A Microgenetic Approach: A story behind

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Cognitive-developmental research findings are often highly consistent across age groups rather than merely describing the majority of experiments in the domain of cognitive change. There has been interest in understanding how these changes are generated, how the changes differ, and also about differences in reasoning and problem solving in the process itself.

This gap cannot be attributed to the number of widely cited reviews of increasing our understanding of cognitive change (Karpov & Miller, 1993; Sternberg, 1984). It is a byproduct of two quite general conceptualizations and inadequate models to adequately evaluate conceptualizations and how to change and how alternative ways of conceptualizing may improve understanding.

CONCEPTUALIZATIONS OF COGNITIVE DEVELOPMENT

Cognitive developmentalists often suggest that children of a given age should exhibit the same limit, theory, strategy, or rule that
154 problems in 7 sessions

development / cross-section / age

training sessions

S1  S2  S3  ...  S7

6y

7y

8y
<table>
<thead>
<tr>
<th></th>
<th>over sessions (1-7)</th>
<th>over age (6-7)</th>
<th>match</th>
</tr>
</thead>
<tbody>
<tr>
<td>total % correct</td>
<td>increase</td>
<td>increase</td>
<td>+</td>
</tr>
<tr>
<td>% form correct</td>
<td>no change</td>
<td>no change</td>
<td>+</td>
</tr>
<tr>
<td>% orientation correct</td>
<td>increase</td>
<td>increase</td>
<td>+</td>
</tr>
<tr>
<td>% size correct</td>
<td>increase</td>
<td>increase</td>
<td>+</td>
</tr>
<tr>
<td>% colour correct</td>
<td>no change</td>
<td>no change</td>
<td>+</td>
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<tr>
<td>% form cited</td>
<td>no change</td>
<td>no change</td>
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<tr>
<td>% orientation cited</td>
<td>no change</td>
<td>increase</td>
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</tr>
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<td>% size cited</td>
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<tr>
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<td>no change</td>
<td>+</td>
</tr>
<tr>
<td>predominant error</td>
<td>duplicates</td>
<td>duplicates</td>
<td>+</td>
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<tr>
<td>stability over time</td>
<td>yes</td>
<td>predicted</td>
<td>+</td>
</tr>
<tr>
<td>transfer to conservation</td>
<td>yes</td>
<td>predicted</td>
<td>+</td>
</tr>
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mgm: principles & rules

Data collection
• observation span the (whole) period of (rapid) change
• the density of the observation is high, relative to the speed of change
• the change is often (experimentally) manipulated

Data analyses
• source
• rate
• path
• breadth
• variability
Variability of change

The graph shows the percentage of correct responses over sessions for different groups: non-learners, learners, and precocious learners. The x-axis represents the session number (1 to 7), and the y-axis represents the percentage of correct responses. The non-learners group shows a steady increase in correct responses, while the learners group reaches a plateau, and the precocious learners group shows variability with peaks and troughs.
Path of change (quantitative & qualitative analysis of errors)

- 154 problems
- At some point ... learners discovered the correct solution
- Defined as 3 consecutively correct answers

...010011010010101111011001111...
MGM: the change undressed

Data analyses
- source
- rate
- path
- breadth
- variability

Pattern recognition
Observation & analyses
Overlapping waves

[Graphs showing % Correct and Strategy Use over sessions and trials]
MG studies on N estimation

- Estimating N: does orientation matter? by Wang Xuan
- Interrelation between counting & N estimation in 4-6-year olds by Lucija Cernivec
- N cognition & space abilities in 3-year olds by Sara Marn
- Numerical and time-reated estimation by Marina Vidovic