Participants:** 15 young (18-35yrs) and 14 mature (57-74yrs)

**Design:**
- 180 concept – false feature stimuli. 180 concept - true feature fillers.

**Procedure:**
- Feature correlation was calculated from the CSLB property norms (Devereux et al, in press). All features were shared (i.e. occurred 3+ times in the norms).

Examples of stimuli:
LEMON is green
RASPBERRY is sweet
SATSUMA is large
HARMONICA is in orchestras
TAMBOURINE is played
TRUMPET is black

**Results:**
- Young mean=743ms
- Mature mean=1004ms

This pattern of results was also true for the errors.

Feature Verification (Speeded)

**Participants:** 16 young (18-30yrs) and 17 mature (60-75yrs)

**Design:**

**Procedure:**
- Features were single words in a blocked presentation. Items in a block shared a relation (has, does, is, found) (Randall et al, 2004)

Examples of stimuli (with relation has):
- PANSY has a bulb
- DAFFODIL has oil
- CARNATION has thorns
- STOOL has a back
- BASKET has liquid
- SKI has seats

**Results:**
- Young mean=738ms
- Mature mean=836ms

This pattern of results was also true for the errors.

Conclusions

- We tested young and mature participants to investigate the influence of the strength of correlation of a false feature with the features in the presented concept. We used slower and more speeded versions to test for the consistency of that influence.
- The strength of the correlation predicted rejection RTs and errors rates for both young and mature participants in both feature verification tasks. The results indicate that all features that reliably co-occur with other features are activated and that this occurs not just within the features of the presented concept.
- This is evidence for spreading activation between features that is strong enough to interfere with participants’ ability to reject false features. The degree of spreading activation is determined by the co-occurrence of features which is the key factor underlying correlation, providing support for distributed feature based models.

References

