Impact of Response Scale Direction on Survey Responses in Web and Mobile Web Surveys

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Response Scales

• Measurement of many constructs (e.g., attitudes, opinions, behaviors, states) relies on use of response scales
• Design choices when presenting response scales in self-administered surveys (Christian et al. 2009):
  – No. of scale points
  – Verbal & numeric labels
  – Visual presentation
  – Alignment
  – Direction/Response order

Response Scale Direction

• Scale direction “seems to be a matter of taste” (Rammstedt & Krebs 2007)
• Scale could run from...
  – ...positive/high to negative/low
    • “strongly agree” to “strongly disagree”
    • “all of the time” to “never”
  – ...negative/low to positive/high
    • “strongly disagree” to “strongly agree”
    • “never” to “all of the time”
• Holding other features of a response scale constant, does direction affect survey responses?
  – If yes, in what way?
  – Are there differences between PC web and mobile web?

Acknowledgements

Data collection for this study was funded by a DGOF Research Grant 2013.
### Theoretical Impact of Scale Direction on Survey Responses

- “Primacy effects”
  - Satisficing (Krosnick 1991)
  - Anchoring and adjustment (Tversky & Kahneman 1974)
  - “Near means related” heuristic (Tourangeau et al. 2004; 2007)
  - Cultural influences

### Previous Research

- Direction is shown to bias answers towards start of scale in self-administered surveys (Belson 1966; Chan 1991; Friedman et al. 1988; 1993; Israel 2006; Sheluga et al. 1978)
  - Exceptions (Dickson & Albaum 1975; Israel & Taylor 1990; Powers et al. 1977; Rammstedt & Krebs 2007; Weng & Cheng 2000)
- For Web surveys
  - Vertical scales (Hofmans et al. 2007; Toepoel et al. 2009)
  - Horizontal scales (Stapleton 2013)
  - Horizontal scales less prone to scale direction effect than vertical scales (Christian et al. 2009)
  - Grid questions (Keusch & Yan under review)

### Response Scales in Mobile Web Surveys

- Mobile web surveys alternative form of self-administered data collection + web surveys increasingly completed on mobile devices
- Limited amount of space for displaying Qs and scales on mobile screens
- Responses to scales can differ between web and mobile web Rs (Peytchev & Hill 2010; de Bruijne & Wijant 2013)
- Stapleton (2013) showed stronger scale direction effect among mobile web Rs than among PC web Rs
  - No randomization of modes of administration

### Study Methodology: 2x2x3 Experiment

- Mode of administration
  - PC web
  - Mobile web (iPhone)
- Scale direction
  - High to low
  - Low to high
- Scale alignment
  - Horizontal
  - Vertical
  - Drop-down
Study Methodology: Experiment

Study Methodology: Questionnaire

- Screener (2 Qs)
- Life satisfaction (1 Q)
- Self-reported health (1 Q)
- Health behaviors (4 Qs) -> health behavior indices
- ANES: Attention to news (1 Q)
- Affect questions (7 Qs) -> affect indices
- Materialism (7 Qs) (Richins 1987) -> materialism index
- Demographics (6 Qs)

Study Methodology: Recruitment (1)

- HIT posted on Amazon’s Mechanical Turk (Antoun et al. 2013; Berinsky et al. 2012; Buhrmester et al. 2011)
- iPhone users
- Feb-Apr 2014
- Incentive: $0.35

Study Methodology: Recruitment (2)


**Study Methodology: Sample**

- \( n=1,186 \) iPhone users over 18yrs in U.S.
- 57% male
  - 61% male in PC group
  - 53% male in iPhone group
- 18-71 years
  - Median age: 28 years
- 60% with college degree
  - 56% with college degree in PC group
  - 64% with college degree in iPhone group
- 59% have participated in 10 or more web surveys within last 30 days

**Paradata**

- Most break-offs happened at device switch
  - 47% did not switch
  - Only 3% of R broke-off during experiment
- At least 1 missing item
  - iPhone: 7.6%
  - PC: 3.6%
    - No sign. influence of scale direction and alignment
- Response latency
  - iPhone: 3 min 1 sec
  - PC: 2 min 27 sec
    - No sign. influence of scale direction
    - Horizontal sign. shorter (2 min 31 sec) than vertical (2 min 46 sec) and drop-down (2 min 51 sec)

**ANOVA**

- DVs
  - Pos. & neg. health behaviors indices
  - Pos. & neg. affect indices
  - Materialism index
- No main effects for device, direction, and alignment
  - Controlling for gender, education, response time, & web survey experience
- Interaction effects
  - Materialism index
    - Direction by device \((p=.032)\)
  - Negative affect index
    - Direction by alignment \((p=.022)\)
    - Positive affect index
    - Direction by Web survey experience \((p=.089)\)

**Ratings by Direction**

<table>
<thead>
<tr>
<th>Group</th>
<th>Pos. health behaviors</th>
<th>Neg. health behaviors</th>
<th>Pos. affect</th>
<th>Neg. affect</th>
<th>Materialism</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low-high</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High-low</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

controlling for gender, education, response speed, & web survey experience
Ratings by Device

<table>
<thead>
<tr>
<th></th>
<th>PC (n=631)</th>
<th>iPhone (n=555)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pos. health behaviors</td>
<td>[Diagram]</td>
<td>[Diagram]</td>
</tr>
<tr>
<td>Neg. health behaviors</td>
<td>[Diagram]</td>
<td>[Diagram]</td>
</tr>
<tr>
<td>Pos. affect</td>
<td>[Diagram]</td>
<td>[Diagram]</td>
</tr>
<tr>
<td>Neg. affect</td>
<td>[Diagram]</td>
<td>[Diagram]</td>
</tr>
<tr>
<td>Materialism</td>
<td>[Diagram]</td>
<td>[Diagram]</td>
</tr>
</tbody>
</table>

Ratings by Alignment

<table>
<thead>
<tr>
<th></th>
<th>Drop-down (n=419)</th>
<th>Horizontal (n=387)</th>
<th>Vertical (n=380)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pos. health behaviors</td>
<td>[Diagram]</td>
<td>[Diagram]</td>
<td>[Diagram]</td>
</tr>
<tr>
<td>Neg. health behaviors</td>
<td>[Diagram]</td>
<td>[Diagram]</td>
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</tr>
<tr>
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<td>[Diagram]</td>
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<td>[Diagram]</td>
</tr>
<tr>
<td>Neg. affect</td>
<td>[Diagram]</td>
<td>[Diagram]</td>
<td>[Diagram]</td>
</tr>
<tr>
<td>Materialism</td>
<td>[Diagram]</td>
<td>[Diagram]</td>
<td>[Diagram]</td>
</tr>
</tbody>
</table>

Materialism Index by Direction by Device

Interaction: p=0.032

<table>
<thead>
<tr>
<th></th>
<th>Low-high</th>
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</tr>
</thead>
<tbody>
<tr>
<td>PC (n=631)</td>
<td>[Diagram]</td>
<td>[Diagram]</td>
</tr>
<tr>
<td>iPhone (n=555)</td>
<td>[Diagram]</td>
<td>[Diagram]</td>
</tr>
</tbody>
</table>

Negative Affect Index by Direction by Alignment

Interaction: p=0.022

<table>
<thead>
<tr>
<th></th>
<th>Low-high</th>
<th>High-low</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drop-down (n=419)</td>
<td>[Diagram]</td>
<td>[Diagram]</td>
</tr>
<tr>
<td>Horizontal (n=387)</td>
<td>[Diagram]</td>
<td>[Diagram]</td>
</tr>
<tr>
<td>Vertical (n=380)</td>
<td>[Diagram]</td>
<td>[Diagram]</td>
</tr>
</tbody>
</table>
Positive Affect Index by Direction by Web Survey Experience

Interaction: $p=0.089$

Internal Consistency – Health Behaviors

<table>
<thead>
<tr>
<th>Direction</th>
<th>high-low</th>
<th>low-high</th>
<th>Feldt test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>0.653</td>
<td>0.595</td>
<td>$p=0.031$</td>
</tr>
<tr>
<td>Device</td>
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<tr>
<td>iPhone (n=555)</td>
<td>0.648</td>
<td>0.58</td>
<td>$p=0.074$</td>
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<tr>
<td>PC (n=631)</td>
<td>0.659</td>
<td>0.602</td>
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<td>Alignment</td>
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<td></td>
</tr>
<tr>
<td>Drop-down (n=419)</td>
<td>0.615</td>
<td>0.663</td>
<td>$p=0.170$</td>
</tr>
<tr>
<td>Horizontal (n=387)</td>
<td>0.599</td>
<td>0.585</td>
<td>$p=0.406$</td>
</tr>
<tr>
<td>Vertical (n=380)</td>
<td>0.725</td>
<td>0.509</td>
<td>$p=0.001$</td>
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</tbody>
</table>

Internal Consistency – Affect

<table>
<thead>
<tr>
<th>Direction</th>
<th>high-low</th>
<th>low-high</th>
<th>Feldt test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>0.582</td>
<td>0.581</td>
<td>$p=0.489$</td>
</tr>
<tr>
<td>Device</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>iPhone (n=555)</td>
<td>0.578</td>
<td>0.559</td>
<td>$p=0.360$</td>
</tr>
<tr>
<td>PC (n=631)</td>
<td>0.587</td>
<td>0.603</td>
<td>$p=0.364$</td>
</tr>
<tr>
<td>Alignment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drop-down (n=419)</td>
<td>0.539</td>
<td>0.562</td>
<td>$p=0.355$</td>
</tr>
<tr>
<td>Horizontal (n=387)</td>
<td>0.583</td>
<td>0.609</td>
<td>$p=0.331$</td>
</tr>
<tr>
<td>Vertical (n=380)</td>
<td>0.627</td>
<td>0.58</td>
<td>$p=0.209$</td>
</tr>
</tbody>
</table>

Cronbach's Alpha; n=1,186

Internal Consistency – Materialism

<table>
<thead>
<tr>
<th>Direction</th>
<th>high-low</th>
<th>low-high</th>
<th>Feldt test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>0.788</td>
<td>0.763</td>
<td>$p=0.090$</td>
</tr>
<tr>
<td>Device</td>
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<tr>
<td>iPhone (n=555)</td>
<td>0.782</td>
<td>0.757</td>
<td>$p=0.188$</td>
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<tr>
<td>PC (n=631)</td>
<td>0.793</td>
<td>0.767</td>
<td>$p=0.148$</td>
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<tr>
<td>Alignment</td>
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<tr>
<td>Drop-down (n=419)</td>
<td>0.803</td>
<td>0.734</td>
<td>$p=0.017$</td>
</tr>
<tr>
<td>Horizontal (n=387)</td>
<td>0.772</td>
<td>0.799</td>
<td>$p=0.195$</td>
</tr>
<tr>
<td>Vertical (n=380)</td>
<td>0.78</td>
<td>0.757</td>
<td>$p=0.160$</td>
</tr>
</tbody>
</table>

Cronbach's Alpha; n=1,186
Conclusions

• Compared to PC users, mobile device users...
  – ...took longer time to complete the survey
  – ...were more likely to provide missing data
• Scale direction does not have a significant main effect on mean ratings
  – Significant interaction with device for one index
  • Stronger scale direction effects for mobile device users in materialism
  – Significant interaction with scale alignment for one index
  • Stronger scale direction effects for drop-down menu in neg. affect
  – Significant interaction with web survey experience for one index
  • Stronger scale direction effects for less experienced Rs in pos. affect
  – Satisficing is not explanation for differences in responses
• Higher internal consistency under high-low direction

Limitations & Future Research

• MTurk workers are highly motivated
• Mobile web Rs limited to iPhone users
• Investigating mechanism for direction effects

Thank you!

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Question Wording

• Health behavior (All of the time – Most of the time – Some of the time – A little of the time – Never)
  – During an average week, how often do you...
    – ...eat foods that are high in fat and/or calories?
    – ...eat fast food?
    – ...eat a variety of fresh fruits and vegetables?
    – ...do physical exercise?
  – Thinking about yesterday, how...
    – ...calm did you feel?
    – ...happy did you feel?
    – ...frustrated did you feel?
    – ...sad did you feel?
    – ...competent did you feel?
    – ...nervous did you feel?

• Materialism (Strongly agree – Somewhat agree – Neither agree nor disagree – Somewhat disagree – Strongly disagree)
  – It is important to me to have really nice things.
  – I would like to be rich enough to buy anything I want.
  – I’d be happier if I could afford to buy more things.
  – People place too much emphasis on material things.
  – It’s really true that money can buy happiness.
  – The things I own give me a great deal of pleasure.
Methods


Literature


Literature


