INTERACTIONS BETWEEN CONCEPTS AND PROPERTIES IN ADJECTIVE-NOUN COMBINATIONS
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BACKGROUND

1. Concepts are rarely used in isolation: research examining the neural processes underlying conceptual combination will help reveal how concepts interact with one another, thus enabling us to reference a theoretically infinite number of objects.
2. In adjective-noun combinations (e.g., GREEN PUMPKIN), properties are directly ascribed to objects: here we explore if and how conceptual information is dynamically activated and transformed online as new properties are integrated into concepts during comprehension.

DESIGN

Subjects (N=15) completed 5 different runs while fMRI data were collected: NOUN, ADJ, ADJ-NOUN, and ADJ-NOUN-PICTURES.

PROPERTIES

<table>
<thead>
<tr>
<th>OBJECTS</th>
<th>PROPERTIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>KEY</td>
<td>METAL</td>
</tr>
<tr>
<td>TABLE</td>
<td>WOODEN</td>
</tr>
<tr>
<td>PUMPKIN</td>
<td>ORANGE</td>
</tr>
<tr>
<td>GRASS</td>
<td>GREEN</td>
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<tr>
<td>COOKIE</td>
<td>SWEET</td>
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<td>PICKLE</td>
<td>SALTY</td>
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<tr>
<td>PILLOW</td>
<td>SOFT</td>
</tr>
<tr>
<td>KNIFE</td>
<td>SHARP</td>
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DYNAMIC PROPERTY ACTIVATION

If a property is activated during adjective-noun comprehension, then the pattern evoked by the ADJ-NOUN property should be more similar to the ADJ pattern than is the unmodified NOUN pattern.

PROPERTY ACTIVATION = \( \text{sim(ADJ-NOUN, ADJ)} - \text{sim(NOUN, ADJ)} \)

For example:

\( \text{sim(GREEN PUMPKIN, PUMPKIN)} \)

PROPERTY VOXELS

During adjective-noun processing, property-sensitive voxels show evidence of property activation (i.e., ADJ-NOUN patterns become more similar to the ADJ pattern) for the properties relevant to the voxels’ dimension (blue bars) than for other properties (\(t(3)=14.99, p < 0.001\)).

ADDITIONAL ANALYSES

1. Cluster the Property-Maps and run analyses in individual ROIs to link degree of property activation and integration with specific anatomical regions.
2. Instead of a property-focused approach, isolate voxels underlying representation of object concepts and explore property activation and integration across the feature dimensions and properties of interest.

REFERENCES


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