Masked priming effects in semantic categorization are independent of category size
Background

- Subliminal priming ~ long-standing debate in cognitive psychology
- Nowadays: debate has shifted
- Subliminal priming exists!
- But: are subliminal primes semantically processed?
- Three competing theories
1. **The semantic categorization hypothesis**: subliminal primes are processed up to a semantic level (e.g. Dehaene et al., 1998)

2. **The direct motor specification hypothesis**: subjects develop automatic S-R mappings, bypassing semantics: no priming for novel primes (Neumann & Klotz, 1994, e.g. Damian, 2001)

3. **The category search model**: subliminal priming only possible for small categories (e.g. Forster, 2004)
Predictions and Goal

1. The semantic categorization hypothesis: response congruency effects, no matter what
2. The direct motor specification hypothesis: response congruency effects only for repeated primes and limited stimulus sets
3. The category search model: response congruency effects only for small categories

Goal = Clarify the role of category size on subliminal priming effects using novel primes
**Design**

**Congruent trial**
- **Time:**
  - 17ms
  - 34ms
  - 480ms
- **Symbols:**
  - LION
  - Horse
- **Labels:**
  - Smaller than dog
  - Bigger than dog

**Incongruent trial**
- **Time:**
  - 17ms
  - 34ms
  - 480ms
- **Symbols:**
  - LION
  - Mouse
- **Labels:**
  - Smaller than dog
  - Bigger than dog

**Fig. 1**
**Fig. 2**
• In all 3 experiments, targets never appeared as primes (novel primes)
• Response assignment was varied across subjects
• Median RTs and mean error rates were studied
• Prime visibility was always objectively measured (“apply same task to prime”): never differed from chance level!!!
Experiment 1

- N = 16
- 3 separate parts:
  - 1a: categorize number words as smaller or larger than 5 (small category)
  - 1b: categorize body parts as below or above the pelvis (small category)
  - 1c: categorize animals as smaller or bigger than a dog (broad category)
Experiment 1: results

**Fig. 3**

- **Experiment 1a**
  - RT (ms)
  - $p < .001$

- **Experiment 1b**
  - RT (ms)
  - $p < .001$

- **Experiment 1c**
  - RT (ms)
  - $p < .001$

- Congruent
- Incongruent
Experiment 1

• Pattern analogous for analyses on error rates
• Conclusion: clear congruency effects
  – for novel primes ≠ Damian (2001)
  – for all categories ≠ Forster (2004)
• But:
  – Our task ≠ Forster’s task
  – Small stimulus sets
   ➔ Experiments 2 and 3
Experiments 2 & 3

- $N_2 = 14$
- Exp. 2: categorize words as animals or objects

- $N_3 = 16$
- Exp. 3: categorize words as animals or not
Experiments 2 & 3: results

**Experiment 2**

- RT (ms) for animal targets
- RT (ms) for object targets

**Experiment 3**

- RT (ms) for animal targets
- RT (ms) for non-animal targets

*Fig. 4*  
*Fig. 5*

- Pattern analogous for analyses on error rates
Conclusion

- Significant priming effects, across different tasks, irrespective of category size and irrespective of stimulus set size!
- Evidence in favor of the semantic categorization hypothesis $\Rightarrow$ subliminal primes are semantically processed!
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