From Visual Masking to Autism

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Cognitive Architecture

Processes and representations in the visual hierarchy:

- **Subprocesses**
  - Selection of different features
  - Binding of similar features
  - Extraction of visual features

- **Representations**
  - Global structures
  - Organized wholes
  - Local features
  - Unorganized parts

Combined action of perception and attention:

- Perception comprises three intertwined subprocesses, namely, feedforward extraction, horizontal binding, and recurrent selection.
- Resulting percepts reflect hierarchical stimulus organizations, that is, segmentations in terms of wholes and parts.
- Attention may modulate the construction of percepts, but predominantly subserves top-down scrutiny of established percepts.

Local features are the first ones processed by perception; global structures are the first ones encountered by attention.

Visual Masking

Visual masking is the reduced visibility of one stimulus (the target) caused by another stimulus (the mask):

- Masking effects are usually defined in terms of the temporal conditions under which they occur (e.g., "forward" or "backward" masking).
- These temporal conditions are necessary but not sufficient (e.g., they may also yield priming or nothing special); for instance:
  - **Symmetry first:** behaviour for SOA = 20-100 as if SOA = 0
  - **Symmetry last:** for SOA = 20-100, partly symmetrical stimuli are discriminated better from completely random stimuli and worse from completely symmetrical stimuli — explanation:

Structural factors determine which effects occur under given temporal conditions.

The Local Advantage in Autism

Autistics perform better than typical individuals on visual tasks in which local features are to be discerned:

- To this end, enhanced local processing would be helpful, but reduced global processing seems both necessary and sufficient.
- Autistics exhibit impaired neuronal synchronization, which indeed suggests a reduced perceptual integration capability.

Dissociating local and global processing:

- Typical individuals can deploy attention via a global structure to compatible features nearly as easily as autistics can do directly.
- In typical individuals, global structures mask incompatible features; autistics are bothered less by that.
- Naïve stimuli hardly differentiate: the local elements may or may not be congruent with the global structure but they are compatible with it.

Conclusions

- Visual masking and the local advantage in autism are intimately connected.
- Impaired synchronization hampers the emergence of global structures that normally mask incompatible features.
- To dissociate local and global processing, (in)compatibility is a better criterion than (in)congruency.

Notes


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