Factors that influence age-related performance in task switching: the benefits of a cue and switch-frequency

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Introduction
Normal aging has been shown to negatively impact cognitive control functions. The elderly, for instance, show delayed responses compared to the young when they are required to change flexibly between two different tasks. These age-related differences can be decreased, when a cue that precedes the target indicates that a switch to the other task is required. In the present study, we examined whether this cue-related benefit for the elderly also depends upon the frequency of task switching.

Methods
Design: Digit (not 5) requires response to more/less than 5/ or odd/even? Pure blocks: one task; Mixed blocks: two tasks.
Factors:
(1) Cue-status (informative, uninformative).
(2) Ratio switch (S) & stay (R).
equiprobable: switch after 0, 1, or 2 stay trials
A-BB-AAA-B-AAA-BBB
non-equiprobable: 123: switch after 2, 3, or 4 stay trials.
AAA-BBBB-AAA-AAAA-BBBB

Participants: 14 elderly; mean age 76.1 (68-87) years, 14 young; mean age 24.3 (range 18-30) years.
EEG recording: Sintered Ag/AgCl, 62 scalp sites; Ref.: linked mastoids; DC-100Hz; 500Hz sampling rate; ERPs: Fig 1.

Behavioral Results
Table 1: RTs in ms for the different conditions.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Young</th>
<th>Elderly</th>
</tr>
</thead>
<tbody>
<tr>
<td>pure task</td>
<td>485</td>
<td>697</td>
</tr>
<tr>
<td>equiprobable</td>
<td>515</td>
<td>706</td>
</tr>
<tr>
<td>non-equiprobable</td>
<td>591</td>
<td>696</td>
</tr>
</tbody>
</table>

Figure 2: The elderly had more difficulty than the young in switching, as reflected by statistically reliable larger Switch costs. However, informative cues reduced Switch costs more in the elderly than in the young. Switch costs were not only smallest for the young in equiprobable blocks, but did also not differ between informative and uninformative cues.

Discussion
Independent of task-switching frequency, the elderly benefited more from an informative cue than the young. Moreover, ERPs indicated that for both age groups switch trials elicited a cue-related increase and a target-related decrease in P300, suggesting at least partly similar executive processes for the young and the elderly. However, a larger switch-related reduction in the target-related P300 for the elderly might reflect their less successful task preparation.

The behavioral data indicate that the young could more easily switch from one task to the other in the equiprobable condition that required frequent switching after 0, 1 or 2 stay trials. In accord with this behavioral result the young only showed a small switch-related increase in the cue-related P300, an effect that has been associated with the retrieval of the relevant task-set. This suggests that the young, but not the elderly, might be able to keep both tasks sets in an active state and/or more easily accessible.

References