Eye Movements and Decision Making Behavior in Indecisive Individuals
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Introduction
Indecisiveness is defined as the inability to make decisions in a timely manner across situations and domains [1], and it may inhibit the ability to process information and make a suitable decision [2]. Indecisiveness has been correlated with other characteristics such as perfectionism, lower self-esteem and lower life satisfaction. Some reports state that indecisive use alternative-based (inter-dimensional) search strategies—searching across the dimensions for each course alternative—and decisive use dimensional-based (intra-dimensional) strategies—searching across the courses for each dimension [4], while other studies have found the opposite [5].

Purpose
• To apply eye movement to decision-making search behavior because of the advantages it holds over manual search tasks [6].
• To understand how indecisiveness affects decision making search behaviors, with a primary focus on the amount of information gathered and search strategy.
• Of secondary interest is how other personality correlates can also provide insight into the underlying factors of decision-making search behaviors.

Method
Participants: 55 Wesleyan University students
Apparatus: An EyeLink 1000 eye tracker was used to record subjects' eye movements. It records eye fixations every millisecond.

Procedure:
• Conditions:
  * No Delay: In this condition, there was one trial. Subjects were asked to look at a grid containing information on five dimensions for five college course options while their eye movements were tracked. They were instructed to look at a grid as little or as much information as they wanted and then to make a course decision.
  * Delay: Subjects in this condition were told that they had the option of re-accessing the course database once more before making a course decision, during which courses could become available or unavailable. If they chose to defer, there were no changes and the same course grid was presented as Trial 2.

Results
Personality Scale Correlations:

<table>
<thead>
<tr>
<th>Indecisiveness</th>
<th>Holism</th>
<th>Concern over mistakes</th>
<th>Doubt about actions</th>
<th>Low Self-Esteem</th>
<th>Maximization</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indecisiveness</td>
<td>0.57**</td>
<td>-0.60**</td>
<td>0.59**</td>
<td>0.14</td>
<td>0.27</td>
</tr>
<tr>
<td>Holism</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Concern over mistakes</td>
<td>-0.59**</td>
<td>0.724</td>
<td>0.609</td>
<td>0.58</td>
<td></td>
</tr>
<tr>
<td>Doubt about actions</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low Self-Esteem</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Indecisiveness is highly correlated with doubt about actions, (part of the perfectionism scale) and low self-esteem.

Behavioral Descriptives:

<table>
<thead>
<tr>
<th></th>
<th>Trial 1</th>
<th>First 75 Fixations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Std. Deviation</td>
</tr>
<tr>
<td>Total fixation time (ms)</td>
<td>45459</td>
<td>18009</td>
</tr>
<tr>
<td>Fixation time on relevant information (ms)</td>
<td>31106</td>
<td>13129</td>
</tr>
<tr>
<td>Fixation time in blank cells (ms)</td>
<td>14256</td>
<td>8538</td>
</tr>
<tr>
<td>Proportion of intra-dimensional shifts</td>
<td>0.706</td>
<td>0.091</td>
</tr>
<tr>
<td>Fixation time in chosen course row (ms)</td>
<td>6259</td>
<td>3534</td>
</tr>
</tbody>
</table>

Summary
• Indecisiveness is highly correlated with doubt about actions and low self-esteem.
• In Trial 1, participants looked at the chosen course row more than any of the other four rows—eye movements capture facets of people's decision making thought processes.
• In Trial 1, indeciscives spent a lower proportion of their fixation time on relevant information compared to decisives and a higher percentage of time on blank spaces.
• In the first 75 fixations, there was a negative correlation between indecisiveness and fixation time in the relevant areas of information.
• In the first 75 fixations, indecisives relied more on an alternative-based search strategy than decisives.

Conclusions and Discussion
• Eye tracking methods may provide insight into decision making behaviors.
• Indecisive individuals look less at areas containing information and use a different search strategy than decisive individuals, using more of an alternative-based search.
  • This is similar to the search pattern found by Patalano and Wengrovitz (2007).
• Analyses of doubt and self-esteem yielded results similar to indecisiveness.
  • Post-hoc analyses revealed that once low self-esteem was covaried out in an analysis of covariance, the relationship between indecisiveness and the proportion of intra-dimensional shifts was no longer significant. This highlights the problem of the highly collinear nature of indecisiveness and self-esteem.

Future Research
• What are indecisive individuals thinking when they look more at the blank spaces when faced with a decision? * Disentangle the relationship between indecisiveness and other personality correlates such as self-esteem and perfectionism.

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Literature Cited