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Decision Experience in Hyperchoice: The Effect of Age, Numeracy, and Mental Fatigue

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Abstract
This experimental study examined differences in decision-making satisfaction and difficulty, in which an abundance of options are available. The results suggest that age and mental play a role, but differences in numeracy showed the greatest significant differences: those with higher numeracy preferred more options; and lower numeracy, fewer options.

Hypotheses
(1) Participants will have worse decision experience (lower decision satisfaction, greater decision difficulty) in the scenario of hyperchoice compared to simple-choice. (2) The negative impact of hyperchoice (as stated above) on decision experience is stronger in older adults than younger adults, (3) in lower experience people than higher numerate people, (4) and people with higher mental fatigue than lower mental fatigue.

Introduction
• Hyperchoice: a large number of available options that overwhelms the consumers past their cognitive threshold and drains their psychological energy (Larceneux, Reiner, & Fady, 2007; Mick, Broniarczyk, & Haidt, 2004; Solomon, 2007).  
  • E.g. entering a product name into the Amazon search bar may lead to over 100,000 results  
  • Participants found the hyperchoice process more difficult, and subsequently, reported lower satisfaction and regret over their choices (Yengar & Lepper, 2000).  
  • Aging is associated with cognitive decline, which can be problematic for decision making (Carpenter & Yoon, 2011).  
  • Lower numeracy is associated with biased decisions (Peters & Bjelkebring, 2015).

Participants
228 participants: 114 older adults (59-96 years old, M_age = 76.88, SD = 9.06) and 112 younger adults (18-29 years old, M_age = 23.97, SD = 2.53) (56.1% female, 77.2% White)

Measures
• Hyperchoice Manipulation and Choice Tasks  
  • Hyperchoice (16 options)  
  • Simple choice (4 options at a time * 4 = 16 total options)  
  • Mattress Choice: Price= $351, Rating = 32 out of 100  
  • Gamble Choice: Probability of .88 of winning $174  
  • Decision satisfaction and decision experience (5-point Likert scale: 1=highly satisfied/very difficult, 5=highly dissatisfied/easy)
  • Rasch-Based Numeracy Scale (Weller et al., 2013); α = .74; 8 items; median proportion of correct answers (larger number=higher numeracy) = .63 for older adults, .75 for younger adults)  
  • “Imagine that we roll a fair, six-sided die 1000 times. Out of 1000 rolls, how many times do you think the die would come up as an even number?”
  • Mental Fatigue Scale Scale (Johansson & Ronnback, 2014; α = .90; 14 items; 4-point Likert scale: 1=low mental fatigue, 4=high mental fatigue; median (higher number=higher mental fatigue) = 1.45 for older adults, 1.68 for younger adults)  
  • “Do you find it difficult to gather your thoughts and concentrate?”  
  • Demographic Survey: age, gender, ethnicity, level of education (6 levels)

Results
<table>
<thead>
<tr>
<th>Age</th>
<th>Gender</th>
<th>Education</th>
<th>Hyperchoice</th>
<th>Numeracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Older adults felt greater difficulty than younger adults.</td>
<td>Males felt greater difficulty than females. (marginal)</td>
<td>Participants with higher education felt greater difficulty than participants with lower education.</td>
<td>Participants with greater mental fatigue felt greater difficulty.</td>
<td>Participants with low numeracy felt greater satisfaction than participants with high numeracy.</td>
</tr>
</tbody>
</table>

Discussion & Conclusion
• Overall, hyperchoice had a main effect or interacted with other factors on decision experience.  
  • Older adults had greater decision difficulty in both tasks and lower decision satisfaction in the gamble choice task.  
  • Lower numerate people were more sensitive to the challenges imposed by hyperchoice.  
  • Younger adults reported higher mental fatigue than older adults.  
  • This study highlights the importance of math education and suggests that merchants should try to limit product selections.

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Figure 1. Gamble Choice Decision Difficulty: The Interaction between Numeracy and Choice Condition
Figure 2. Mattress Choice Decision Difficulty: The Interaction between Education and Choice Condition
Figure 3. Gamble Choice Decision Satisfaction: The Interaction between Numeracy and Choice Condition

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