Emotions in best- and worst- discrete choice experiments

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Emotions in BW DCEs???

Pick the best shower gel!
How do you feel about it?
Neutral?
Not really emotional?

Now, pick the worst shower gel!
How do you feel now?
Still no emotions?

Don´t worry, that´s normal.
Your feelings are very subtle....
Brief overview of talk ...

**Objectives**

- Test for *emotional experiences underlying* best-worst DCEs
  - If so: Test if *emotional experiences differ* between best & worst choices?
- Gain insights in *differential roles of framing manipulations* (best VS worst)
  - More nuanced interpretation of BWDCE choice data?
- Investigate *contingencies of emotional processes in best & worst DCEs*
  - Provide initial thoughts about integrating emotions in DCE models.

**Procedure**

- Best-Worst Discrete Choice Experiment (BWDCE) study set-up
- Continuous facial EMG (emotion measurement) / eyetracking during BWDCE

**Results**

- Emotions do exist in BW DCEs & they differ between best & worst choices
- Emotions are markers of utility AND dis-utility
- Selective attention, moderating factors influence emotions in decision making
Differences in best/worst decisions...

- **Best choices can be less consistent** than worst-choices (Kogut, 2011).
  - More likely to reconsider options not initially chosen in “best-frames”
    → increasing subjective attractiveness (Carmon, Wertenbroch, & Zeelenberg, 2003).

- **Best-choices** may induce a **greater need to justify** (Wedell, 1997).
  - Best → justification → overly accentuates differences in options (see also Ganzach, 1995).

→ Best & worst decision-making differs!
→ Outcome-focused ex post cognitive perspectives.
→ Emotional processes as an important factor influencing decision making
  (Bechara & Damasio, 2005; Pfister & Bohm, 2008).
Emotions in BW DCEs

- Response task (best / worst) shifts **focus of attention to compatible features** of the stimulus (Schkade & Johnson, 1989, Shafir, 1993).

- **Importance of an attribute** is enhanced by its **compatibility** with the particular **response scale** (Tversky et al., 1988).
  - Choosing (Best) $\rightarrow$ positive attribute-levels.
  - Rejection (Worst) $\rightarrow$ negative attribute-levels.

- Emotion $\leftrightarrow$ focus of attention on relevant aspects of a decision task (Pfister & Bohm, 2008).
  - Positive emotions $\rightarrow$ positive attribute-levels
  - Negative emotions $\rightarrow$ negative attribute-levels

- **H1**: Emotional expression is more positive in best-choices than in worst-choices.
Emotions as valence marker in BW DCEs

- Emotions = valence (utility) associated with an option (Reid & Gonzales-Vallejo, 2009; Bechara & Damasio, 2005)
- Integration of non-continuous self-explicated measures (SAM, Bradley & Lang, 1994) improves predictive power of choice-model (Reid & Gonzales-Vallejo, 2009).

- Best-choices: positive emotions = “utility”
- Worst-choices: negative emotions = “disutility”

- H2: The higher the marginal (dis-) utility of an option presented in best (worst) choices, the higher the positive (negative) emotions associated with that option.
Emotions and selective attention in BW DCE

- Selective attention → **bias of visual gaze on an eventually chosen option** during decision-making (Krajbich, Armel, & Rangel, 2011; Simion & Shimojo, 2006).
- **“Gaze bias”** partly based on **“preferential-looking”** (Shimojo, Simion, Shimojo, & Scheier, 2003).
  - Growing focus on preferred options.
  - Decreasing focus on disliked options.
  - Gaze bias accompanied by decision-relevant emotions (positive & negative).
  - Gaze bias leads to a higher chance of emotional expression merely due to longer exposure time.

- **H3:** Gaze bias towards an eventually chosen option is accompanied by more emotional associations.
Moderating effects on emotions in BW DCEs

- **Experienced difficulty** (Bechara & Damasio, 2005; Shafir, 1993).
- **Subjective certainty** (Bless et al., 1990; Tiedens & Linton, 2010).
- **Motivation** (Lang, Bradley, & Cuthbert, 1999).
- **Gender** (women more emotional expressive; Collignon et al., 2010; Kring & Gordon, 1998).
- **Habituation effects** (decreasing over time; e.g. Epstein & Paluch, 1997)
1. Large-scale online study (N=434)
   - Powerful but undifferentiated test of emotional differences between best- and worst-choices (comparable to Reid & Gonzales-Vallejo, 2009)
     - SAM for emotional valence measures (Bradley & Lang, 1994).
     - BEST more positive than WORST $\rightarrow$ t(433)=3.87; p<.001 (H1 – supported)

2. Laboratory study (N=37)
   - Basis for fine grained analyses of emotional differences.
   - Facial electromyography (fEMG; facial muscle activity recording) for continuous emotions measures (Larsen et al., 2003)
   - Parallel eyetracking to allow for accurate assignment of subtle emotional experiences to specific options.

   - BOTH STUDIES IDENTICAL BW DCE SETUP (Street & Burgess, 2004)
   - Large study (shower gels), lab study (shower gel & yoghurts).
### Choice-options...two sets of stimuli

#### Probably less attractive

<table>
<thead>
<tr>
<th>-1</th>
<th>Code</th>
<th>+1</th>
</tr>
</thead>
<tbody>
<tr>
<td>store brand</td>
<td>Brand</td>
<td>manufacturers’ brand</td>
</tr>
<tr>
<td>pine</td>
<td>Scent</td>
<td>sea breeze</td>
</tr>
<tr>
<td>best standard</td>
<td>Label</td>
<td>organic</td>
</tr>
</tbody>
</table>

#### Probably more attractive

<table>
<thead>
<tr>
<th>durable FMCG</th>
<th>non-durable FMCG</th>
</tr>
</thead>
<tbody>
<tr>
<td>-1</td>
<td>Code</td>
</tr>
<tr>
<td>best standard</td>
<td>Label</td>
</tr>
<tr>
<td>high</td>
<td>Calories</td>
</tr>
<tr>
<td>lemon</td>
<td>Taste</td>
</tr>
</tbody>
</table>

**Two different stimuli-sets for generalization**

28.05.2013
Procedure in the lab study

1. BEST choices with yoghurts
   Filler items (Covariates)

2. WORST choices with showergels
   Filler items (Covariates)

3. BEST-WORST choices with yoghurts
   Filler items (Covariates)

4. BEST choices with showergels
   Filler items (Covariates)

5. WORST choices with yoghurts
   Filler items (Covariates)

6. BEST-WORST choices with showergels

Covariates questions between choice tasks used as distractor to prevent carry-over effects.

Randomized
- Choice set positions within task framing (best/worst)
- Options positions within choice sets
  → Controlled for position effects
Lab Study - procedure choice-set level

Instruction:
Choose **BEST**
(Choose **WORST**)

Instruction, then self-paced progress

Fixate on cross for 2 seconds
→ center visual attention
→ measure emotional baseline

4 options per Choice set, choice with button-press ends presentation

10 seconds forced break
→ regress on emotional baseline

break 10 sec

28.05.2013 12
Combination of fEMG and eyetracking

→ Eyetracking used to assign fEMG-measures to options...

→ dependent variables:
  - **frown-muscle activity** (high = negative emotions / low = positive emotions)
  - **smile-muscle activity** (high = positive emotions / low = negative emotions)

**Results lab study - Yoghurts**

<table>
<thead>
<tr>
<th>Stimulus: Yoghurt (N=3383)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Muscle:</strong></td>
<td>Frown-muscle</td>
<td>Smile-muscle</td>
</tr>
<tr>
<td>Constants</td>
<td>3.248*** (.327)</td>
<td>1.709*** (.367)</td>
</tr>
<tr>
<td>Best-choices</td>
<td>-.405** (.125)</td>
<td>1.086*** (.174)</td>
</tr>
<tr>
<td>Worst-choices</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Best*option utility</td>
<td>.674** (.233)</td>
<td>.954** (.325)</td>
</tr>
<tr>
<td>Worst*option disutility</td>
<td>.755** (.240)</td>
<td>.780* (.335)</td>
</tr>
<tr>
<td>Gaze bias</td>
<td>.022** (.007)</td>
<td>.016 (.010)</td>
</tr>
<tr>
<td>Gaze on “no-choice”</td>
<td>.043+ (.022)</td>
<td>-.045 (.031)</td>
</tr>
<tr>
<td>Gaze on choice</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>-2 restr. LL</td>
<td>2813.2</td>
<td>5221.7</td>
</tr>
<tr>
<td>BIC</td>
<td>2829.6</td>
<td>5238.1</td>
</tr>
</tbody>
</table>

**H1 supported:**
Frown & smile muscles indicate **more positive emotions in best** than worst choices.

**H2 needs to be revised:**
Higher (dis-)utility in best (worst) setting, the higher frown & smile muscle activity → overall more decision relevant emotions?

**H3 Partly supported:**
Selective attention on eventually chosen option stimulates **frown-muscle** (a more serious evaluation?).
Results Lab Study - Showergels

<table>
<thead>
<tr>
<th>Stimulus: Shower gel (N=3577)</th>
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</thead>
<tbody>
<tr>
<td><strong>Muscle:</strong></td>
</tr>
<tr>
<td>Frown-muscle</td>
</tr>
<tr>
<td>-----------------</td>
</tr>
<tr>
<td><strong>Constants</strong></td>
</tr>
<tr>
<td>3.488***</td>
</tr>
<tr>
<td>(.379)</td>
</tr>
<tr>
<td><strong>Best-choices</strong></td>
</tr>
<tr>
<td>-.498***</td>
</tr>
<tr>
<td>(.103)</td>
</tr>
<tr>
<td><strong>Worst-choices</strong></td>
</tr>
<tr>
<td>0</td>
</tr>
<tr>
<td><strong>Best*option utility</strong></td>
</tr>
<tr>
<td>.484*</td>
</tr>
<tr>
<td>(.186)</td>
</tr>
<tr>
<td><strong>Worst*option disutility</strong></td>
</tr>
<tr>
<td>-.141</td>
</tr>
<tr>
<td>(.337)</td>
</tr>
<tr>
<td><strong>Gaze bias</strong></td>
</tr>
<tr>
<td>.0180**</td>
</tr>
<tr>
<td>(.006)</td>
</tr>
<tr>
<td><strong>Gaze on “no-choice”</strong></td>
</tr>
<tr>
<td>-.090***</td>
</tr>
<tr>
<td>(.015)</td>
</tr>
</tbody>
</table>

-2 restr. LL 1923.2 5373.1
BIC 1939.5 5389.4

H1 partly supported: Less frown-muscle activity indicates more positive emotions in best-choices.

H2 again to be revised: Frown-muscle activity in best-setting indicates options with higher utility → more seriously evaluated?

H3 supported: Selective attention on eventually chosen option stimulates both: frown & smile muscles.
# Results Lab Study

<table>
<thead>
<tr>
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<th>Yoghurt (N=3383)</th>
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<tr>
<td><strong>Muscles:</strong></td>
<td><strong>Frown</strong></td>
<td><strong>Smile</strong></td>
</tr>
<tr>
<td>Constants</td>
<td>3.488*** (.379)</td>
<td>1.969*** (.403)</td>
</tr>
<tr>
<td>Best-choices</td>
<td>-0.498*** (.103)</td>
<td>0.062 (.168)</td>
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<tr>
<td>Worst-choices</td>
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<td>0</td>
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<tr>
<td><strong>Best*option utility</strong></td>
<td>0.484* (.186)</td>
<td>0.438 (.304)</td>
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<tr>
<td><strong>Worst*option disutility</strong></td>
<td>-0.141 (.337)</td>
<td>-0.268 (.550)</td>
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<tr>
<td><strong>Gaze bias</strong></td>
<td>0.0180*** (.006)</td>
<td>0.023* (.011)</td>
</tr>
<tr>
<td><strong>Gaze on “no-choice”</strong></td>
<td>-0.090*** (.015)</td>
<td>-0.139*** (.024)</td>
</tr>
<tr>
<td><strong>Gaze on choice</strong></td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>-2 restr. LL</td>
<td>1923.2</td>
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</tr>
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<td>BIC</td>
<td>1939.5</td>
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</tbody>
</table>

H1 *(partly) supported*  
Smile muscle in shower gel not significant, but right direction.

H2 **to be revised**  
All red spaces should have negative signs, if emotions were a marker of (dis-) utility.

H3 *(partly) supported*  
Smile muscle in yoghurts not significant, but right direction.
Summary & implications

H1: Emotional expression significantly more positive in best choices than worst choices. SUPPORTED
   – Emotional experience is an important factor in decision making!
   – Task-framing changes emotional processes during decision making!

H2: The higher the marginal (dis-) utility of an option in a best (worst) choice, the higher the positive (negative) emotions associated with it.
   TO BE REVISED
   – Emotional experience is NOT a marker of utility (limits of fEMG?).
   – Emotional experience is a marker of utility AND disutility?!
   – Differentiation between decision utility & experienced utility necessary (Kahnemann, Wakker & Sarin, 1997)?!
   – Differentiation of decision process necessary (Russo & Leclerc, 1994)?!

H3: Gaze bias towards the eventually chosen option accompanied by more emotional associations with that option. SUPPORTED
   – Emotions & selective attention integrate in decision making.
Overall implications & need for further research

Existence of emotions in BW DCEs
- Results indicate DCEs invoke emotions.
- Both positive as well as negative emotions are encountered.
- Confirmed for both cases of low-involvement FCMG products → generalization, probably not an exception.

Contingencies of emotions in BW DCEs
- Type of decision task matters → best & worst settings evoke different emotions.
- Utility at the option & choice-set-level impacts emotions.
- Personal characteristics (e.g. gender) + other covariates (habituation, perceived complexity...) impact emotions.

Impact of emotions on outcomes (utility)
- Further research needed...
Thank you for your attention!