Risky decision and happiness task
(The Great Brain Experiment smartphone app)

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This resource consists of data from a risky decision and happiness task that was part of The Great Brain Experiment (GBE) smartphone app. Data were collected from 47,067 participants aged 18+ between March 8, 2013 and October 5, 2015. These anonymous unpaid participants completed the task a total of 91,058 times making approximately 2.7 million choices and 1.1 million happiness ratings in total. This resource represents at least 6,000 hours of task data. A subset of 1,858 participants also completed a depression questionnaire and answered five questions about their depression history. Within the app, the game was referred to as 'What makes me happy?'. Each completed play consisted of 30 trials (11 Gain, 8 Mixed, and 11 Loss) and 12 responses to the question 'How happy are you right now?' The game typically took 3-5 minutes to complete. Data are stored in Matlab structure arrays. The Matlab script Rutledge_GBE_risk_data_code.m generates key results from published studies.

When using this resource, please cite any relevant articles and the Dryad DOI.

Chen X, Rutledge RB, Brown HR, Dolan RJ, Bestmann S, Galea JM (2018) Age-dependent Pavlovian biases influence motor decision-making. *PLoS Computational Biology* 14, e1006304. https://doi.org/10.1371/journal.pcbi.1006304

Rutledge RB, Moutoussis M, Smittenaar P, Zeidman P, Taylor T, Hrynkiewicz L, Lam J, Skandali N, Siegel JZ, Ousdal OT, Prabhu G, Dayan P, Fonagy P, Dolan RJ. (2017) Association of neural and emotional impacts of reward prediction errors with major depression. *JAMA Psychiatry* 74, 1-8. https://doi.org/10.1001/jamapsychiatry.2017.1713

Hunt LT, Rutledge RB, Malalasekera WMN, Kennerley SW, Dolan RJ (2016) Approach-induced biases in human information sampling. *PLoS Biology* 14, e2000638. https://doi.org/10.1371/journal.pbio.2000638

Rutledge RB, Smittenaar P, Zeidman P, Brown HR, Adams RA, Lindenberger U, Dayan P, Dolan RJ (2016) Risk taking for potential rewards decreases across the lifespan. *Current Biology* 26, 1-6. https://doi.org/10.1016/j.cub.2016.05.017

Rutledge RB, Skandali N, Dayan P, Dolan RJ (2014) A neural and computational model of momentary subjective well-being. *Proceedings of the National Academy of Sciences USA* 111, 12252-12257. https://doi.org/10.1073/pnas.1407535111

Brown HR, Zeidman P, Smittenaar P, Adams RA, McNab F, Rutledge RB, Dolan RJ (2014) Crowdsourcing for cognitive science: the utility of smartphones. *PLoS ONE* 9, e100662. https://doi.org/10.1371/journal.pone.0100662

Data collection details

For each play, trials were randomly selected from the lists of potential options with 11 Gain, 8 Mixed, and 11 Loss trials selected on each play in a random order. Each play included a happiness rating before the first trial and after every 2-3 trials such that each play ended with a happiness rating and included 12 ratings in total.

There were 5 updates to the app (indicated by designVersion). Versions 1 and 2 featured a 'ratio' design. Gain trials featured 4 different safe amounts (30, 35, 45, 55) and 15 multipliers (1.64, 1.7, 1.76, 1.82, 1.88, 1.94, 2, 2.06, 2.12, 2.18, 2.26, 2.4, 2.7, 3.2, 4). Potential risky options were equal to the safe amount multiplied by one of the 15 multipliers for a total of 60 potential Gain trials (e.g., +30 vs +49/0). Loss trials were symmetric with a negative sign in front of all values for a total of 60 potential Loss trials (e.g., -30 vs 0/-30). Mixed trials had a safe option equal to 0 and featured 3 different potential gain amounts (40, 55, 75) with 10 multipliers (0.2, 0.34, 0.5, 0.64, 0.77, 0.9, 1, 1.1, 1.35, 2) for a total of 30 potential Mixed trials (e.g., 0 vs +40/-8). Task versions 1 and 2 had 150 total possible trials.

Versions 3, 4, and 5 featured an 'uncorrelated design'. This design was used in all new downloads of the app starting on July 17, 2013. Participants who completed the task before and after updating the app will have completed plays with both designs. Gain trials featured 3 different safe amounts (35, 45, 55) and 15 risky gain amounts (59, 66, 72, 79, 85, 92, 98, 105, 111, 118, 124, 131, 137, 144, 150) for a total of 45 potential Gain trials (e.g., +35 vs +59/0). Loss trials were symmetric with a negative sign in front of all values for a total of 45 potential Loss trials (e.g., -35 vs 0/-59). Mixed trials featured 3 different potential gain amounts (40, 55, 75) with 10 potential loss amounts (-10, -19, -28, -37, -46, -54, -63, -72, -81, -90) for a total of 30 potential Mixed trials (e.g., 0 vs +40/-10). Task versions 3-5 had 120 total possible trials.

Data are only available for completed plays and when an internet connection was available at the time that the game was completed. Participants who subsequently requested that their data be deleted are not included in this data set. For this reason, the data are not identical to the published studies although <2% of the data are affected. No published result is affected by subsequent deletion requests. For example, 6 participants included in the study linking depression and happiness during the task later asked for their data to be deleted. Results obtained for the remaining 1,858 are consistent with the published results. In general, published results are strengthened by the larger final sample size.

Download dates are the month that the app was downloaded. Days are counted from the day that the task was first played. Dates are not included to protect participant identity. The updated initial survey was available starting on July 17, 2013 including a native language item and the possibility to indicate a location outside of the United Kingdom. Participants who downloaded the app prior to this date and updated the app after that date unfortunately had their initial survey responses overwritten by the new survey results.

SubjData table. SubjData is a Matlab structure array with the following fields. SubjData contains the data for 47,067 participants.

Field name	Purpose	Values
id	Sequential participant number. Values match those in the depData structure.	Integer (>0), 1-47,067
age	Age group from 1 (18-24), 2 (25-29), 3 (30-39), 4 (40-49), 5 (50-59), 6 (60-69), 7 (70+)	Integer (>0), 1-7
isFemale	1 (female), 0 (male)	Integer, 0 or 1
location	See location table for detailed information 0-7 United Kingdom 100-309 Other Europe 400 USA 401-509 Other North or South America 600-909 Africa, Asia, Pacific 999 Unknown (not United Kingdom)	Integer (>=0), 0-999
education	Education level 0 School (GCSE or similar) 1 School (A-levels, vocational, or similar) 2 University degree 3 Advanced degree (MA, PhD, etc)	Integer (>=0), 0-3
nativeLanguage	0 (Arabic), 1 (English), 2 (French), 3 (German), 4 (Hindi), 5 (Mandarin), 6 (Portuguese), 7 (Punjabi), 8 (Spanish), 9 (Other)	Integer (>=0), 0-9
deviceType	Device type with possible values of 'Android', 'iPhone', 'iPad', 'iPod', and 'unknown'.	Text string
downloadDate	Month and year app downloaded.	Text string (mm/yyyy)
nPlays	Total number of plays with available data.	Integer (>0)
timesPlayed	Number of plays started up to and including the current play. Missing plays were either not completed or an internet connection was not available at the time of completion.	Integer (>0)
dayNumber	Number of days since task first played.	Integer (>=0), 0-924
designVersion	Task design version. See task version table for detailed information.	Integer (>0), 1-5
dataHdr	Header for the columns in the data matrices.	Cell array of text strings
data	Task data. See data table for detailed information.	Cell array of 30x15 matrices

Data table. Data is a cell array contained with the subjData Matlab structure array with the following columns. Data for completed plays are 30x15 matrices. Columns 6 and 13 are empty.

Column	Purpose	Values
1	Trial number	Integer (>0), 1-30
2	Side of the screen with the risky option: 1 (left), 2 (right). Always 1 for this data set.	Integer (>0), 1 or 2
3	The value for the safe option.	Integer
4	The value displayed on the spinner's winning side.	Integer (>=0)
5	The value displayed on the spinner's losing side.	Integer (<=0)
7	Choice made: 1 (gambled), 0 (safe choice)	Integer, 0 or 1
8	Trial outcome (i.e., if the player gambled and this value matches the value in column 4, they won the gamble)	Integer
9	Choice latency	Floating point, seconds
10	The happiness rating the player made after this trial. Note that the happiness rating for trial 1 was actually made before the first trial of the task. All other ratings are after the trial.	Integer, 0-100 If the player wasn't asked for this trial, the value will be NaN.
11	The starting point for the cursor when players were asked for ratings. This was always 50 for task versions 1 and 2. This was a random integer 25-75 for task versions 3-5.	Integer, 0-100 If the player wasn't asked for this trial, the value will be NaN.
12	The time taken to answer the happiness question.	Floating point, seconds If the player wasn't asked for this trial, the value will be NaN.
14	The amount of time it took for the spinner to land on a value. For task versions 1 and 2, the direction of the spin was not encoded and most spin durations were around 4.4s. For task versions 3-5, spin durations varied from 3.8-5.7s. Positive values indicate that the spinner was spun clockwise. Negative values indicate that the spinner was spun counterclockwise.	Floating point, seconds If the player didn't spin the spinner, this value will be NaN.
15	The angle that the spinner stopped at (won if ended on left side of spinner, lost if ended on right side of spinner).	Floating point, radians, clockwise from up $0 <= x < PI$: Right side of spinner $PI <= x < 2 * PI$: Left side of spinner

DepData table. DepData is a Matlab structure array with the following fields in addition to all fields in the subjData table. DepData contains the data for 1,858 participants.

Field name	Purpose	Values
depStatus	Have you ever been diagnosed with depression? 1 Yes, by a psychiatrist 2 Yes, by a family doctor or another doctor but not a psychiatrist 3 No, I have never been diagnosed with depression 4 I'd rather not say	Integer (>0), 1-4
depEpisodes	If you suffer from depression, how many depressive episodes have you had in your life? 1, 2, 3, 4 or more, no response	Integer (>0), 1-5
depYears	If you suffer from depression, how many years of your life in total have you been depressed? Less than 1 year, 1-2 years, 2-3 years, more than 3 years, no response	Integer (>0), 1-5
depMeds	Have you ever taken any anti-depressant medications? 1 Yes, I am currently taking anti-depressant medications. 2 Yes, I took anti-depressant medications in the past and they were helpful. 3 Yes, I took anti-depressant medications in the past and they were not helpful. 4 No, I have never taken anti-depressant medications. 5 I'd rather not say.	Integer (>0), 1-5
depFamily	Has anyone in your immediate family suffered from depression? 1 Yes, more than one person. 2 Yes, one person. 3 Not as far as I know. 4 I'd rather not say.	Integer (>0), 1-4
bdiDate	Date stamp for when Beck Depression Inventory (BDI-II) questionnaire completed in dd/mm/yyyy format.	Text string
bdiDayNumber	Number of days since task first played (negative numbers are possible).	Integer
bdiRaw	Raw data for responses to the 21 items in the BDI-II	21-vector of integers (>=0), 0-3
bdiTotal	Total BDI-II score	Integer (>=0), 0-58

Location table

Country	Value
UK	
England (North)	0
England (Midlands)	1
England (South not London)	2
England (London)	3
Scotland	4
Wales	5
Northern Ireland	6
Other UK (for app downloads starting July 7, 2013)	7
Northern Europe	
Denmark	100
Estonia	101
Finland	102
Iceland	103
Ireland	104
Latvia	105
Lithuania	106
Norway	107
Sweden	108
Other Northern Europe	109
Western Europe	
Austria	200
Belgium	201
France	202
Germany	203
Italy	204
Netherlands	205
Portugal	206
Spain	207
Switzerland	208
Other Western Europe	209
Eastern Europe	
Bulgaria	300
Croatia	301
Czech	302
Greece	303
Hungary	304
Poland	305
Russia	306
Serbia	307
Slovakia	308

Other Eastern Europe	309
North America	
USA Canada Costa Rica Cuba Dominican Republic El Salvador Honduras Mexico Nicaragua Other North America	400 401 402 403 404 405 406 407 408 409
South America	
Argentina Bolivia Brazil Chile Colombia Ecuador Peru Uruguay Venezuela Other South America	500 501 502 503 504 505 506 507 508 509
Africa	
Algeria Egypt Ethiopia Kenya Morocco Nigeria South Africa Tanzania Uganda Other Africa	600 601 602 603 604 605 606 607 608 609
West Asia	
Iraq Israel Jordan Kuwait Lebanon Qatar Saudi Arabia Turkey UAE Other West Asia	700 701 702 703 704 705 706 707 708 709

Asia	
Bangladesh	800
China	801
India	802
Malaysia	803
Pakistan	804
Singapore	805
South Korea	806
Thailand	807
Vietnam	808
Other Asia	809
Pacific	
Australia	900
Brunei	901
Fiji	902
Indonesia	903
Japan	904
New Zealand	905
Papua New Guinea	906
Philippines	907
Taiwan	908
Other Pacific	909
Unknown (this is almost entirely users in early app versions that are not from the UK who marked 'Rest of the world'. UK regions indicated by 0-6 have been unchanged for all app versions.)	999