The mechanisms of subliminal stimuli: A meta-analysis and new experiments

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Overview

- Introduction
- Aims
- PART I: The depth of subliminal processing
- PART II: Conscious versus unconscious processing
- General conclusions
Introduction

- Can unconsciously / subliminally presented information influence our behaviour?

→ Subliminal advertising:
  - “Drink Coca-cola, Eat popcorn” → James Vicary (1957)
  - McDonald’s
Masked priming paradigm (Marcel, 1983)
Introduction

→ Masked priming paradigm

<table>
<thead>
<tr>
<th>Prime</th>
<th>Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>Congruent condition</td>
<td>Both &gt; 5</td>
</tr>
<tr>
<td>Incongruent condition</td>
<td>One &lt;, one &gt; 5</td>
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</tbody>
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Difference (RT_I - RT_C) = priming effect
• Can unconsciously / subliminally presented information influence our behaviour? YES!
• BUT…what are the limits/possibilities of unconscious processing?
  – How deep can unconscious information be processed?
  – Does unconscious processing extend to high cognitive levels?
Aims

• Clarify the mechanisms of subliminal stimuli by shedding light on these remaining issues by conducting a large-scale meta-analysis and new masked priming experiments

• 2 different approaches:
  1. The depth of unconscious processing
  2. Conscious VS unconscious processing
Part I

How deep can subliminal stimuli be processed?

2 classes of theories:

- Semantically (e.g. Dehaene et al., 1998)
- Non-semantically, but due to Stimulus-Response (S-R) mappings (e.g. Damian, 2001)
1. Semantic account, congruent condition:

- Prime 6
- Target 9
- Larger than 5!
- Response = press right
- Congruent ➔ faster RT!
1. Semantic account, incongruent condition:

Prime 1

Smaller than 5!

Response = press left

Incongruent → slower RT!

Target 9

Larger than 5!

Response = press right
2. S-R account, congruent condition:

- Prime: 6
- Target: 9

Larger than 5!

Response = press right

Congruent ➔ faster RT!
2. S-R account, incongruent condition:

Prime 4

Target 9

Response = press RIGHT

Response = press left

Incongruent ➔ slower RT!
2. S-R account → Limited to:
   - expected stimuli (e.g. repeated primes, based on task instructions)
   - Small number of stimuli (e.g. small sets, small categories)
   ➔ NO subliminal priming expected for: unexpected stimuli, large stimulus sets, large stimulus categories
Part I

• How deep can subliminal stimuli be processed?
  1. New masked priming experiments
  2. Meta-analysis
Part I

• **Results**

1. Subliminal priming for large target sets/large categories (VDB & R, 2007, Exp Psy) and unexpected primes (VDB et al., in press, Exp Psy)

2. Meta-analysis (VDB et al., in press, Psych Bull): significant subliminal priming across literature, even when the influence of S-R links was minimized or eliminated
• Conclusion Part I: unconscious information can be processed up to a high semantic level!

• However, when the experimental context allows forming of non-semantic S-R links, priming effects are boosted
Part II

Conscious VS unconscious processing

- Differential mechanisms underlying conscious and unconscious processing
  1. Can unconscious compared to conscious information be used strategically and influence subliminal processing?
  2. Does attention have a differential influence on unconscious and conscious stimuli?
1. **Strategic effects** (VDB et al., 2008, Con & Cog; VDB & R, 2008, Con & Cog)

   - % Arabic numbers (e.g. 1) versus number words (e.g. one) was manipulated within a masked priming paradigm: 50-50, 25-75 or 75-25
   
   - This context factor was manipulated either on a conscious (i.e. target) or unconscious (i.e. prime) level
1. **Strategic effects: results**

→ The *conscious* manipulation was used by the subjects, whereas the *unconscious* manipulation could not be used directly by the subjects.
2. **Attention** (VDB et al., under revision)

- Primes were attended or not attended
- Primes were presented consciously or unconsciously

→ *Conscious* primes did not require attention to trigger priming, whereas attention was a prerequisite for *subliminal* priming to emerge!

![Graph showing priming effect (ms) vs attention status (attended vs not attended) with N = 52](image)
Part II

- Conclusion Part II: subliminal information cannot be used strategically and it requires attention in order to evoke priming effects.
- Unconscious processing does have its limits compared to conscious processing.
- However: subliminal information might be used *indirectly* + recent studies.
General Conclusions

• Subliminal processing can extend to high cognitive levels: subliminal information can be semantically processed, seems able to be used strategically in an indirect (and even direct) way

• Subliminal processing also has limits: it requires attention

• Further research is needed to pin down the limits and possibilities of unconscious processing: when can/can’t subliminal information be used strategically?
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