Why do children link up chicken and egg before building the link between chicken and rabbit?
Acquisition of thematic and taxonomic links in semantic memory in childhood memory

Introduction
Lexicosemantic organization in children comprises different links between concepts. Taxonomic links refer to relationships between concepts sharing common properties and thus belonging to the same category (eg., chicken and rabbit). Thematic links refer to links uniting items sharing a spatio-temporal or contextual link (eg., chicken and egg). There are two main theoretical positions about the temporality of acquisition of taxonomic and thematic links in childhood. The first is traditional, proposing an earlier development of thematic links comparing to taxonomic one. The second view is pluralistic, supporting a parallel development of both relationships.

The objective of this study was to challenge both views of conceptual development in children.

Methodology

1. PARTICIPANTS

(N=90)

Group 1
5 years old
N=30 (♀ 14)

Group 2
7 years old
N=30 (♀ 14)

Group 3
9 years old
N=30 (♀ 15)

Clinical and demographical features

<table>
<thead>
<tr>
<th>Group</th>
<th>Age (years)</th>
<th>MMSE</th>
<th>SKQ</th>
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<tbody>
<tr>
<td>1 (5y)</td>
<td>66.73 (♂=3.31)</td>
<td>11.93 (♂=2.97)</td>
<td>39.17 (♂=12.54)</td>
</tr>
<tr>
<td>2 (7y)</td>
<td>89.27 (♂=2.84)</td>
<td>20.67 (♂=2.45)</td>
<td>17.57 (♂=10.60)</td>
</tr>
<tr>
<td>3 (9y)</td>
<td>113.67 (♂=2.85)</td>
<td>25.83 (♂=2.24)</td>
<td>9.23 (♂=4.86)</td>
</tr>
</tbody>
</table>

Means for the three experimental groups for age (in months), MMSE (Mini-Mental State Examination) scores and total number of errors on the SKQ (Semantic Knowledge Questionnaire, Simoes Loureiro & Lefebvre, 2015). Standard deviations are between brackets.

2. TASK

Naming task associated to a masked semantic priming paradigm

1) Taxonomic condition (N=22 items)

2) Thematic condition (N=22 items)

3) Neutral condition (N=22 items)

4) Fillers pairs (N=110 items)

Results

Given the differences in speed processing between groups, priming effects were expressed as a proportion of priming in accordance with Balota et al. (1999) procedure:

\((\text{Mean RT in unrelated condition} - \text{mean RT in related condition}) \times 100\)

1. INTRAGROUP COMPARISONS

Proportion of priming effect

Thematic priming effect appears significantly at 7 and 9 years old. Taxonomic priming effect only appears at 9 years old.

<table>
<thead>
<tr>
<th></th>
<th>Taxonomic</th>
<th>Thematic</th>
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</thead>
<tbody>
<tr>
<td>Group 1</td>
<td>0.16 (♂=0.16)</td>
<td>2.26 (♂=0.16)</td>
</tr>
<tr>
<td>Group 2</td>
<td>3.28 (♂=0.29)</td>
<td>7.12 (♂=0.73) *</td>
</tr>
<tr>
<td>Group 3</td>
<td>6.96 (♂=0.72) *</td>
<td>8.01 (♂=0.70) *</td>
</tr>
</tbody>
</table>

* Significant PE (Student’s t test comparing the related condition to the baseline)._difference with p<0.05

2. INTERGROUP COMPARISONS

Comparison of PE

Repeated-measures ANOVA with condition (taxonomic vs thematic) as ‘within subject factor,’ and the groups as ‘between subject factor’

Group effect *

\[ F(2, 87) = 8.259, \text{p} = .001, \eta^2 = .160 \]

Condition effect *

\[ F(1,87) = 11.492, \text{p} = .001, \eta^2 = .117 \]

Discussion and conclusions

The objective of this study was to bring a contribution to the understanding of the constitution of the semantic network in children aged from 5 to 9 years old, considering the type of links in the semantic memory (taxonomic versus thematic). Our results demonstrate a progressive development of the lexico-semantic network in 5- 9-year-old children with a distinct evolution of the thematic and taxonomic paths of knowledge organization. Indeed, we observed a specific evolutions in both modes of organization. Thematic priming appears significantly at 7, suggesting that this path of knowledge organization develops early in children. On the contrary, taxonomic priming develops later, only appearing significantly at 9 years of age. Our results fit well with the theory supporting a specific development of both links with an easier process of thematic relationships and it’s why children link up chicken and egg before building the link between chicken and rabbit.