Effect of reinforcement on the size-latency phenomenon

Saccadic latencies are known to depend on target eccentricity. Recently, it has been shown that latencies consistently change according to a step-size ratio (Madelain et al., 2005; Harwood et al., 2008; De Vries et al., 2016), an effect termed the size-latency phenomenon.

Hypothesis: latencies are function of an implicit cost-benefit relationship.

We probe this hypothesis by explicitly manipulating the benefit of specific latencies using a reinforcement procedure.

METHODS

Step-size ratios

<table>
<thead>
<tr>
<th>Ratio 0.3</th>
<th>Ratio 1.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixation</td>
<td>Target step + saccade</td>
</tr>
<tr>
<td>1.5</td>
<td>2.5</td>
</tr>
<tr>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>8</td>
<td>10.5</td>
</tr>
<tr>
<td>1.5</td>
<td>2.5</td>
</tr>
</tbody>
</table>

We used a adaptive reinforcement criterion

Criterion = the median latency computed over a 50-trial moving window for each ratio:
- 320 trials per session
- 40-trial blocks with one ratio during baseline
- 30 sessions per subject
- 2 counterbalanced blocked conditions

We used a adaptive reinforcement criterion

Reinforced if latency < criterion
Reinforced if latency > criterion

RESULTS

Manipulating the cost-benefit relationship changed the latency distributions

Chances in saccadic latencies are not explained by changes in saccadic amplitudes

Latencies decreased by 31 ms and increased by 75 ms

Changes in saccadic latencies are not explained by changes in saccadic amplitudes

Hypothesis: latencies are function of an implicit cost-benefit relationship.

We probe this hypothesis by explicitly manipulating the benefit of specific latencies using a reinforcement procedure.

REFERENCES


De Vries et al. (2016). The saccadic size-latency phenomenon explored: Proximal target size is a determining factor in the saccade latency. Vision Research.

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