Analysis Design: Detecting distractor processing with classifiers

1. Perform spectral decomposition:
   - Wavelets (49 bands from 2-128 Hz)
   - Spectral components concatenated to make feature vectors
2. Train classifiers to detect each category:
   - One classifier per category per time bin
   - On-screen as target vs. off-screen
   - Trained with ridge regression
3. Apply trained classifiers:
   - Classifier trained to detect the category of the distractor image used for each trial
   - Sum output over time bin classifiers
4. Relate RT and distractor processing:
   - Split trials into quartiles using classifier output
   - Compute priming effect per quartile

Results

Behavioral results:
- Time to name novel image (907ms)
- Time to name ignored image (922ms)
- Priming effect (-1.5ms) (t(15) = 2.71, p < .05)
- Task generates standard weak negative priming effect

Classifier sensitivity analysis:
- Sensitivity to distractor (area under ROC)
  - Priming effect varies nonmonotonically as a function of level of distractor processing
  - Moderate processing predicts significantly larger priming effect than either less or more processing

Conclusions & Discussion

Moderate processing of a perceptual representation reduces the subsequent accessibility of that representation.

This result links the conditions known to induce synaptic weakening in rodents to diminished accessibility of perceptual representations in humans.