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Sad or Happy?
The effects of emotions on stated preferences for environmental goods

Nick Hanley, Christopher Boyce,
Mikolaj Czajkowski, Steve Tucker,
Charles Nossair, and Michael Townsend.

Role of emotions in economics

- Basic emotions have been argued to play an important role in decision making (Elster, 1998, Loewenstein, 2000).
- However, the conventional economic model used to predict choices and to derive values is not well set up to recognize how day-to-day emotions might affect these choices and values.

- For a given set of preferences (a given utility function), whether I am happy or sad at some particular moment should not, according to economic theory, determine whether I choose to buy a particular type of coffee for a particular posted price.
- Yet a literature in behavioural sciences and psychology suggests that there are many examples of where emotional states do matter for such decisions.
- Should economists worry about this?

➔ If emotions affect choices, then assumptions of stable welfare measures based on a given set of preferences is perhaps wrong.

Findings from behavioural science

- It has been suggested that emotions enter into the decision making process in three important ways (Rick & Loewenstein, 2008).

- First, certain emotions may be anticipated directly from the outcome of the decision itself and materialize at some future point i.e. through comparing the expected sadness from choosing to buy a ticket to watch St Johnstone play rather than going to the movies

- Second, there are emotions, referred to as integral emotions, which occur at the moment of decision and are directly related to the decision at hand (Lerner, Li, Valdesolo, & Kassam, 2014). For example, the decision itself may pose some element of risk and therefore evoke feelings of fear, or even pleasure (unlikely, where St Johnstone are concerned).

- Rick & Loewenstein (2008) argue that both of these kinds of emotions are part of the decision making process, and do not pose a major challenge for the utility maximizing framework of economics, since they influence the utility associated with choice alternatives.

Incidental emotions

- a more fundamental challenge comes from the consideration of “incidental emotions”, which occur at the moment of the decision but are irrelevant to the payoffs from the decision at hand.
- Examples are joy and sadness
- Incidental emotions influence high level cognitive processes, such as interpretation, judgement, decision-making, and reasoning (Blanchette & Richards, 2010) and it has thus been suggested that incidental emotions have the power to *“re-programme us into effectively different people*” (Loewenstein, 2010).

Strong evidence to support an important role for incidental emotions in decision making

- On the basis that sunshine causes greater feelings of happiness, the amount of sunshine in a given day has been shown to influence stock market performance (Hirshleifer & Shunway, 2003; Kamstra, Kramer, & Levi, 2003).
- When a country's team is eliminated from the World Cup, stock market returns decline (Edmans, Garcia & Norli, 2007).
- Endowment effect is eliminated (reversed) when inducing sadness (Lerner, Small, & Loewenstein, 2004)
- Decisions in ultimatum games (Andrade and Ariely, 2009)
- Charitable donations are influenced by guilt, sympathy, or nostalgia (Kogut & Rigove 2005; Small & Loewenstein, 2003; Ford & Merchant, 2010)

- We thus try to induce different emotional states in our subjects
- We do this using short film clips which have been shown by others to induce feelings of happiness or sadness ("treatments")
- Also include a neutral treatment
- Then we get people to participate in a choice experiment for an environmental good
- We test whether the films "worked"
- Finally, we then test whether the treatments have significant effects on (i) preference parameters (ii) randomness of choice.

Choice experiments

- A stated preference method, although can also be applied using revealed preference data
- Describe good / policy options in terms of their attributes and the levels these take. One attribute is typically a price.
- Generate alternative choices which are made up of these attributes/levels combinations
- Choices which individuals make reveal their trade-off rates (MRS)
- Can also estimate WTP for a change in any attribute
- Analysed using Random Utility Theory (McFadden; Manski) and discrete choice models.

Design (1) - treatments

- Participants randomly assigned to one of three treatments
- In each, they were asked to watch a collection of short film clips (approximately 6-7 minutes in length) of the same valence (sad, happy, neutral).
- The film clips were selected based on prior research which has illustrated the effectiveness of such clips in eliciting specific emotions (Rottenberg, Ray, & Gross, 2007; Schaefer, Nils, Sanchez, & Philippot, 2010).
- So you either watch sad films, or happy films, or neutral films

Film clips used

Condition	Clip 1	Clip 2	Clip 3	Clip 4
Sadness	The Champ (see next slide)	Born on the 4th of July	Forest Gump	
Happiness	Ladder 49	Love actually	Love Actually	Indiana Jones
Neutral	Stock market report	Golf grip video	Abstract painting techniques	Antiques auctions

Design (2): the choice experiment

- The quasi-public good we focus on is beach quality in the north island of New Zealand
- The “good” is a trip to a beach
- Attributes of this good:
  - Water quality
  - Sediment
  - Fish populations
  - Travel distance (➔ price)

Water quality

- Water Quality was described as varying along the coastline due to pollution from human wastes (sewage), nutrient run-off from farmland and other contaminants.
- Respondents were told that such pollution could lead to more beach closures due to increased incidence of algal blooms and rising levels of harmful bacteria in bathing waters.
- They were also told that increased efforts to control pollution were possible, and these would lead to high levels of (better) water quality.

Levels for Water Quality

- Poor water quality – high levels of nutrients, algal blooms likely
- Good water quality
- Very good water quality – nutrient levels are greatly reduced, algal blooms very unlikely

sediments

- Many areas of the New Zealand coastline have suffered from increased sediment loads, which has resulted in a change in clarity, the loss of sand areas, and the increased growth of mangroves which greatly impedes access to the water.

- Respondents were told that "*if we take no further action, sediment will continue to accumulate at the coast and areas of muddy sediment will increase (in coverage and in muddiness). In some places, this will result in further expansion of mangroves. While we can't entirely remove the sediment problem, it is possible to reduce its impacts. With an increased effort in storm-water management areas, we may also be able to improve on the current situation, leading to clearer, bluer water and less muddy shores.*"

Levels for sediments

- High levels of sediment – water is very cloudy, beaches become muddy
- Medium levels of sediment
- Low levels of sediment - water is very clear, beaches stay sandy

Fish populations

- The third attribute used to describe visits to the beach was fish populations. Sea angling is a very popular recreational activity in New Zealand, whilst scuba divers and snorkelers will also likely value more biodiversity in coastal waters.
- Respondents were told that: " *how good fish stocks are depend on how the coastal environment is managed. Right now, fish populations are under pressure from over-fishing and from water pollution. We can take actions to reduce these pressures, but unless we do so, stocks might continue to decline.*"

Levels for fish populations

- Declining – fish populations are falling due to too much pollution and too much fishing
- Stable
- Increasing – there are healthy and expanding populations of fish such as snapper.

Cost of beach visits

- Only small part of costs of water treatment paid via local taxes
- No pricing of beach access
- So we used travel distance instead
- *"Another important factor is obviously how far you would have to travel (to visit any beach), so you will see some information in the choice sets about this too."*

Experimental design

- Given this set of attributes and levels, three blocks of 8 choice sets were constructed.
- Each choice set contains three choice options: visit beach A, visit beach B, or visit neither and make no beach trip on that choice occasion.

Example Choice Card

	Beach A	***Beach B***	*Go to neither – I would not want to visit either of these beaches and would stay at home instead.*
Water quality	good	very good	
Sediments	low	high	
Fish populations	stable	declining	
How far from where you live?	120 km	30 km	
I would choose:	□	□	□

Design (3): lab procedures

- 17 sessions conducted in September 2014 at the University of Waikato in Hamilton, New Zealand.
- A total of **287 subjects** participated in the experiment. The participants were university students that were recruited university wide using ORSEE (Greiner, 2014).
- All interaction within the experiment took place via private computer terminals.
- Each session lasted between 20 – 60 minutes depending upon the treatment.
- Participants were paid $20NZ upon completion of the survey.

Procedures (cont.)

- Upon arrival to the laboratory, participants were free to choose any computer desk to use for the session.
- a short welcome speech by the experimenter after which the survey program was run simultaneously for everyone.
- Participants were initially provided a screen asking their area of study and where they are from. Once everyone completed these two questions, the movie clips started simultaneously for everyone. All subjects were provided headphones for viewing the movies.
- Upon completion of the movie, participants took part in the choice experiment survey.
- Lastly, participants answered a series of questions regarding their personal traits and a self-assessment of emotional state induced while watching the movie. Participants were asked to wait quietly until everyone was finished and then were called back one at a time to be privately paid their participation fee.

Econometric approach

- Paper focusses on mixed logit results
- Interact emotional treatment (happy, sad versus neutral) with the attributes *X;*
- And then with the scale parameter
- Investigated several other econometric approaches, but main results do not change.

What are we testing?

<u>Preference heterogeneity effect:</u>

- *H_0^1: individuals in a sad or a happy (i.e., non-neutral) emotional state will state different preferences for changes in an environmental good than those in a neutral emotional state.*
- *H_0^2: individuals who are in a happy emotional state will state different preferences for changes in an environmental good than those in a sad emotional state.*

<u>Randomness of choice effect:</u>

- *H_0^3: individuals in a sad or happy (i.e., non-neutral) state will display a different randomness of stated choices than individuals in a neutral state.*
- *H_0^4: individuals in a happy emotional state will display a different randomness of stated choices than individuals in a sad emotional state.*

- Results

- First, does the treatment work?

Ordered probit models for effects of treatment on self-reported emotional state

	(A) *sad-happy*	(B) *bad-good*
	Coefficient (s.e.)	Coefficient (s.e.)
Index probability function probability parameters		
Happy treatment	1.3987*** (0.1635)	1.1684*** (0.1574)
Sad treatment	-2.2936*** (0.1660)	-1.4130*** (0.1585)
Threshold parameters for index function		
constant	2.6731*** (0.1210)	2.5598*** (0.1153)
η_1	0.7441*** (0.1000)	0.6529*** (0.0984)
η_2	1.5492*** (0.1108)	1.1778*** (0.1000)
η_3	3.0243*** (0.1042)	2.7623*** (0.0936)
η_4	3.8369*** (0.1014)	3.5245*** (0.0928)
η_5	4.7355*** (0.1326)	4.3084*** (0.1214)
Model characteristics		
Log-likelihood (constant only)	-541.7879	-498.7284
Log-likelihood	-388.1543	-498.7284
McFadden's pseudo R^2	0.2836	0.1913
AIC/*n*	2.7610	2.8660
n (observations)	287	287
k (parameters)	8	8

- Yes, the films induced the desired emotional states.

- Effects of treatments on preference parameters

	(A) Baseline model		(B) Effect of emotional treatments (separate) on preferences					
			Main effects		Interactions with *happy* treatment		Interactions with *sad* treatment	
Variable	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
WQ_1	2.6245***	0.0019	2.3666***	0.0065	0.5377	0.0281	0.4317	0.0254
	(0.1312)	(0.2030)	(0.2029)	(4.0240)	(0.3450)	(4.2493)	(0.3093)	(5.3026)
WQ_2	3.2266***	0.0133	2.9284***	0.0078	0.8424	0.0040	0.2896	0.0068
	(0.1593)	(0.1791)	(0.2599)	(5.4136)	(0.4312)	(9.9424)	(0.3709)	(7.1731)
SED_1	0.9984***	0.0109	1.1444***	0.0109	-0.0775	0.0070	-0.3167	0.4481
	(0.0995)	(0.3220)	(0.1770)	(4.4786)	(0.2723)	(7.6381)	(0.2440)	(0.3543)
SED_0	1.2195***	0.7859***	1.3647***	0.5669	0.1116	0.7732**	-0.4858	0.6920
	(0.1426)	(0.1348)	(0.2424)	(0.3199)	(0.3900)	(0.3818)	(0.3370)	(0.4396)
$FISH_1$	0.7599***	0.2237	0.8837***	0.0349	-0.1314	0.3447	-0.2319	0.3334
	(0.0939)	(0.2797)	(0.1600)	(3.1952)	(0.2535)	(0.5742)	(0.2277)	(0.6135)
$FISH_2$	0.8746***	0.9036***	0.9824***	0.6867***	-0.1284	0.5696	-0.1381	0.9001**
	(0.1466)	(0.1526)	(0.2672)	(0.2584)	(0.4394)	(0.5567)	(0.3737)	(0.4043)
OO	0.8621***	1.6367***	0.6998***	1.5386***	0.2183	1.1170	0.3175	0.0570
	(0.1771)	(0.1657)	(0.2682)	(0.2224)	(0.4045)	(0.7051)	(0.3908)	(5.1486)
DIST	-1.8966***	1.2490***	-1.9247***	1.1439***	-0.1938	1.0543	0.1491	0.0522
	(0.1749)	(0.1557)	(0.2944)	(0.2139)	(0.5333)	(0.5401)	(0.4305)	(5.8717)
Model characteristics								
Log-likelihood (constants only)	-2442.06		-2442.06					
Log-likelihood	-1913.91		-1903.61					
McFadden's pseudo R^2	0.216273		0.2205					
Ben-Akiva Lerman's pseudo R^2	0.447731		0.4494					
AIC/*n*	1.681213		1.7009					
n (observations)	2296		2296					
k (parameters)	16		48					

- So no effects on mean preference parameters of sad or happy treatment
- Now with treated versus not:

	(C) Effect of emotional treatments (combined) on preferences				(D) Effect of emotional treatments (separately) on scale		(E) Effect of emotional treatments (combined) on scale	
	Main effects		Interactions with *happy* or *sad* treatments					
Variable	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
WQ_1	2.3904***	0.0022	0.3863	0.0002	2.4904***	0.0022	2.4958***	0.0015
	(0.1969)	(5.9836)	(0.2536)	(7.4978)	(0.1969)	(0.2054)	(0.1970)	(0.1909)
WQ_2	2.9613***	0.0073	0.4327	0.0178	3.0729***	0.0127	3.0662***	0.0126
	(0.2551)	(3.6670)	(0.3206)	(1.2656)	(0.2432)	(0.1681)	(0.2428)	(0.1686)
SED_1	1.1585***	0.0112	-0.2457	0.0300	0.9475***	0.0139	0.9415***	0.0100
	(0.1760)	(5.8239)	(0.2088)	(3.4149)	(0.1157)	(0.2740)	(0.1156)	(0.3250)
SED_0	1.3817***	0.6155**	-0.2477	0.6347	1.1634***	0.7417***	1.1516***	0.7472***
	(0.2410)	(0.3139)	(0.2918)	(0.3937)	(0.1578)	(0.1355)	(0.1571)	(0.1353)
$FISH_1$	0.8984***	0.0339	-0.2122	0.2310	0.7178***	0.2147	0.7165***	0.2054
	(0.1621)	(3.0573)	(0.1972)	(0.6088)	(0.1027)	(0.2597)	(0.1026)	(0.2736)
$FISH_2$	1.0014***	0.6630**	-0.1881	0.7823**	0.8330***	0.8424***	0.8252***	0.8628***
	(0.2656)	(0.2621)	(0.3329)	(0.3345)	(0.1508)	(0.1541)	(0.1509)	(0.1522)
OO	0.6898**	1.6084***	0.2733	0.3882	0.8066***	1.5660***	0.8183***	1.5501***
	(0.2773)	(0.2749)	(0.3397)	(1.3760)	(0.1766)	(0.1880)	(0.1761)	(0.1864)
DIST	-1.9587***	1.2423***	0.0865	0.0511	-1.8131***	1.1904***	-1.7968***	1.1797***
	(0.3018)	(0.1869)	(0.3841)	(3.7498)	(0.2046)	(0.1680)	(0.2035)	(0.1687)
Covariates of scale								
Happy treatment					0.1810			
					(0.1081)			
Sad treatment					-0.0192			
					(0.1080)			
Happy or *sad* treatments							0.0774	
							(0.0932)	
Model characteristics								
Log-likelihood (constants only)	-2442.06				-2442.06		-2442.06	
Log-likelihood	-1908.92				-1911.86		-1913.57	
McFadden's pseudo R^2	0.218318				0.217114		0.216414	
Ben-Akiva Lerman's pseudo R^2	0.448459				0.447869		0.44774	
AIC/*n*	1.691102				1.681193		1.681796	
n (observations)	2296				2296		2296	
k (parameters)	32				18		17	

***, **, * represent significance at 1%, 5%, 10% level; standard errors in parentheses

No effects of (sad or happy) emotional treatment on preferences

No effects on scale either

➔So there are no statistically significant effects of being sad or being happy versus a neutral treatment on preference parameters;

➔and thus no effects on WTP for changes in any of the attributes

➔And no effects on scale

- We rejected null hypotheses relating to preference heterogeneity (H_0^1, H_0^2): inducing people into a more sad or a more happy state than neutral produced no statistically significant effects on estimated preference parameters and thus on WTP for changes in beach quality.
- we failed to find any significant effect of variations in emotional state on the randomness of choice (we rejected hypotheses H_0^3 and H_0^4), despite work in behavioural sciences which has suggested that emotional state can impact on choice rationality

discussion

- Incidental emotions should not effect choices in the standard economic model (here, the RUM), since they do not effect expected pay-offs
- That is exactly what we found here
- We also found no effect of emotional treatment on the randomness of peoples' choices
- Despite evidence that the treatment worked in terms of inducing the desired emotional conditions

➔Why do we find an absence of such effects, when the behavioural science literature tends to find evidence to support such effects?

Possible reasons

- Public good aspect of choices?
- Stated choice (intentions) versus actual behaviour?
- Sample not large enough to detect an effect? (*that one we can rule out*)
- Did treatment effects persist for long enough? We compared effects on first 4 choices versus all 8. No difference. (evidence from pysch. literature is that incidental emotions persist following inducement)

- Moreover, no effect when we use self-reported emotional states rather than treatment effects
- And no effects of varying extent of experience with the good

- So it’s good news for the standard economic model!

New work

- Looking for alternative measures of “deep” preference heterogeneity which ought to be more stable than emotions
- Looking in fact at the effects of personality type on choices in an environmental choice experiment
- 2 data sets collected so far, but no paper yet.

ndh3@st-andrews.ac.uk