

Is overconfidence an individual difference?

Online Supplement

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Pretest: Task Domain Selection and Lay Theories

We conducted a pretest to identify contexts in which people believe individual differences in overconfidence would be most likely to emerge; we used these responses to inform later studies. The secondary purpose was to understand lay theories of whether there are individual differences in overconfidence.

Method

We preregistered this pretest at https://aspredicted.org/blind.php?x=1Y3_N1N on March 25, 2022 before data collection began.

Participants.

We recruited 195 participants from Amazon Mechanical Turk and paid them \$0.60 for a survey which took 6.42 minutes on average. Our preregistered exclusion criteria rejected seven participants who failed a multiple-choice attention check question asking about the definition of overconfidence, leaving us with a final sample of 188 (more than the 100 we preregistered).

Study Design and Procedure.

Participants first read the following definition and example of overprecision, which we labeled as overconfidence for vernacular simplicity: “This survey is about overconfidence, in the sense of being overly certain. For example, let's say someone says a particular political candidate will be elected. Someone insists that they are 90% sure. If predictions like this are correct 90% of the time they claim 90% confidence, then the person's certainty is justified. If, however, they turn out to be right *less* than 90% of the time, then their predictions would be *overconfident*.” Then, participants answered an attention check question that asked them to identify an example of overprecision from three multiple-choice options. Participants then answered the question, “To what extent do you agree with the following statement? Some people have a tendency to be more

overconfident than others, regardless of the situation” on a scale from -2 (“*Strongly disagree – overconfidence depends on the situation*”) to 2 (“*Strongly agree – some people are just more overconfident*”).

Next, participants listed three “situations where we would be most likely to observe” differences between individuals in overconfidence. These were our primary responses of interest. Participants then indicated how overconfidence related to five trait measures: extraversion, need for cognitive closure, humility, intellectual humility, and stickiness of first impressions (on 3-point scale from “*Not at all related*” to “*Very related*”). Finally, participants reported whether they believed demographics (age, gender, education, and socioeconomic status) correlated with overconfidence, and if so, in what direction. Results on beliefs about individual differences and demographic variables appear in the Supplement.

Results

Situations.

We asked each participant to name three situations in which some people would be more overconfident than others; in total, they named 564 different situations. The most common were sports (61 responses = 10.82%), something related to betting, investing or gambling (61 responses = 10.82%), and politics (51 responses = 9.04%).

Belief in overconfidence as an individual difference.

Participants agreed that overconfidence is an individual difference, with an average rating of 1.40 ($SD = 0.89$), between 1 = “*Somewhat agree*” and 2 = “*Strongly agree*” (which is significantly above the midpoint of 0 = “*Neither agree nor disagree*,” one-sample $t(187) = 21.70$, $p < .001$).

We used these results to select a task domain that (at least according to the pretest participants) gives us the best chance of finding individual differences in overconfidence: in Study 1a, 1b, 2, and 3b we examine sports forecasting.

We preregistered exploratory analyses in which we asked participants to indicate how related they thought various individual difference measures were to overconfidence, 0 = “not at all related” to 2 = “very related”: extraversion (“The person is extraverted”, $M = 1.38$, $SD = 0.63$), cognitive closure (“The person wants a straight answer to any questions, with no space for ambiguity”, $M = 1.07$, $SD = .75$), intellectual humility (“The person cannot recognize when they might be wrong”, $M = 1.75$, $SD = 0.55$), stickiness to first impressions (“The person forms rigid first impression of people or situations, $M = 1.43$, $SD = 0.66$). Thus, participants believed that humility and intellectual humility were the most likely to be related to overconfidence.

In addition, we asked participants to respond to they believed age, gender, education, and socioeconomic status were related to overconfidence (e.g. “Do you think someone who is older or younger will tend to be more overconfident, i.e. more confident than you should be?” Options “Older”, “Younger”, “Exactly the same”, “No idea”). Precise counts for each of these questions are displayed in the tables below; in general, participants believed that people who are younger, male, college-educated, and wealthier would be more likely to be overconfident.

Table S1. Pretest. Do you think someone who is older or younger will tend to be more overconfident, i.e. more confident than they should be?

Response	Count	Proportion
Older	39	0.207

Response	Count	Proportion
Younger	88	0.468
Exactly the same	52	0.277
No idea	9	0.048

Table S2. Pretest. Do you think someone who is male or female will tend to be more overconfident, i.e. more confident than they should be?

Response	Count	Proportion
Male	110	0.585
Female	5	0.027
Exactly the same	60	0.319
No idea	13	0.069

Table S3. Pretest. Do you think someone who has attended college or has not attended college will tend to be more overconfident, i.e. more confident than they should be?

Response	Count	Proportion
Has attended college	76	0.404
Has not attended college	26	0.138
Exactly the same	66	0.351
No idea	20	0.106

Table S4. Pretest. Do you think someone who is wealthier or poorer will tend to be more overconfident, i.e. more confident than they should be?

Response	Count	Proportion
Wealthier	76	0.404
Poorer	26	0.138
Exactly the same	66	0.351
No idea	20	0.106

Study 1a-2: Additional Analyses

Table S5. Study 1a and 1b inter-task correlations for tasks that appeared in both studies, disattenuated by inter-time correlation.

Measure	Study 1a (N = 379)			Study 1b (N = 138)		
	MLB-RPM	MLB-WGT	RPM-WGT	MLB-RPM	MLB-WGT	RPM-WGT
Accuracy (Score)	.60	-.16	-.17	.39	.37	.04
Confidence						
Estimation	.53	2.19	.34	.43	.56	.35
Placement	.61	.54	.34	.49	.62	.59
Placement (Percentile)	1.54	1.35	.88	1.14	1.51	1.24
SPD Variance	1.60	1.66	1.65	1.64	1.46	1.71
Overconfidence						
Overestimation	.87	.52	-.01	.76	.72	.35
Overplacement	.98	.42	.03	1.06	.98	.55
Overplacement (Percentile)	.53	.92	.14	1.87	1.29	.94
Overprecision	1.60	1.66	1.65	1.64	1.46	1.71

Note. Disattenuated correlations can exceed 1, especially when raw correlations are high and reliabilities are low.

Table S6. Study 1a-2. Correlations between confidence and trait measures.

Estimation	AOT	Narcissism	OCT	Gender (M)	Age
[1a] MLB	-.06	-.01		.15**	.08
[1a] RPM	.07	-.02		.08	.02
[1a] WGT	-.05	-.02		.03	.13*
[1b] MLB	-.04	.01		.13	.12
[1b] RPM	.20*	.11		.09	.01
[1b] WGT	.15	.00		.19*	.05
[1b] GOT	.00	-.13		.21*	.06
[2] NFL (T1)	.09	.00	.11	.20*	.10
[2] NFL (T2)	.07	-.08	.17	.31***	.01
Placement	AOT	Narcissism	OCT	Gender (M)	Age
[1a] MLB	.06	-.10*		.24***	-.06
[1a] RPM	.10	-.06		.17***	-.03
[1a] WGT	.03	-.08		.13*	.07
[1b] MLB	-.15	-.04		.22**	.00
[1b] RPM	.23**	.00		.20*	.01
[1b] WGT	.11	-.06		.24**	-.06
[1b] GOT	.00	-.16		.12	-.10
[2] NFL (T1)	.10	-.06	.00	.22*	.07
[2] NFL (T2)	.03	.06	.04	.42***	.06
Precision (reverse-scored SPD Variance)	AOT	Narcissism	OCT	Gender (M)	Age
[1a] MLB	.18***	.12*		.01	.05
[1a] RPM	.10	.07		.05	-.01
[1a] WGT	.16**	.09		.05	.02
[1b] MLB	.03	.09		-.14	.00
[1b] RPM	-.01	.13		-.03	-0.02
[1b] WGT	-.09	.09		-.04	-.02
[1b] GOT	-.08	.10		-.13	.00
[2] NFL (T1)	-.18*	-.13	.04	-.07	-.01
[2] NFL (T2)	-.16	-.12	.10	-.03	-.08

Table S7. Study 1a-2 correlations between accuracy and trait measures.

Accuracy	AOT	Narcissism	OCT	Gender (M)	Age
[1a] MLB	.03	-.02		.17***	-.01
[1a] RPM	.22***	.04		.16**	-.04
[1a] WGT	-.06	-.02		-.06	-.18***
[1b] MLB	-.13	.12		.09	.05
[1b] RPM	.33***	.13		.09	-.08
[1b] WGT	-.08	-.07		-.24**	-.21*
[1b] GOT	.05	-.04		-.21*	.10
[2] NFL (T1)	.21*	.04	-.16	.22*	.12
[2] NFL (T2)	.06	-.13	.14	.17*	.15

Table S8. Comparisons between Study 1a data from participants who did return for Study 1b to data from participants who did not return those who did not return.

Variable	Mean (returned)	Mean (did not return)	t-test
Gender Male	0.5 (0.5)	0.44 (0.5)	$t(282.73) = 1.12, p = .264, d = 0.12$
Age	38.07 (11.76)	33.51 (9.27)	$t(234.18) = 3.92, p < .001, d = 0.45$
AOT	3.74 (0.54)	3.78 (0.53)	$t(279.25) = -0.74, p = .461, d = -0.08$
NPI	12.39 (3.22)	12.41 (2.81)	$T(254.18) = -0.06, p = .951, d < .01$
T1 MLB Correct	5.04 (1.59)	5.01 (1.53)	$t(276.20) = 0.17, p = .867, d = 0.02$
T1 RPM Correct	4.47 (2.11)	4.33 (2.18)	$t(292.06) = 0.61, p = .546, d = 0.06$
T1 WGT Correct	1.71 (1.51)	1.93 (1.56)	$t(292.50) = -1.32, p = .186, d = -0.14$
T1 MLB Estimation	5.41 (1.67)	5.53 (1.74)	$t(294.80) = -0.65, p = .516, d = -0.07$
T1 RPM Estimation	3.98 (1.96)	4.34 (2.1)	$t(301.10) = -1.67, p = .096, d = -0.17$
T1 WGT Estimation	5.32 (2.01)	5.45 (2.25)	$t(311.11) = -0.60, p = .551, d = -0.06$
T1 MLB Placement Difference	-0.09 (1.99)	0.25 (1.78)	$t(259.19) = -1.67, p = .097, d = -0.18$
T1 RPM Placement Difference	-0.71 (2.16)	-0.43 (2.1)	$t(277.31) = -1.20, p = .232, d = -0.13$
T1 WGT Placement Difference	0.02 (1.97)	0.19 (1.75)	$t(258.14) = -0.83, p = .409, d = -0.09$
T1 Overestimation MLB	0.38 (2.24)	0.52 (2.21)	$t(280.97) = -0.61, p = .540, d = -0.07$
T1 Overestimation RPM	-0.49 (2.25)	0 (2.24)	$t(283.65) = -2.07, p = .039, d = -0.22$
T1 Overestimation WGT	3.61 (2.53)	3.53 (2.78)	$t(307.87) = 0.29, p = .770, d = 0.03$
T1 Overplacement MLB	-0.11 (2.59)	0.26 (2.22)	$t(250.50) = -1.41, p = .160, d = -0.16$
T1 Overplacement RPM	-0.84 (2.36)	-0.43 (2.39)	$t(288.25) = -1.63, p = .105, d = -0.17$
T1 Overplacement WGT	0.13 (2.45)	0.08 (2.39)	$t(279.24) = 0.19, p = .850, d = 0.02$
T1 Overprecision MLB	-3.07 (2.74)	-3.25 (2.63)	$t(275.41) = 0.62, p = .533, d = 0.07$
T1 Overprecision RPM	-0.6 (2.54)	-0.62 (2.72)	$t(301.95) = 0.07, p = .944, d < 0.01$
T1 Overprecision WGT	-2.94 (2.65)	-3.07 (2.65)	$t(285.41) = 0.46, p = .643, d = 0.05$

Table S9. Study 2 comparisons between Time 1 data from participants who did or did not return for Time 2.

Variable	Mean (returned)	Mean (did not return)	t-test
Gender Male	0.43 (0.5)	0.42 (0.5)	$t(54.87) = 0.14, p = .890, d = 0.03$
Age	36.33 (9.91)	34.42 (9.2)	$t(58.51) = 1.09, p = .279, d = 0.20$
NPI	12.99 (2.44)	13.03 (3)	$t(48.09) = -0.08, p = .938, d = -0.02$
OCT	33.81 (13.42)	36.62 (17.21)	$t(46.95) = -0.91, p = .369, d = -0.20$
T1 Actual Score	5.67 (1.57)	5.69 (1.47)	$t(58.22) = -0.07, p = .942, d = -0.01$
T1 Estimation	6.54 (1.49)	6.44 (1.96)	$t(46.29) = 0.27, p = .785, d = 0.06$
T1 Fan Picked	0.98 (1)	1.61 (2.05)	$t(39.52) = -1.80, p = .079, d = -0.49$
T1 Placement	6.02 (1.31)	5.72 (1.7)	$t(46.66) = 0.97, p = .336, d = 0.21$
T1 Placement Difference	0.52 (1.97)	0.72 (2.24)	$t(50.42) = -0.49, p = .628, d = -0.10$
T1 Placement2	49.79 (20.11)	48.53 (26.56)	$t(46.24) = 0.26, p = .793, d = 0.06$
T1 SPD Variance	5.22 (2.15)	5.91 (2.16)	$t(54.86) = -1.70, p = .096, d = -0.32$
T1 Overestimation	0.87 (2)	0.75 (2.01)	$t(55.00) = 0.31, p = .757, d = 0.06$
T1 Overestimation Fan	0.2 (0.73)	0.5 (0.81)	$t(51.19) = -2.01, p = .049, d = -0.40$
T1 Overplacement Indirect	0.52 (2.3)	0.7 (2.48)	$t(52.19) = -0.39, p = .697, d = -0.08$
T1 Overplacement Direct	8.49 (33.14)	7.97 (38.43)	$t(49.75) = 0.07, p = .941, d = 0.02$
T1 Overprecision	-2.74 (2.15)	-3.43 (2.16)	$t(54.86) = 1.70, p = .096, d = 0.32$

Study 3a: Additional Methods and Analyses

Additional Methods Notes

The full list of scale items for each factor of intellectual humility are as follows. All items are from 1 = “strongly disagree” to 5 = “strongly agree” and reverse-scored.

Intellectual Humility Factor 1: Independence of Intellect and Ego

- “When someone disagrees with ideas that are important to me, it feels as though I'm being attacked.”
- “When someone contradicts my most important beliefs, it feels like a personal attack.”
- “I tend to feel threatened when others disagree with me on topics that are close to my heart.”
- “When someone disagrees with ideas that are important to me, it makes me feel insignificant.”
- “I feel small when others disagree with me on topics that are close to my heart.”

Intellectual Humility Factor 4: Lack of Intellectual Overconfidence

- “My ideas are usually better than other people’s ideas.”
- “For the most part, others have more to learn from me than I have to learn from them.”
- “When I am really confident in a belief, there is very little chance that belief is wrong.”
- “I’d rather rely on my own knowledge about most topics than turn to others for expertise.”
- “On important topics, I am not likely to be swayed by the viewpoints of others.”
- “Listening to perspectives of others seldom changes my important opinions.”

Additional Analyses

We preregistered a secondary analysis to compare the variances in precision measures attributable to individuals or measure. We employed a cross-classified multilevel model of a dataframe in long form (such that each row is a participant-measure, only for our 4 key measures), predicting precision scores from the fixed and random effects of subject, and fixed and random effects of precision measure. We then produced 1000 samples, with replacement, of $n = 300$ each from our precision scores all scaled to be on a range of 0 to 100, and compute individual and measure variance for each of these samples. We then compared the variances of each distribution using a 2-sample t-test.

We found that variance attributable to the individual is significantly greater than variance attributable to measures, $M_{\text{individual}} = 198.65$, $M_{\text{measure}} = 41.17$, two-sample $t(1337.9) = 72.13$, $p < .001$. This particular analysis supports more credence to the idea that overconfidence is an individual difference than not.

Figure S1. Study 3a. Example Subjective Probability Distributions

