Persuasive Performance Feedback: The Effect of Framing on Self-Efficacy

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Self-monitoring technology
Self-monitoring technology

Sleep
Zeo
Self-monitoring technology

Activity & Sleep
Lark
Self-monitoring technology

Activity & Sleep

BodyMedia
Self-monitoring technology
Feedback design is underexplored
Example—fitbit’s step count

“Get 268 steps more to hit your daily goal”
Inspiration

Framing Effects  [Tversky & Kahneman, 1981]

half empty?
half full?
Odds of a grueling operation

“90 out of 100 patients are alive after five years”

“10 out of 100 patients are dead after five years”

[Marteau, 1989]
Power of positive valence framing

“90 out of 100 patients are alive after five years”

“10 out of 100 patients are dead after five years”

[Marteau, 1989]
Goal

Persuasive performance feedback to nudge people toward healthier behaviors

[Thaler & Sunstein, Nudge, 2008]
Hypothetical scenario

4:30 PM, weekday

10,000 steps
Achieved steps

I’ve walked 2,500 steps!
Remaining steps

7,500 more steps to take!

7,500 steps

10,000 steps
Three types of framing

Valence of Performance
Presentation Type
Data Unit
Three types of framing

Valence of Performance

achieved vs. remaining

- 2,500 steps achieved
- 7,500 steps remaining
Three types of framing

Valence of Performance

Presentation Type

- text-only vs. text with visual

- 2,500 steps achieved
Three types of framing

Valence of Performance

Presentation Type

Data Unit

raw vs. percentage

2,500 steps achieved

25% achieved
Distance to the goal

Low achievement vs. High achievement

25% 75%
# Feedback manipulation

## Between-subjects Factors (2x2x2)

<table>
<thead>
<tr>
<th>Valence</th>
<th>Presentation</th>
<th>Data Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Achieved</td>
<td>Text-only</td>
<td>Raw</td>
</tr>
<tr>
<td>Percentage</td>
<td>Text with visual</td>
<td>Percentage</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Remaining</th>
<th>Presentation</th>
<th>Data Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Text-only</td>
<td>Raw</td>
<td>Percentage</td>
</tr>
<tr>
<td>Text with visual</td>
<td>Raw</td>
<td>Percentage</td>
</tr>
</tbody>
</table>

## Within-subjects Factor (x2)

<table>
<thead>
<tr>
<th>Distance to the goal</th>
<th>Condition 1</th>
<th>Condition 2</th>
<th>Condition 3</th>
<th>Condition 4</th>
<th>Condition 5</th>
<th>Condition 6</th>
<th>Condition 7</th>
<th>Condition 8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low achievement (25%)</td>
<td>2,500 steps achieved</td>
<td>7500 steps achieved</td>
<td>2500 steps achieved</td>
<td>75% achieved</td>
<td>75% remaining</td>
<td>7500 steps achieved</td>
<td>75% remaining</td>
<td>75% remaining</td>
</tr>
<tr>
<td>High achievement (75%)</td>
<td>7,500 steps achieved</td>
<td>75% achieved</td>
<td>2500 steps remaining</td>
<td>75% achieved</td>
<td>75% remaining</td>
<td>2500 steps remaining</td>
<td>25% remaining</td>
<td>75% remaining</td>
</tr>
</tbody>
</table>
Dependent measures

Self-efficacy (per feedback)  [Bandura, 1990]

Rate how confident you are that you can achieve your daily goal as of now (4:30 PM, weekday).

0 = Certain I cannot meet my goal  
10 = Certain I can meet my goal

Interest level in taking 10,000 steps every day (per subject)

0 = Not at all interested  
10 = Very interested
Study procedure

- Filtering Q1-1
- Interest level Q
- Filtering Q2
- Self-efficacy Q1
- Self-efficacy Q2
- Filtering Q1-2
- Demographic Q

Feedback A
Feedback B
Results
Participants (N = 400)

Convenience sampling (N = 511)
- Recruited from researchers’ social network (e.g., post on facebook, email)
- Skewed toward highly educated, motivated, technical population

Removed 111 participants
- Did not understand the feedback correctly (70 participants)
- Outside of U.S. (25 participants)
- Did not pay attention to the survey (9 participants)
- iPhone/iPad user (7 participants)
Participants (N = 400)

Gender Ratio

- Female: 47%
- Male: 53%

Pedometer Use

- No: 57%
- Yes: 43%

Participants’ ages ranged from 19 to 68 (M = 32.7)
Main effect of valence framing

p = .04

Distance to the Goal

Certain I can meet my goal

Unsure if I can meet my goal

Certain I cannot meet my goal
Main effect of valence framing

Achieved framing

2,500 steps achieved
25% achieved

Remaining framing

7,500 steps remaining
75% remaining
Main effect of presentation type

Distance to the Goal

- Certain I can meet my goal
- Unsure if I can meet my goal
- Certain I cannot meet my goal

\[ p = .007 \]
Main effect of presentation type

Text-only
- 2,500 steps achieved
- 25% achieved
- 7,500 steps remaining
- 75% remaining

Text with visual
- 2,500 steps achieved
- 25% achieved
- 7,500 steps remaining
- 75% remaining
Interaction effect: Data Unit x Distance to the goal

$p = .002$

Diagram:
- Certain I can meet my goal
- Unsure if I can meet my goal
- Certain I cannot meet my goal

Distance to the Goal

25% 75%
Interaction effect: Data Unit x Distance to the goal

Distance to the Goal

- Certain I can meet my goal
- Unsure if I can meet my goal
- Certain I cannot meet my goal

p = .02
Interaction effect: Data Unit x Distance to the goal

- 2,500 steps achieved
- 25% achieved

This effect was not observed for the distance to the goal at 75% level
Discussion
Discussion

Give feeling of bigger achievement for higher self-efficacy
   Highlight what people achieved
   Data unit can contribute to this

High-interest sampling bias supports our findings further
   Less likely to observe framing effects in intrinsically motivated people
Future Work

Embedding persuasive performance feedback in real-world situations and testing through deployment studies

Testing at more extreme cases toward the both ends of the goal (e.g., 5%, 95%)

Using judgmental / exaggerated visuals for stronger framing effect
Contributions

Feedback design matters—context dependent
Leverage framing effect

Empirical guidance to create influential, persuasive feedback

Many application domains
  Health communication campaign
  Self-monitoring technology interface design
  Privacy…
Thank you!

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