Lifespan cognitive development: The Role of strategic variations.

Bob is someone who…

• Makes you understand what/which are the «big issues»;
« Big Issues »

- Role of strategies  
  \textit{(Lemaire & Fayol, M&C, 1995)}

- Domain-general & Domain-specific processes  
  \textit{(Lemaire & Fayol, 1996, EJCP)}

- Developmental mechanisms  
  \textit{(Lemaire & Fayol, 1994, JECP)}

Bob is someone who...

- Makes you understand what/which are the « big issues »;
- Exerts a role model for the academic books that you may write;
In this important book, Patrick Lemaire demonstrates a powerful new way of looking at aging – and at human cognition in general – that takes a fresh strategy-based perspective. This is a must-read for professionals and students in gerontology and for anyone interested in better understanding the aging of the human mind.

– Alan Hartley, MM Jones Professor of Psychology, Scripps College, USA

Cognitive Aging: The role of strategies offers a ground-breaking new strategy perspective to understanding the underpinnings of both age-related changes and invariance in human cognition. The book first describes what is currently known about cognitive aging, reviewing the behavioral and neuroimaging data showing how our cognitive performance changes with age during adulthood. Current mainstream models propose that as we age we use the same mental processes as when we are young, only less efficiently. In fact, there is good evidence that as we age, we qualitatively change the ways in which we think, resulting in changes in the types of strategies we use to accomplish cognitive tasks.

Using data from psychology and neuroscience, strategic variations during cognitive aging are illustrated in many cognitive domains, from attention, memory and problem solving to decision making, reasoning, and language. By investigating the various changes in strategy choice and repertoire, frequency of use, and efficiency of execution as adults grow older, the author provides a better understanding of age-related changes and individual differences in human cognition. Finally the book illustrates how this strategy perspective can be used to address related issues such as pathological aging, relationships and personality as well as the role of physical fitness and emotions in cognitive aging.

This advanced textbook will be invaluable to students and researchers on cognitive aging courses, as well as those in the field of gerontology, and professionals in allied areas such as medicine, nursing and social work.

Patrick Lemaire is a Professor of Psychology at Aix-Marseille University. He is also a member of the prestigious Institut Universitaire de France and has over 130 publications in cognitive aging and related fields.
Bob is someone who…

- Makes you understand what/which are the « big issues »;
- Exerts a role model for the academic books that you may write;
- Helps you to make insightful proposals

Aspects of Strategic Changes

- Repertoire
- Distribution
- Execution
- Selection

Lemaire & Siegler (JEP:Gen), 1995
Age-related changes in strategy repertoire

Two-digit addition problem solving: Use of 9 strategies

<table>
<thead>
<tr>
<th>Strategies</th>
<th>Example (12+46)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rounding the first operand down</td>
<td>(10 + 46) + 2</td>
</tr>
<tr>
<td>Rounding the second operand down</td>
<td>(12 + 40) + 6</td>
</tr>
<tr>
<td>Rounding both operands down</td>
<td>(10 + 40) + (2 + 6)</td>
</tr>
<tr>
<td>Columnar retrieval</td>
<td>(2 + 6) + (10 + 40)</td>
</tr>
<tr>
<td>Rounding the first operand up</td>
<td>(20 + 46) - 8</td>
</tr>
<tr>
<td>Rounding the second operand up</td>
<td>(12 + 50) - 4</td>
</tr>
<tr>
<td>Rounding both operands up</td>
<td>(20 + 50) - 8 - 4</td>
</tr>
<tr>
<td>Borrowing units</td>
<td>18 + 40</td>
</tr>
<tr>
<td>Retrieving</td>
<td>58</td>
</tr>
</tbody>
</table>

Lemaire & Arnaud, 2008
Hodzik & Lemaire, 2011
Effect of Age on Number of Strat.

Lemaire & Arnaud, 2009
Hodzik & Lemaire, 2011

Aging, EF, & Strategy Repertoire

Lemaire & Arnaud, 2009
Hodzik & Lemaire, 2011
Age-related changes in strategy selection

Computational estimation task

46 x 52
Strategy selection

46 x 52

(2392)

Rounding-up

50x60

Rounding-Down

40x50


Complex Addition problems

146 + 352

Rounding-up

Rounding-Down
Age-related differences in selecting the best strategy

- Lemaire et al. 2004; Hodzik et al., 2008; Lemaire & Brun, 2014

Aging, EF, & Strategy Selection

- Hodzik & Lemaire, 2011
- Lemaire & Lecacheur, 2011
Bob is someone who…

- Makes you understand what/which are the « big issues »;
- Exerts a role model for the academic books that you may write;
- Helps you to make insightful proposals;
- Takes you on a trip to the « Discovery of mechanisms ».

One-prime trials

| 32 x 64 | 23 x 58 | 41 x 53 |

Two-prime trials

| 41 x 53 | 32 x 64 | 23 x 58 |

Lemaire & Leclère, 2014a,b
Adults’ age-related differences in strategy perseveration effects

Lemaire & Leclère, 2014a, b

Age-related changes in strategy perseverations

Lemaire & Brun, 2014a, b; in press
Bob is someone who…

- Makes you understand what/which are the « big issues »;
- Exerts a role model for the academic books that you may write;
- Helps you to make insightful proposals
- Takes you on a trip to the « Discovery of mechanisms »;
- Helps you remain a psychologist during a time of technological revolutions
Two examples

- **Example 1**: Temporal compensations during aging
- **Example 2**: Spatial compensations during aging

**Exemple 1:**
Strategy sequential congruency effects

Computational Estimation Task

- **RD**: 40 x 70 (Better-Strategy Problems)
- **RU**: 50 x 80 (Poorer-Strategy Problems)
Poorer strategy effects

Sequential poorer strategy effects

Latencies

Better Strategy

Poorer Strategy

Solution Latencies (in ms)

Previous: Better Strategy

Previous: Poorer Strategy

Lemaire & Hinault, 2014; Hinault & Lemaire, 2016; Hinault et al., 2014; 2016
Sequential poorer strategy effects

Lemaire & Hinault, 2014

Sequential poorer strategy effects

Lemaire & Hinault, 2014
Scalp Distributions of ERPs: YA

Scalp Distributions of ERPs: OA
ERPs signatures of sequential strategy congruency effects in YA/OA

**Exemple 2: The Calanques!**
Exemple 2: The Calanques!
Exemple 2:
How many dots?
Numerosity estimation performance

Benchmark Strategy in Young Adults

Gandini, Lemaire, Anton, & Nazarian, 2008
Benchmark strategy in Older Adults

Occipital Areas:
- Middle Gyrus
- Lingual Gyrus

Inferior Parietal Lobule
Precentral Gyrus
Postcentral Gyrus
Insula

Gandini et al., 2008

Bob is someone who…

- Makes you understand what/which are the « big issues »;
- Exerts a role model for the academic books that you may write;
- Helps you to make insightful proposals
- Takes you on a trip to the « Discovery of mechanisms »;
- Helps you remain a psychologist during a time of technological revolutions
Merci Bob !