Both better and worse than others depending on difficulty: Replication and extensions of Kruger's (1999) above and below average effects

*Max Korbmacher ORCID: 0000-0002-8113-2560 Department of Biological and Medical Psychology, Faculty of Psychology, University of Bergen <u>Max.korbmacher@student.uib.no</u> / <u>max.korbmacher@gmail.com</u>

> * Ching (Isabelle) Kwan The University of Hong Kong u3534221@connect.hku.hk / isabellekwan1998@gmail.com

^*Gilad Feldman ORCID: 0000-0003-2812-6599 Department of Psychology, University of Hong Kong, Hong Kong SAR <u>gfeldman@hku.hk</u> / <u>giladfel@gmail.com</u>

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*The listed authors contributed equally and share first authorship.

^Corresponding author.

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Author bios:

Max Korbmacher is a graduate student at the University of Bergen.

Ching Kwan was an undergraduate student at the University of Hong Kong during the academic year 2020.

Gilad Feldman is an assistant professor with the University of Hong Kong psychology department. His research focuses on judgment and decision-making.

Corresponding author:

Gilad Feldman, Department of Psychology, University of Hong Kong, Hong Kong SAR; <u>gfeldman@hku.hk</u>

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Max Korbmacher revised all materials, verified, and reproduced all analyses, and wrote the initial journal submission manuscript.

Ching Kwan conducted the replication as part of her undergraduate thesis at the University of Hong Kong.

Gilad Feldman supervised the thesis, conducted the pre-registrations, ran data collection, and edited drafts.

(More details are specified in the CrediT table below.)

Contributor Roles Taxonomy

In the table below, employ CRediT (Contributor Roles Taxonomy) to identify the contribution and roles played by the contributors in the current replication effort. See

https://www.casrai.org/credit.html for details and definitions of each of the roles listed below.

Role	Max Korbmacher	Kwan Ching	Gilad Feldman
Conceptualization			Х
Pre-registration		X	Х
Data curation			Х
Formal analysis	X	Х	
Funding acquisition			Х
Investigation		X	
Pre-registration peer review / verification			
Data analysis peer review / verification		Х	
Methodology		X	
Project administration	X		Х
Resources			Х
Supervision			Х
Validation	X	Х	Х
Visualization	X	X	
Writing-original draft	X	Х	
Writing-review and editing	Х		Х

Directory for all relevant files

osf.io/7yfkc

Additional information

The current replication is part of the larger 'mass pre-registered replications in judgment and decision-making'. The project aims to revisit well-known research findings in the area of judgment and decision making (JDM) and investigate the replicability of these findings. See <u>https://osf.io/5z4a8/</u> and <u>https://mgto.org/pre-registered-replications/</u>

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Abstract

Above-and-below-average effects are well-known phenomena that arise when comparing oneself to others. Kruger (1999) found that people rate themselves as above average for easy abilities and below average for difficult abilities. We conducted a successful pre-registered replication of Kruger's (1999) Study 1, the first demonstration of the core phenomenon (N = 756, US MTurk workers). Extending the replication to also include a between-subject design, we added two conditions manipulating easy and difficult interpretations of the original ability domains, and with an additional dependent variable measuring perceived difficulty. We observed an above-average-effect in the easy extension and below-average-effect in the difficult extension, compared to the neutral replication condition. Both extension conditions were perceived as less ambiguous than the original neutral condition. Overall, we conclude strong empirical support for Kruger's above-and-below-average effects, with boundary conditions laid out in the extensions expanding both generalizability and robustness of the phenomenon. All materials, data, and code are available on: https://osf.io/7yfkc/.

Keywords: Above-average effect, below-average effect, bias, judgment and decision making, anchoring, egocentrism

Both better and worse than others depending on difficulty:

Replication and extensions of Kruger's (1999) above and below average effects

Background

The above-average effect refers to the tendency to perceive oneself as better than the average person across different aspects. Kruger (1999) was the first to present instances of the opposite – a below-average effect – the tendency to view oneself as worse than the average person and proposed that this opposing effect depends on the ease of the ability domain. The above-average effect was observed when one's perceived skills in an ability domain were high, whereas the below-average effect occurred when perceived skills were low. Hence, Kruger identified the two effects' underlying mechanism to be the egocentric nature of comparative ability judgments and suggested an anchoring-and-adjustment account. Individuals anchor onto their own skills and then adjust away from their own anchor when judging the skill of others. Therefore, when considering easy activities, people perceive their ability/skill as high and display the above-average effect, failing to account for the "true" distribution curve of such abilities/skills which includes others who are also highly skilled. When activities are difficult and hence absolute domain ability is generally low, a below-average effect can be observed due to the failure to consider that others are also not highly skilled.

This was first operationalized in Study 1 in Kruger (1999) using a questionnaire in which participants first compared themselves with their peers on four relatively easy and four relatively difficult ability domains (or activities). Participants then answered a series of questions, detailing 1) estimates of their own and classmates' absolute abilities (termed "comparative ability"), 2)

desirability, 3) ambiguity of each ability, and 4) past experience of each ability. A strong negative correlation between domain difficulty and participants' comparative ability judgments presented support for both above and below-average effects (Kruger, 1999). The study demonstrated correlational evidence for the egocentric nature of comparative ability judgments based on a strong positive correlation between participants' ratings of their own and their comparative abilities. For all ability domains, participant judgments of their own absolute abilities better predicted their comparative ability judgments than did participants' judgments of their peers' skills. Additional experimental studies (2 and 3 in Kruger, 1999) used a situation in which participants received either a very easy or a difficult test, leading to similar results as in Study 1. The anchoring-and-adjustment account was discussed, as cognitive load significantly increased bias during comparative ability judgements.

We conducted a close replication and extensions of Kruger (1999) with two main goals; 1) test the robustness of above- and below-average effects, and 2) examine extensions to test whether ambiguities regarding domain difficulty may impact this effect. Two between-subject conditions were added to the original design to test whether an easier or more difficult version of Kruger's original ability domains would moderate the effects. Furthermore, we added an additional dependent variable to assess the phenomenon using ratings of perceived domain difficulty more directly. We begin by introducing the literature on above-and-below-average effects and the choice of target article for replication, then provide information on the original findings, and outline our added extensions.

Above-and-below-average effects

In the 1980s, researchers began to assess subjects' self-evaluations in relationship to their peers with the results showing over-estimations of own chances for positive outcomes compared

to the average population (e.g., Weinstein, 1980, 1983). Focusing on comparisons with others, the phenomenon became later known as above or better-than-average effect (Kruger, 1999; Kruger & Dunning, 1999). Research picked up quickly on the above-average effect, testing boundary conditions such as culture (Heine & Lehman, 1997) or self-appraisal (Wilson & Ross, 2001). Kruger (1999) was the first to add that there is not only an above but also below-average effect.

Underlying mechanisms

Throughout the last decades, a range of different underlying mechanisms was proposed to explain the above-average effect (less research focused on the below-average effect), such as informational differences (i.e., knowing more about oneself than others), focalism (i.e., focussing on oneself during comparative judgments), naïve realism, and egocentrism (Brown, 2012). The final mechanism was also used in the chosen study for replication (Kruger, 1999); when people assess how they compare with their peers, they may focus egocentrically on their own skills and insufficiently account for the skills of the comparison group. However, Kruger (1999) reported not only an above-average effect, but also a below-average effect, both explained by egocentrism.

Theoretical grounding

Originally, the above-average effect has been described as motivated by selfenhancement needs (i.e., to induce positive affect towards oneself) or a byproduct of motivated reasoning (Alicke, 1985; Brown, 1986; Kunda, 1990; Taylor & Brown, 1988). Self-enhancement enables the maintenance of a global self-concept allowing for both positive attributes under personal control and negative attributes resulting from factors beyond personal control (Alicke,

1985)¹. Self-verification can be used as another explanation for the above-average effect (Zell et al., 2020). Expanding on self-enhancement, the self-verification theory describes that both selfenhancement and exposure to information which creates and strengthens a biased view of oneself can lead to phenomena such as the above-and-below-average effects (Zell et al., 2020). In that sense, higher self-esteem has been linked with stronger above-average effects (e.g., Bosson et al., 2000; Chung et al., 2016). Support for the motivational perspective and the ubiquity of the above-average effect was provided by those objectively being below-average in certain characteristics displaying the above-average effect (e.g., Sedikides et al., 2014). For instance, prisoners comparing themselves with non-prisoners on pro-social characteristics rated themselves on average as above-average in most characteristics (Sedikides et al., 2014). Another explanation can be found in social comparisons during which people evaluate their social position compared to relevant peers – with the tendency of positioning oneself as higher-standing (Gerber et al., 2018). An example of both effects applying during social comparisons is when Democrats and Republicans compare their own warmth and competency with the average person of their in- and out-group (Eriksson & Funcke, 2013). In-group comparisons lead to belowaverage ratings for warmth among Democrats and above-average effects among Republicans, which reversed for outgroup comparisons (Eriksson & Funcke, 2013). Above-and-below-average effects have also been found to vary across ages, with egocentrism accounting for age differences (Zell & Alicke, 2011). Young, middle-aged, and older adults displayed an above-

¹ See Ziano et al. (2021) for a recent successful direct replication of Alicke (1985), showing that people rate more desirable traits to be more descriptive of themselves than of others, and extending that the effect was stronger for more controllable traits. This study was different from the current work as it focused on traits whereas the focus here is on skills.

average effect for most ability and trait dimensions, whereas a below-average effect was observed for older adults with clear deficiencies (Zell & Alicke, 2011).

Follow-up research

Due to the large number of citations of Kruger's (1999) findings, it is difficult to generalize the publication's impact. However, focusing on follow-up research on the above and below-average effects', more recent studies provided information about the effects' wide applicability and boundary conditions, with a large body of work supporting the original findings (e.g., Aucote & Gold, 2005; Burson et al., 2006; Johansson & Allwood, 2007; Sweeny & Shepperd, 2007). For example, building on the original findings, Giladi and Klar (2002) demonstrated that individual items within a positive group tend to be rated as above-average and individual items within a negative group tend to be rated as below-average. These effects can be reversed depending on the timing of the denotation of the target item, which affects the direction and size of the comparative biases (Windschitl et al., 2008B).

Much subsequent research also continued to explore underlying mechanisms, such as motivations and debiasing factors influencing egocentrically biased comparative judgments. Epley and Caruso (2004) discussed how unconscious, automatic features of human judgment result in egocentric judgments that appear objective to the judges themselves. Windschitl and colleagues' (2008A) experiments attempting to debias over-optimism for easy tasks and underoptimism for hard tasks through feedback was only successful under restrictive conditions. Yet, their results support the pervasiveness of egocentric biases as participants failed to generalize non-egocentric tendencies to new contexts.

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Choice of study for replication

Kruger's (1999) work made an important contribution to the field by introducing the below-average effect and conditions in which occurs, which adds to the understanding of a highly prevalent effect with importance to daily reasoning. A recent meta-analysis of better-than-average-effect studies found the effect to be robust across studies, yet, with the effect being smaller for abilities compared to personality traits (Zell et al., 2020). Problematically, definitions and measurement of skill are incongruent which leads to biased assessment and operationalizations differ strongly between studies testing above-and-below average-effects, generally (Zell et al., 2020), and in specific contexts such as drivers' overconfidence in their driving skills (Sundström, 2008). Hence, despite the prolific literature that followed, the above-average effect's robustness has been repeatedly called into question (Sundström, 2008; Zell et al., 2020).

However, some studies failed to conceptually replicate mechanisms and boundary conditions originally reported by Kruger, such as the relationship of estimates about others in relationship to estimates about oneself. For example, Moore and Kim (2003) found mixed evidence for the relationship between comparative ability and the evaluations of others' ability. This was also shown in a practical context by Walsh and Ayton (2009). After presenting an imaginary scenario in which a doctor provides information about a serious diagnosis applying to the participant and how that affects others', own happiness estimates by participants were indeed influenced by information about others' happiness.

We chose Kruger's (1999) study for replication based on the following factors: absence of direct replications, impact, and open questions about boundary conditions of the above and

below-average effects. To the best of our knowledge, there are currently no published direct replications of Kruger (1999). Yet, the article has had a significant impact on several scientific and practical fields informing highly cited about judgement and decision-making, for example, in management (Bazerman & Moore, 2012), economy (DellaVigna, 2009; Koellinger et al., 2007), medicine (Stewart et al., 2013), education or the workplace in general (Dunning et al., 2004). At the time of writing (May 2021), there were 1178 Google Scholar citations of the article and many important follow-up theoretical and empirical articles (judgment and decision-making: Chambers & Windschitl, 2004; Moore, 2007; Moore & Cain, 2007; Moore & Small, 2007; Whillans et al., 2020; Windschitl et al., 2008B). We chose Study 1 as it was the first demonstration of the core phenomenon. We aimed to revisit this classic phenomenon in a wellpowered preregistered close replication (e.g., Brandt et al., 2014).

Original hypotheses in target article

In the original study, participants compared themselves to their peers on eight ability domains of varying difficulty. Kruger proposed that $(H_{orig1}:)$ compared to judgments of their peers' abilities, people's judgments of their own abilities account for more variance in their comparative ability judgments.

Past research on reasons for people's tendency to focus on their own ability when comparing themselves to others offers insight on why comparative ability judgments are egocentric in nature. One's own skills are more likely to be assessed first when comparing the self to others (Srull & Gaelick, 1983), are easier to conceptualize than skills of the average person (Higgins et al., 1982; Higgins & Bargh, 1987; Srull & Gaelick, 1983), and have a larger database to refer to than others' skills (Ross & Sicoly, 1979). These explanations formed the basis of Kruger's primary hypothesis. When comparing one's own ability to peers' ability, assessments are predominantly based on the perception of one's own skills and less on the perceptions of peers' skills, and therefore, perceptions of one's own absolute ability better predict comparative ability judgments.

Based on that, Kruger proposed that $(H_{orig2}:)$ people tend to perceive themselves as above average when considering easy abilities, and that $(H_{orig3}:)$ people tend to perceive themselves as below average when considering difficult abilities. We merged the dichotomized hypotheses to propose that the more difficult the ability domain is perceived to be, the more likely a person is to shift from perceiving oneself as above average to perceiving oneself as below average.

Original findings in target article

Kruger (1999) used a combination of correlational studies, one-sample t-tests, and multiple regression and found support for all hypotheses (Table 1). Above and below-average effects were prevalent for all but one difficult item: telling jokes. He observed an inverse association between the domain difficulty and comparative ability: as ability domains increased in difficulty, the perception of their comparative ability decreased. Participants believed to be above average for easy abilities and below average for difficult abilities.

Ability	Domain difficulty ¹	Comparative ability ²	Judgmental weight of Own ability ³	Judgmental weight of Others' ability ³
Easy				
Using a mouse	3.1	58.8**	0.21	0.06
Driving	3.6	65.4****	.89****	25*
Riding a bicycle	3.9	64.0****	.61****	-0.02
Saving money	4.3	61.5**	.90****	25***
Difficult				
Telling jokes	6.1	46.5	.91****	-0.03
Playing chess	7.1	27.8****	.96****	22**
Juggling	8.3	26.5****	.89****	-0.16
Computer programming	8.7	24.8****	.85****	-0.1

Kruger's (1999) findings: Mean comparative ability estimates and judgmental weight of own and peers' abilities

¹Higher numbers reflect greater difficulty.

²Mean percentile estimates above 50 reflect an above-average effect, estimates below 50 reflect a below-average effect.

³Standardised betas from multiple regressions predicting participants' comparative ability (percentile) estimates from their estimates of their own absolute ability and the absolute ability of their peers, respectively. *p < .05. **p < .01. ****p < .001. ****p < .0001.

To examine the relationship between one's own absolute ability and comparative ability judgments, multiple regressions predicting comparative ability from their own ability, and others' ability were conducted for each of the eight abilities. Participants' perception of their own ability better predicted their comparative ability judgments. Participants anchored onto their own absolute ability, as opposed to their peers' absolute ability when comparing themselves to others across ability domains. We summarized effect sizes and power analysis for the original study results in the sections "effect size calculations of the original study effects" and "power analysis of original study effect to assess required sample for replication" in the detailed supplementary on OSF.

Extensions

Extension 1: Manipulating domain difficulty

We aimed to extend the replication study by considering the ambiguities in the definitions of easy and difficult used in the domains of the original study. The ability domains in the target article were only succinctly described (see Table 2). Each ability domain may connote different meanings, depending on how participants interpret the domains. For instance, the ability "saving money" was categorized as an easy ability. Yet, the amount of money saved was not specified, and that may matter for perceived difficulty, as saving 3% of income per month is likely to be perceived as easier than saving 20% of income per month.

Original domain group (replication)	Easy domain group (extension)	Difficult domain group (extension)
	Easy domains	
Using a computer mouse	Using a computer mouse with your dominant hand	Using a computer mouse with your non-dominant hand
Driving	Driving a car with automatic gear in your home country	Driving a car with manual gear in a foreign country where people drive on the opposite side of the road
Riding a bicycle	Riding a bicycle for 10 minutes on a flat road	Riding a bicycle for an hour up a road with an upwards incline slope
Saving money	Saving 3% of your income each month	Saving 20% of your income each month
	Difficult domains	
Telling jokes	Telling a joke to one person you know well (e.g., friend, family member, etc.)	Telling a joke in front of a live audience in an improv stand-up comedy club
Playing chess	Win a game of chess against an AI (computer) in beginners' mode	Win a game of chess against an AI (computer) in advanced mode
Juggling	Juggling 2 balls	Juggling 4 balls
Computer programming	Computer programming guided by someone very knowledgeable in computer programming	Computer programming guided by someone not knowledgeable in computer programming

Extension: Manipulation of perceived domain difficulty in target's domains

Therefore, we manipulated domain difficulty. In our replication, we randomly assigned participants to one of the three conditions receiving different definitions of the ability domains, either: 1) original domain condition (replication), 2) easy domain condition (extension) with an easy reinterpretation of the original domains, or 3) difficult domain condition (extension) with a difficult reinterpretation of the original domains (see Table 2).

For the two extension groups, the extension domains aim to be specifically defined in measurable terms. More context is provided for the domains to be more specific, such as the hand used (dominant versus non-dominant hand) for using a mouse, the location and type of car (home country and automatic gear car versus foreign country and manual gear car) for driving, and the help received for computer programming (someone very knowledgeable versus someone not very knowledgeable), which is an ability domain most participants may not have experience with. Additionally, an objective measure should be quantitatively determined in units that can be measured (e.g., length of time, amount of money) or counted (e.g., number of people; Roth et al., 2008). Therefore, the extension domains also use criteria such as time (10 minutes versus 1 hour), number of people (one person versus a live audience in an improv stand-up comedy club), and difficulty (beginner mode versus advanced mode).

Extension 2: Measuring domain difficulty

For the second extension, we added an additional dependent variable measuring domain difficulty. In the original study, domain difficulty was determined in a pretest by a separate group of participants (n = 39). They rated their absolute ability – the extent of how skilled they are – on the eight abilities on a 10-point scale (higher number indicates higher skill level): "For this ability, please rate your own ability from 1 (very unskilled) to 10 (very skilled)". The ratings

were then reverse-scored and higher numbers indicated greater domain difficulty. The four ability domains lower than the midpoint of the scale were categorized as easy domains, whereas the four ability domains higher than the midpoint of the scale were categorized as difficult domains.

Due to problems associated with categorizing the continuous variable of the difficulty level of ability domains into easy domains or difficult domains, in the current replication, we measured domain difficulty on a continuous scale: "Please rate the difficulty of this ability from 1 (very easy) to 10 (very difficult)". Details on the adjustment can be found in the section below "adjustments to the original study". In contrast to the original study, domain difficulty ratings were scored on a similar scale as comparative ability, (own and others') comparative ability, desirability, and ambiguity.

We examined difficulty ratings across all domains to assess whether perceived difficulty was as expected in the original and conditions in which difficulty was manipulated. For the easy domain condition, we hypothesized that easy interpretations of the original domains would result in lower domain difficulty ratings across all abilities compared to ratings of the original domain group. For the difficult domain condition, we hypothesized that difficult interpretations of the original domains of the original domain group. For the difficult in higher domain difficulty ratings across all abilities compared to rating across all abilities compared to original domains would result in higher domain difficulty ratings across all abilities compared to original domain group ratings. We expected the ambiguity ratings for both easy and difficult conditions to be lower than that in the original's domains. Additionally, we tested whether comparative ability would be influenced by our easy/difficult manipulations.²

 $^{^{2}}$ Although this test was the reason for the preregistration, due to an error, neither hypotheses or tests related to the core questions of the extensions were part of the preregistration. Hence, analyses connected to this question in the extension will be treated as exploratory.

Hypotheses

Based on the original study and the current extension hypotheses, this replication aims to

test four central hypotheses (Table 3).

Table 3

Summary	of	the	hy	oothe	ses
~			~ .		

Hypothesis	Statement	Variables	Conditions
H ₁ (Original)	Compared to judgments of others' abilities, participant judgments of their own abilities better predict their comparative ability judgments.	Own absolute ability; others' absolute ability; comparative ability	Replication and extension conditions
H ₂ (Original reframed)	The more difficult the ability domain, the more likely a person is to shift from perceiving oneself as above average to perceiving oneself as below average.	Comparative ability; domain difficulty; desirability; ambiguity	Replication and extension conditions
H ₃ (Extension)	Compared to the replication condition participants, the easy domain condition participants assign lower domain difficulty and ambiguity ratings to abilities.	Domain difficulty; ambiguity	Replication and easy domain conditions
H ₄ (Extension)	Compared to the replication condition participants, the difficult domain condition participants assign higher domain difficulty and lower ambiguity ratings to abilities.	Domain difficulty; ambiguity	Replication and difficult domain conditions

Adjustments to the original study

In the original study, the eight ability domains were divided into two categories: four easy domains and four difficult domains. On a 10-point scale from very easy to very difficult, easy domains had domain difficulty ratings below 5 (the midpoint of the scale), and difficult domains above 5, respectively. The above-average effect was tested for the easy domains, whereas the below-average effect was tested for the difficult domains.

Yet, several issues may arise from treating continuous variables as categorical. First, the categorization of continuous variables, especially dichotomization of placing variables into two groups, might lead to misclassifications, loss of information and power (Naggara et al., 2011). Second, the loss of power by dichotomizing variables at the median is equal to discarding one-third of the data (Cohen, 1983; MacCallum et al., 2002). Third, variation between categorized groups may be underestimated as close response scores divided into different groups are defined as being very different instead of very similar. It has thus been suggested to keep variables continuous using methods such as linear regressions instead of t-tests (Altman & Royston, 2006).

For the above reasons, we did not assign ability domains to specific dichotomic easy/difficult categories. The above- and below-average-effects were tested on a continuous scale: instead of using one-sample t-tests, correlations were used to test the relationship between domain difficulty and comparative ability in three different ways: item-wise, compiled items in a vector (but not averaging across them), and row-wise averaged for the three conditions. Applying this method is a more direct assessment of perceived difficulty with the same sample. For a full overview of differences between the current and the original study see the detailed supplement on OSF, section "Comparisons and deviations".

Pre-registration and open science

Before data collection, the experiment was pre-registered on the Open Science Framework (OSF) (<u>https://osf.io/byx4z/</u>). Pre-registrations, power analyses, and all materials used in these experiments as well as open-science details and disclosures are available in the detailed supplementary materials on OSF. All data and materials are available at <u>https://osf.io/7yfkc/</u>. All measures, manipulations, and exclusions conducted for this investigation are reported, all studies were pre-registered with power analyses reported in the detailed supplementary on OSF, and data collection was completed before analyses.

Method

Participants and power analyses

We conducted power analyses in R using the pwr package (Champely et al., 2018). The power analyses suggested a sample size of 160 to be sufficient for reaching 95% power with an alpha-level = .05 assuming an effect size of $f^2 = 0.099$ (informed by Kruger, 1999) for a 2-factor multiple linear regression analysis (see the detailed supplement on OSF, section "Power analysis of original study effect to assess required sample for replication"). We set to exceed this estimate (following replication recommendation such as Simonsohn, 2015) and added extensions thereby leading to the recruitment of 756 Amazon MTurkers. A total of 65 participants failed to meet the pre-registered inclusion criteria and were excluded, resulting in a total of 691 included participants (see Table 1 for sample comparison and exclusion details in supplement).

Design

The original study used a within-subject design with one-sample analyses conducted for each condition (easy versus difficult domains), yet in the current replication, we used a 3 (between difficult conditions: original, easy, difficult) x 2 (within difficulty conditions: easy, difficult) mixed-design. All participants were presented with eight items (within-subjects; see Table 2). We used the same methods as in the original study for within-group analyses and added additional analyses for the between-group comparisons (see the detailed supplement on OSF for more details and full measures).

Table 4

Comparison of original study and replication's samples

	Kruger (1999)	MTurk sample (pre-exclusion)	MTurk sample (post-exclusion)
Sample size	37	756	691
Geographic origin	US American	US American	US American
Gender	8 males, 29 females	442 males, 307 females, 7 unspecified	397 males, 288 females, 6 unspecified
Medium (location)	Questionnaire (Cornell University)	Computer (online)	Computer (online)
Compensation	Course credit	Nominal payment	Nominal payment
Year	1999	2020	2020

Procedure

Participants were recruited through MTurk on TurkPrime/CloudResearch (Litman et al., 2017) and completed questionnaires via a provided "Qualtrics" link after giving consent. Participants were randomly assigned to one of three conditions: 1) Original domains (8 original domains; 4 easy and 4 difficult domains), 2) Easy domains extension (easy reinterpretations of the 8 original domains), or 3) Difficult domains extension (difficult reinterpretations of the 8 original domains).

Based on the categorization in the original study, of the eight ability domains, four were categorized as easy and the other four as difficult (see Table 2), presented in randomized order.

Measures

The original study had six dependent variables and the current study added an additional dependent variable of perceived domain difficulty. Across all conditions, the dependent variables were measured as participant ratings for each of the eight ability domains (Table 2). We computed Cronbach's α -scores for the original and extension eight-item scales, first for all domains together, and then divided using the original's categorization of easy and difficult domains, being $\alpha_{all} > .63$, $\alpha_{all} > .46$, $\alpha_{all} > .47$ (See supplementary "Reliability for domains across conditions").

Exclusion criteria

The following exclusion criteria were pre-registered: 1) low proficiency of English (less than 5 on a scale of 1 to 7); 2) not being serious (less than 4 on a scale of 1 to 5); 3) correctly guessing one of the hypotheses; 4) having seen or done the survey before; 5) failure to complete the survey; and 6) not in or from the United States to keep sample characteristics as close to the original study as possible.

Evaluation criteria for replication findings

We compared the replication effects with the original effects in the target article using the criteria set by LeBel and colleagues (2019) (See supplementary "Criteria for evaluation of replications" and "Replication evaluation").

We categorized the current replication as a "close replication" and provided details in Table 5. Variables and questions were the same as in the original, with the addition of extensions and adjustments to fit the MTurk sample, instead of Cornell university students.

Classification of the replication, based on LeBel et al. (2018)

Design facet	Replication	Details of deviation
IV	Same	
operationalization		
DV	Same	
operationalization		
IV stimuli	Similar,	IV1 ability domains is changed from one condition
	with an	of 4 easy and 4 difficult abilities, to 3 conditions of
	added	the replication group, the easy domain group, and
	extension	the difficult domain group. Participants were
		presented with either the original ability domains,
		easy interpretations of the original ability domains,
		domains
DV stimuli	Similar	An additional dependent variable DV1 (domain
D V stilluli	with an	difficulty) is added
	added	For DV2 (comparative ability judgment), the scale
	extension	was changed from 0-99 to 0-100 for easier
		comprehension (requested by the instructor).
		For DV2 (comparative ability judgment) and DV4
		(Judgmental weight of others' absolute abilities),
		the comparison group was changed from "other
		students from the course" to "other MTurk workers"
DV stimes!	C : : 1	to ensure applicability for all Mturk participants.
DV stimuli	Similar,	For DV / (experience in the ability domain), the
	added	unspecified in the original study. Similar to the
	extension	majority of other dependent variables, it is measured
	extension	using a scale of 1 (no experience at all) to 10 (very
		experienced).
Procedural details	Similar,	Participants are all assigned to the same condition in
	with an	the original study. In the replication, they are
	added	randomly assigned to one of the three conditions.
	extension	
Physical settings	Different	From a questionnaire to filling out an online
~ .		Qualtrics survey.
Contextual	Different	From Cornell University undergraduates to
variables	Class	American MTurk workers as participants.
Keplication	Close	with two added extensions.
classification	replication	

Results

We analyzed the data using R v3.6.3 (R Core Team, 2020), with analyses conducted both on a participant- and an item-level. To allow for a broader assessment of the data, we conducted preprocessing by both calculating mean scores (Table 6 for correlation matrices for each condition), and compiling the values for variables' eight items (abilities) in their raw form, resulting in 8 rows per participant (see "Correlations per condition" subsection in the supplementary for correlation matrices for each condition). For analyses conducted on an item level, participant ratings for each of the eight abilities were examined.

Table 6

Variable	Original domains (n = 240)		= Easy domains (n = 225)		Difficult domains (n = 226)	
	Mean	SD	Mean	SD	Mean	SD
Mean domain difficulty	6.05	1.15	5.22	1.63	7.39	1.19
Mean comparative ability	53.29	14.5	58.86	14.92	46.97	18.86
Mean own absolute ability	6.04	1.37	6.64	1.44	4.77	2.02
Mean others' absolute ability	6.22	1.14	6.59	1.33	5.06	1.79
Mean desirability	8.15	0.99	7.9	1.15	7.54	1.35
Mean ambiguity*	3	1.24	2.68	1.23	2.76	1.43

Mean ratings across all abilities for the three conditions

*Ambiguity scores were reversed to indicate increasing ambiguity from 1 to 10.

Domain difficulty comparisons by conditions

We conducted paired-sample Wilcoxon tests comparing difficulty *ratings* between the grouped 4 easy and 4 difficult replication/original and extension domain *items* and found domain difficulty ratings to be higher for difficult abilities across all comparisons (summarized in Table 7, ps < .001), supporting Kruger's (1999) original categorization³. Hence, all conditions were analyzed as in the original study, including correlations between the variables across the eight domains, and one-sample Wilcoxon-tests testing for the above-average effect in easy ability domains and the below-average effect in difficult ability domains (see supplementary tables 8.1-8.3).

³ T-statistics for the distinction of ability items into easy and difficult were not reported in Kruger (1999).

Asymptotic Wilcoxon-Mann-Whitney tests comparing perceived domain difficulty ratings between easy and difficult abilities (within conditions)

	<i>T</i> - statistic	df	Mean difference	<i>p</i> -value	Effect size <i>r</i>	Lower 95% CI Bound	Upper 95% CI Bound
Original condition (replication)	668.5	238	2.78	<.001	0.82	0.79	0.85
Easy domain condition (extension)	1416	223	1.99	<.001	0.75	0.69	0.8
Difficult domain condition (extension)	1917	224	1.22	<.001	0.69	0.62	0.75

Replication: original domain condition

We conducted all analyses in this section on the original domain condition (n = 240).

H₁: Relationship between absolute and comparative ability

In a linear regression model, own and others' absolute ability ratings predicted mean comparative ability judgments, F(2, 237) = 323.9, p < .001, $R_{adj}^2 = .73$, 95% CI [0.68, 0.79]⁴. However, we only found support for participants' judgments of their own absolute ability as predictors of their comparative ability judgments, $\beta = 0.90$, t(239) = 19.93, p < .001.

On an item level, we conducted multiple regressions for each of the eight abilities to examine how participants' estimates of both own and others' absolute abilities predict

⁴ See "Additional Tables and Figures" in the supplementary for regression plots and tables.

comparative ability estimates (see Table 8 for standardized betas). Own absolute abilities were generally better in explaining changes in comparative ability judgments than others' skills, which supports H₁.

Table 8

Replication condition: Mean comparative ability estimates and judgmental weight of own versus peers' abilities

Ability	Domain difficulty ¹	Percentile estimate ²	Judgment weight: Own ability ³	Judgment weight: Others' ability ³
Using mouse	2.70 (2.63)	71.2*** (17.90)	0.29***	0.04
Driving	5.19 (2.41)	65.2*** (22.08)	0.85***	-0.11**
Riding bicycle	4.14 (2.44)	61.0*** (20.48)	0.76***	-0.06
Saving money	6.63 (2.08)	62.9*** (21.10)	0.79***	-0.05
Telling jokes	6.10 (2.06)	52.4 (22.63)	0.75***	0.04
Playing chess	7.74 (1.75)	41.0*** (27.00)	0.82***	-0.03
Juggling	7.64 (1.97)	32.0*** (27.67)	0.59***	0.18**
Computer programming	8.29 (1.74)	40.7*** (29.22)	0.83***	-0.06

Note: Table presented as in original study (Kruger, 1999, Table 2) encompassing descriptive statistics, one-sample t-tests, and regressions.

¹Mean (SD) scores for item-wise domain difficulty. Higher numbers reflect greater difficulty.

²Mean (SD) scores for item-wise comparative ability/percentile estimates. Scores above 50 reflect an above-average effect, estimates below 50 reflect a below-average effect. See supplementary tables 8.1 and 9.1 for test statistics and CI's.

³Standardised betas from multiple regressions predicting participants' comparative ability (percentile) estimates from own absolute ability and peers' absolute ability, respectively. **p < .01. ***p < .001.

For the relationship between absolute and comparative ability ratings across all abilities

(240 participants * 8 items), we found a strong relationship between comparative ability

estimates and others' ability ratings r(6) = 0.94, p < .001, 95% CI [0.71, .99] and between

comparative ability estimates and own ability ratings r(6) = 0.99, p < .001, 95% CI [0.96, .99].

Hotelling's (1940) t indicated these correlations to be different from each other t(5) = 4.66, p = .006.

H₁: Additional correlation analyses for the relationship between absolute and comparative ability

When adding two modes of analysis, namely, *vector-compiled scores* and *inventory mean scores*⁵, Pearson's *rs*, calculated for *vector-compiled scores* of comparative ability estimates and other's absolute ability, were r(1918) = 0.50, 95% CI [0.46, 0.53], and between comparative ability estimates and own absolute ability were r(1918) = 0.81, 95% CI [0.79, 0.82], with these correlations being different from each other, Hotelling's (1940) t(1917) = 27.61, p < 0.001. For *inventory mean scores*, correlations between comparative ability estimates and other's absolute ability were r(238) = 0.53, p < .001, 95% CI [0.43, 0.62], and between own and comparative ability r(238) = 0.85, p < .001, 95% CI [0.82, 0.89], with these correlations being different from each other, Hotelling's t(237) = 11.75, p < 0.001.

However, when using a mixed-effects model with random intercepts at the level of participants to explain comparative ability, positive changes in own ability explained positive changes in comparative ability and the relationship between others' and comparative ability being the opposite (Table 9). The findings from both replicated and the new analyses present strong support for H_1 .

 $^{^{5}}$ Vector-compiled scores were each participant (in the replication condition) scores in all 8 domains lined up in one vector with 8 (domains) * 240 (participants) = 1920 rows. *Inventory mean scores* were calculated by averaging the 8 domains for each participant (row-wise), resulting in 240 rows. P-values for vector-compiled scores correlations are not provided as those do not account for repeated responses of the same person.

Estimated fixed-effects coefficients of the mixed-effects regression model with changes in Comparative Ability explained by Others' and Own Ability

Predictors	В	S.E.	CI	р
(Intercept)	12.56	1.33	9.95 - 15.18	< 0.001
Own Ability	7.18	0.16	6.86 - 7.50	< 0.001
Others' Ability	-0.42	0.21	-0.840.01	0.04

Note. The table presents the fixed-effects coefficients with all the model predictors. See supplementary section "Mixed Models" for step-wise regression results.

H₂: Relationship between comparative ability, domain difficulty, and desirability.

We conducted one-sample t-tests to examine domain-wise comparative ability ratings using the 50th percentile estimates of comparative ability to classify above and below average effects (as in Kruger, 1999). Similar as in Kruger's (1999) findings, participants indicated to be above-average for all easy ability domains (ps < .001) and below-average for three of the four difficult ability domains (ps < .001; see Table 8 column 2 for descriptive statistics, and supplementary tables 8.1 and 9.1 for test statistics and CI's). For the above and below-average effects across all abilities, we found a strong negative correlation between comparative ability estimates and domain difficulty r(6) = -0.85, p = .0073, 95% CI [-0.97 -0.37]⁶. Item-wise comparative-ability-domain-difficulty correlations are provided in the supplementary under 'Replication condition: Item-wise correlations between domain difficulty and comparative ability ratings for each ability domain'.

When comparing desirability ratings between easy (M = 8.731, SD = 1.01) and difficult ability domains (M = 7.58, SD = 1.40), a paired-samples Wilcoxon test revealed easy abilities to

⁶ See supplementary Table 11: equivalence tests 1-2.

be more desirable $M_{difference}$ = 1.16, Z(238) = 9.42, p < .001, r = 0.66, 95% CI [0.59, 0.73]. Onesample Wilcoxon tests revealed that all domain-specific desirability scores were higher than the scale midpoint (ps < .001; supplementary table 9.4). That corresponded with a strong positive relationship between comparative ability and desirability r(6) = 0.72, p = .0448, 95% CI [0.03, 0.95].

H₂: Additional Analyses for the relationship between comparative ability, domain difficulty, and desirability.

Similarly, we found a negative association between comparative ability and domain difficulty ratings when using *vector-compiled scores*, r(1918) = -0.35, 95% CI [-0.39, -0.31].⁷ However, when using *inventory mean scores*, opposite to the original study, we found a positive association between comparative ability and mean domain difficulty ratings, r(238) = 0.16, p = .013, 95% CI [0.04, 0.28].⁸ As this *inventory mean scores* correlation did not correspond to the other results, we conducted an exploratory analysis⁹, revealing a small positive correlation between comparative ability and domain difficulty ratings in easy r(238)=0.03, 95% CI [-0.10, 0.15], p = .70, and a small negative correlation in difficult ability domains, r(238)=-0.10, 95% CI [-0.23, 0.02], p = .11. Using mixed models with random intercepts at the participant level, H₂ was not supported as difficulty did not predict changes in comparative ability (Table 10).

⁷ See supplementary Table 11: equivalence tests 2-3. The presented correlation on vector compiled scores is not an optimal measure as these do not account for dependence in several measures provided by the same individual. Hence, p-values are not informative and therefore not reported.

⁸ See supplementary Table 11: equivalence tests 4-5.

⁹ Not included in the preregistration.

Predictors	В	S.E.	CI	р
(Intercept)	8.72	2.4	[4.01, 13.43]	<.001
Own	7.07	0.18	[6.73, 7.42]	<.001
Other	-0.48	0.21	[-0.90, -0.06]	0.025
Difficulty	-0.04	0.16	[-0.36, 0.28]	0.817
Desirability	0.57	0.21	[0.16, 0.99]	0.007
Ambiguity	0.12	0.17	[-0.21, 0.45]	0.48

Estimated fixed-effects coefficients of the mixed-effects regression model with changes in Comparative Ability explained by Others' and Own Ability in the Replication Condition.

Note. The table presents the fixed-effects coefficients with all the model predictors. See supplementary section "Mixed Models" for step-wise regression results.

Original analysis' methods provided support for H_2 . Additionally, a Simpson's paradox can be observed when averaging all eight domains into one score over various manipulated factors for each participant and then correlating them.¹⁰

Extension: Easy domain and difficult domain conditions

Comparative ability for easy and difficult items by conditions

We conducted paired-sample Wilcoxon tests comparing difficulty ratings between the easy and difficult replication/original and extension domains and found comparative ability to be estimated higher for easy abilities across all comparisons (summarized in Table 7, all p < .001).

¹⁰ For an overview of all correlations between mean scores across inventories for the replication condition see supplementary Tables 3.1 and 3.2.

Relationship between absolute and comparative ability

We conducted multiple linear regression analyses to test how ratings of both own and others' ability predict comparative ability judgments across all abilities. Models in both conditions predicted variance in comparative ability judgments, $F_{easy}(2, 222) = 246.6$, p < .001, $R_{adj}^2 = .69$, 95% CI [0.62, 0.76] and $F_{difficult}(2, 223) = 342.9$, p < .001, $R_{adj}^2 = .75$, 95% CI [0.70, 0.81]. Yet, the only significant predictors of participants' own absolute ability were comparative ability judgments in both the easy ($\beta = 0.86$, t(222) = 17.32, p < .001) and the difficult domain condition ($\beta = 0.90$, t(223) = 15.61, p < .001).

Table 11

Extension conditions: Mean comparative ability estimates and judgmental weight of own and peers' abilities by domain difficulty

Ability	Judgmental weight of own ability ¹	Judgmental weight of others' ability ¹	Judgmental weight of own ability ¹	Judgmental weight of others' ability ¹		
	Easy doma	in condition	Difficult domain condition			
Using mouse	0.48***	0.03	0.58***	0.15*		
Driving	0.75***	-0.1	0.78***	-0.02		
Riding bicycle	0.65***	0.06	0.79***	0.06		
Saving money	0.81***	-0.03	0.78***	-0.07		
Telling jokes	0.70***	0.10*	0.70***	0.14**		
Playing chess Juggling	0.79***	0.02	0.75***	0.01		
	0.78***	0.05	0.68***	0.05		
Computer programming	0.85***	-0.03	0.79***	0.03		

¹Standardised betas (β) from multiple regressions predicting participants' comparative ability (percentile) estimates from their estimates of their own absolute ability and the absolute ability of their peers, respectively. *p < .05. **p < .01. ***p < .001 Item-wise multiple linear regression analyses showed, consistent with the original study and replication condition, that extension condition participants weighted own ability estimates stronger than others' ability estimates when assessing their comparative abilities (Table 11). All standardized betas (β) of own absolute abilities were positive and *ps* <.001 (for all abilities), whereas β s of others' absolute abilities were bi-directional and smaller.

For the *easy* domain condition, the correlation between own ability and comparative ability was r(6) = 0.99, p < .001, 95% CI [0.97, 0.999], and the correlation between others' and comparative ability was r(6) = 0.96, p < .001, 95% CI [0.78, 0.99], and these correlations were different from each other – Hotelling's (1940) t(5) = 2.85, p = 0.037. For the *difficult* domain condition, the correlation between own ability and comparative ability was r(6) = 0.97, p < .001, 95% CI [0.85, 0.995], and the correlation between others' and comparative ability was r(6) = 0.97, p < .001, 95% CI [0.85, 0.995], and the correlation between others' and comparative ability was r(6) = 0.92, p = .001, 95% CI [0.60, 0.99], with weaker support found for these correlations as being different from each other – Hotelling's t(5) = 2.24, p = 0.075.

Additional Analyses: Relationship between absolute and comparative ability

The vector-compiled score correlation for the *easy* domain condition between own and comparative ability was r(1798) = 0.78, 95% CI [0.76, 0.80], and between others' and comparative ability was r(1798) = 0.47, 95% CI [0.43, 0.51]. For the *difficult* domain condition correlations between own and comparative ability was r(1806) = 0.78, 95% CI [0.76, 0.80], and between others' and comparative ability was r(1806) = 0.45, 95% CI [0.41, 0.48].

Additionally, also mixed models indicated that own ability was a better predictor of comparative ability than others' ability (Table 12).

Easy condition extension						
Predictors	В	<i>S.E</i> .	CI	р		
(Intercept)	15.48	1.3	12.94 - 18.02	< 0.001		
Own	6.56	0.16	6.25 - 6.88	< 0.001		
Other	-0.04	0.2	-0.43 - 0.36	0.861		
Difficult condition extension						
Predictors	В	<i>S</i> . <i>E</i> .	CI	р		
(Intercept)	16.53	1.49	13.61 - 19.44	< 0.001		
Own	6.4	0.16	6.09 - 6.72	< 0.001		
Other	-0.02	0.22	-0.44 - 0.41	0.94		

Estimated fixed-effects coefficients of the mixed-effects regression model with changes in Comparative Ability explained by Others' and Own Ability in the Extension Conditions

Note. Fixed-effects coefficients with all model predictors. Participants represented the random effect. See supplementary section "Mixed Models" for step-wise regression results.

Extensions:	Mean	domain	difficulty	and mea	n compare	ative abi	ility estin	nates tes	ted ag	gainst t	he
average (sca	ale mic	lpoint)									

Ability	Domain Difficulty	omain Percentile D fficulty Estimate ¹ D		Percentile Estimate ²	
	Easy domain condition		Difficult domain condition		
Using mouse	3.13 (2.90)	71.27 (20.51)***	5.77 (2.36)	55.79 (21.12)***	
Driving	4.58 (2.77)	66.32 (22.74)***	7.16 (2.15)	40.63 (29.28)***	
Riding bicycle	3.88 (2.77)	65.76 (21.92)***	7.85 (2.12)	48.90 (27.54)	
Saving money	5.31 (2.76)	63.63 (25.55)***	6.32 (2.60)	62.68 (25.77)***	
Telling jokes	4.64 (2.67)	59.74 (20.55)***	7.67 (1.98)	40.82 (27.03)***	
Playing chess	6.71 (2.56)	47.81 (27.55)	8.34 (1.89)	41.86 (27.22)***	
Juggling	6.07 (2.60)	46.76 (27.75)	7.81 (2.00)	39.67 (27.66)***	
Computer programming	7.46 (2.13)	49.57 (25.71)	8.15 (1.84)	45.36 (26.02)**	

*p<.05, **p<.01, ***p<.001

Note: Scores are displayed with the following structure: Mean (SD)

¹ Scores above 50 reflect an above-average effect, estimates below 50 reflect a below-average effect. See table 9.2 in supplementary for test statistics and CI's.

²See table 9.2 in supplementary for test statistics and CI's.

Inventory mean score correlations for the *easy* domain condition between own and comparative ability was r(223) = 0.83, p < .001, 95% CI [0.78, 0.87], and between others' and comparative ability was r(223) = 0.52, p < .001, 95% CI [0.42, 0.61]; and the *difficult* domain condition the correlation between own and comparative ability was r(224) = 0.87, p < .001, 95% CI [0.83, 0.90], a and between others' and comparative ability was r(224) = 0.70, p < .001, 95% CI [0.62, 0.76].
Relationship between domain difficulty and comparative ability.

As indicated above, one-sample t-tests indicated above-average-effect for the easy and below-average effect for the difficult condition (Table 13 for mean scores and SD's, supplementary tables 9.2-9.3 for test statistics). However, the below-average-effect was not expressed in the easy extension condition, and the above-average-effect was not clearly expressed in the difficult extension condition. Item-wise correlations between comparative ability and domain difficulty for each ability are provided in the supplementary under 'Extension conditions: correlations between comparative ability and domain difficulty ratings for each ability domain'. The easy domain condition contains mixed results of medium to no associations (p < .936), whereas the difficult domain condition contains negative associations for all abilities (p < .001). Congruent with original and replication findings, there were negative relationships between domain difficulty and comparative ability in the *easy* r(6) = -0.90, p = .002, 95% CI [-0.982, -0.537]¹¹ and *difficult conditions* r(6) = -0.75, p = .033, 95% CI [-0.951, -0.092]¹².

Additional analyses for the relationship between domain difficulty and comparative ability.

Congruent with both original and replication findings, correlations between comparative ability and mean domain difficulty were negative for *vector-compiled score* in the easy, r(1798) = -0.27, 95% CI [-0.31, -0.22], and difficult conditions r(1798) = -0.31, 95% CI [-0.35, -0.27]. When averaging across the inventory (*inventory mean scores*), this relationship changes to r(223) = 0.32, p < .001, 95% CI [.19, .43] in the easy condition; and r(223) = -0.13, p = .0498,

¹¹ See supplement: equivalence tests 7-8.

¹² See supplement: equivalence tests 9-10.

95% CI [-0.26, -0.0002] in the difficult condition – showing the possibility of a Simpson's paradox, just as in the replication condition.¹³ Different from the replication data, in both easy and difficult conditions, with decreasing difficulty, comparative ability increases (Table 14).

Table 14

Estimated fixed-effects coefficients of the mixed-effects regression model with changes in Comparative Ability explained by Others' and Own Ability in the Extension Conditions

Comparative Ability Easy Condition							
Predictors	B	S.E.	CI	р			
(Intercept)	18.6	2.35	[13.99, 23.21]	< 0.001			
Own	6.37	0.18	[6.02, 6.71]	< 0.001			
Other	-0.13	0.21	[-0.54, 0.28]	0.546			
Difficulty	-0.41	0.16	[-0.72, -0.11]	0.008			
Desirability	0.15	0.21	[-0.26, 0.56]	0.468			
Ambiguity	-0.1	0.19	[-0.47, 0.27]	0.6			
Comparative Ability Difficult Condition							
Predictors	B	S.E.	CI	р			
(Intercept)	25.57	2.66	[20.36, 30.79]	< 0.001			
Own	6.11	0.17	[5.78, 6.45]	< 0.001			
Other	-0.16	0.22	[-0.59, 0.26]	0.451			
Difficulty	-1.04	0.2	[-1.43, -0.64]	< 0.001			
Desirability	0.16	0.2	[-0.22, 0.55]	0.405			
Ambiguity	-0.17	0.19	[-0.55, 0.21]	0.37			

Note. The table presents the fixed-effects coefficients with all the model predictors. Participants represented the random effect. See supplementary section "Mixed Models" for step-wise regression results.

 $^{^{13}}$ See supplementary tables 5.1, 5.2, 7.1 and 7.2 for correlations between mean scores across inventories in the extension conditions.

Comparisons of ambiguity and difficulty ratings between the three conditions

As parametric assumptions were not met¹⁴, to test whether different domain definitions from the original domains would result in different domain difficulty and ambiguity ratings, we first conducted a Kruskal-Wallis test that showed differences in difficulty scores across conditions H(2) = 237, p < .001, $\eta^2 = 0.34$ (Figure 1). Supporting the first part of H₃₋₄, post-hoc Bonferroni corrected Mann-Whitney tests showed that compared to the replication condition $(Mdn_{replication} = 6.00, M_{replication} = 6.05, SD = 1.15)$, participants in the easy domain condition $(Mdn_{easy} = 5.00, M_{easy} = 5.22, SD = 1.63)$ rated lower domain difficulty, p < .001. Participants in the difficult domain condition ($Mdn_{difficult} = 7.78$, $M_{difficult} = 7.39$, SD = 1.19) rated higher domain difficulty than in the other conditions, ps < .001 (Figure 1A). We conducted a second Kruskal-Wallis test and found that there were differences in participants' ambiguity ratings between the three conditions H(2) = 11.47, p = .003, $\eta^2 = 0.014$ (Figure 1B). As predicted in the second part of H₃₋₄, post-hoc Bonferroni corrected Mann-Whitney tests showed replication condition ambiguity ratings ($Mdn_{replication} = 2.88 M_{replication} = 3.00, SD = 1.24$) to be lower than both the easy extension condition ($Mdn_{easy} = 2.38$, $M_{easy} = 2.68$, SD = 1.23), $p_{adi} = 0.01$ and the difficult extension condition ambiguity ratings ($Mdn_{difficult} = 2.38$, $M_{difficult} = 2.76$, SD = 1.43), $p_{adj} = 0.01$. We found no support for differences between easy and difficult extension conditions' ambiguity ratings, $p_{adj} \approx 1.00$.

¹⁴ See "Statistical assumptions and normality Tests" section in the detailed supplementary on OSF for parametric tests.

Figure 1

Box and violin plots of domain difficulty and ambiguity ratings across replication, easy extension, and difficult extension conditions with uncorrected p-values for group-wise comparisons and overall models.



Note. Panel A: Mean difficulty across conditions. Panel B: Mean ambiguity across conditions. p > .05, *p < .05, *p < .01, ***p < .001, ****p < .001

Relationship between comparative ability, and domain difficulty and desirability (examining H₂ in the extension conditions)

In the following section, the easy n = 225 and difficult n = 226 extension conditions results are analyzed in the same way as reported above for the replication condition. For the above and below-average effects across all abilities, we found a strong negative correlation between comparative ability estimates and domain difficulty in both extension conditions (see above). Item-wise comparative-ability-domain-difficulty correlations are provided in the supplementary 'Extension conditions: correlations between comparative ability and domain difficulty ratings for each ability domain'.

When comparing desirability ratings between easy and difficult ability domains via Wilcoxon signed ranks test, in the easy extension condition easy (M = 4.23, SD = 2.13) abilities to be more desirable than difficult abilities (M = 6.22, SD = 1.56), Z(223) = -10.62, p < .001, r =0.75, 95% CI [0.70, 0.80], as well as in the difficult extension condition easy abilities (M = 6.78, SD = 1.44), difficult (M = 7.99, SD = 1.30), Z(224) = -9.26, p < .001, r = 0.69, 95% CI [0.62, 0.75]). One-sample Wilcoxon tests revealed that all domain-specific desirability scores were higher than the scale midpoint (ps < .001; supplementary tables 9.5-9-6). Moreover, correlations between comparative ability and desirability in easy r(6) = 0.66, p = .074, 95% CI [-0.08, 0.93] and difficult extension conditions r(6) = 0.15, p = .72, 95% CI [-0.62, 0.77] remain uncertain.

Extension H₂: Additional Analyses for the relationship between comparative ability, and domain difficulty and desirability

Similarly, we found a negative association between comparative ability and domain difficulty ratings when using *vector-compiled scores* in the easy extension condition r(1798) = -

0.27, 95% CI [-0.31, -0.22]¹⁵, as well as in the difficult extension condition r(1806) = -0.31, 95% CI [-0.35, -0.27]¹⁶. Similar to our findings for the replication condition, when using *inventory mean scores*, we found a positive association between comparative ability and mean domain difficulty ratings in the easy extension condition r(223) = 0.32, p < .001, 95% CI [0.19, 0.43]¹⁷, and a negative association in the difficult extension condition r(223) = -0.13, p = .05, 95% CI [-0.26, -0.0002]¹⁸.

Exploratory Analysis: comparative ability across conditions

In an exploratory analysis using a 3 (Condition) x 2 (Difficulty) mixed design, an aligned rank-transform nonparametric factorial ANOVA showed both main effects of condition, F(2, 1376) = 47.03, p < .0001, $\eta^2_G = 0.064$, and difficulty, F(1, 1376) = 302.17, p < .0001, $\eta^2_G = 0.169$, as well as the interaction effect F(1, 1376) = 15.23, p < .0001, $\eta^2_G = 0.022$, were significant.¹⁹

¹⁵ See supplement: equivalence tests 11-12.

¹⁶ See supplement: equivalence tests 13-14.

¹⁷ See supplementary Table 11: equivalence tests 15-16.

¹⁸ See supplementary Table 11: equivalence tests 17-18.

¹⁹ As this analysis was an oversight in our preregistration, an additional power simulation was executed, showing excellent power for observing main and interaction effects of a 3x2 mixed ANOVA. See supplementary "Power Simulation for Exploratory Analysis" for more information.

Figure 2

Comparative ability across conditions



Note. Panel A. Mean easy and difficult mean comparative ability ratings by condition. Panel B. Mean comparative ability ratings by difficulty. Panel C. Mean easy and difficult mean comparative ability ratings by condition with SD. $^{ns}p>.05$, *p<.05, *p<.01, ***p<.001, ***p<.001

Post-hoc multiple comparisons revealed significant differences between all comparisons at Bonferroni corrected ps < .001, except the comparison between easy items in replication

compared to easy items in the easy extension, difficult items in the replication compared to difficult extension, and difficult easy-extension compared to easy difficult-extension (as expected from power-simulations²¹), with $ps \approx 1.00$.

Replication Evaluation

The following section compares the original study and current replication based on the replication evaluation criteria by LeBel et al. (2019). We found clear support for replication hypotheses H₁ and H₂. Both correlations between own absolute ability and comparative ability across all abilities displayed as conducted in the original study and additional analyses detected strong effects in the same direction as the original, but we found no support for difficulty as a predictor of comparative ability in a mixed-effects model using the replication data (Table 15.1). Positive and significant standardized betas for all own absolute abilities, and predominantly negative and non-significant standardized betas for others' absolute abilities were replicated (Table 15.2). The strong evidence bolsters Kruger's research on egocentrism as comparative ability judgments are based on participants' own levels of ability instead of their perceptions of others' level of ability (Kruger, 1999; Kruger & Burrus, 2004). An underlying mechanism might be focalism, a complementary bias on people's tendency to place more judgmental weight on the target (self) and less weight on the referent (others) when making direct comparisons between the two (Krizan & Suls, 2008). An alternative explanation is that people simply have more information about themselves than they do about others. Paired with expectations about distributions of values of luck and skills, participants might have rationally judged, based on their best guess, that their own abilities are higher compared to others' abilities when tasks were easy and vice versa when tasks were difficult (Moore & Healy, 2008).

Table 15.1

	р	Correlation coefficient (r) and 95% CI	р	Correlation coefficient (r) and 95% CI	
Variables (across all abilities)	Original study		Replication condition		Replication evaluation
Own ability and comparative ability	<.001	<i>r</i> (6) = .95 [0.90, 0.97]	<.001	<i>r</i> (6) = 0.99, [0.96, 1.00]	Signal - consistent
Inventory mean and absolute own ability and comparative ability	/	/	<.001; <.001	r(238) = .85 [0.82, 0.89]; r(1918) = 0.50, [0.46, 0.53]; Own (B = 7.18) vs others' ability (B = -0.42)	Additional analyses
Domain difficulty and comparative ability	<.001	<i>r</i> (6) =96, [-0.98, -0.92]	0.007	r(6) = -0.85, [-0.97 -0.37]	Signal - consistent, smaller
Inventory mean and absolute domain difficulty and comparative ability	/	/	.013; <.001	r(238) = 0.16 [0.04, 0.28]; r(1918) = - 0.35, [-0.39, - 0.31]; Difficulty as predictor of comparative ability $B = -$ 0.04	Additional analyses

Comparison of correlational study effect sizes between the original article and replication based on criteria created by LeBel et al. (2019)

Above and below-average effects (H_2) replicated with a slightly smaller effect. Additional analyses revealed a smaller effect in the same direction, but when averaging the entire inventory for each participant and thereby reducing the variability in responses, a Simpson's paradox

Kruger (1999) replication and extensions

seems to occur. Additionally, we found no support for difficulty as a predictor of comparative ability in a mixed regression model using the replication data, but we found support in both extensions. Participants tended to indicate higher rather than lower comparative ability in both the replication and the easy conditions, where difficulty ratings were normally distributed. This was not the case for the difficult condition, where difficulty ratings were right-skewed. In other words, the Simpson paradox was produced by the above-average-effect being stronger than the below-average-effect in the replication and the easy conditions. Overall, this shows the contextual effects of the inventory's difficulty on participants' ratings of tasks difficulty and comparative ability. Using both one-sample Wilcoxon and t-tests, both above-and-below-average effects replicated with smaller effects, whereas above-average effect sizes replicated closer to the original study (Table 15.3). Despite smaller effect sizes, the observed results support above-and-below-and-below-average effects. The prevalence of the below-average-effect also demonstrates that motivated reasoning to see oneself as superior fails to account for certain situations, such as for difficult abilities in the replication.

Table 15.2

Ability	JudgmentalJudgmentalJudgweight ofweight ofweight ofownothers'ownability1ability1ability1Original studyReference		Judgmental weight of own ability ¹	Judgmental weight of others' ability ¹	
			Replication	n condition	Replication outcome
Using mouse	0.21	0.06	0.29***	0.04	
Driving	.89****	25*	0.85***	-0.11**	
Riding bicycle	.61****	-0.02	0.76***	-0.06	
Saving money	.90****	25***	0.79***	-0.05	absolute abilities are all
Telling jokes	.91****	-0.03	0.75***	0.04	positive (same direction) and
Playing chess	.96****	22**	0.82***	-0.03	<.001
Juggling	.89****	-0.16	0.59***	0.18**	
Computer programming	.85****	-0.1	0.83***	-0.06	

Comparison of mean comparative ability estimates and judgmental weight of own versus others' abilities by domain difficulty between the original study and replication condition

Note. The original study only provided the standardized betas and *p*-values. The transformed R^2 and F^2 values would only represent the effect size of one predictor instead of the overall regression, so only the *p*-values and directions were compared.

¹Standardised betas from multiple regressions predicting participants' comparative ability (percentile) estimates from their estimates of their own absolute ability and the absolute ability of their peers, respectively. *p < .05. **p < .01. ****p < .001. ****p < .001

Table 15.3

Comparison of one-sample t-test effect sizes between the original article and replication based on criteria created by LeBel et al. (2019)

	Cohen's <i>d</i> and 95% CI	Replication outcome		
Original study (n=37)				
Each easy ability	0.90 [0.22, 1.57]			
Each difficult ability (excluding telling jokes)	-1.44 [-2.17, -0.72]			
Replication condition (<i>n</i> =240)				
Easy abilities				
Using mouse	1.18 [1.02, 1.35]	Signal - consistent		
Driving	0.69 [0.55, 0.83]	Signal - consistent, smaller		
Riding bicycle	0.54 [0.40, 0.67]	Signal - consistent, smaller		
Saving money	0.61 [0.47, 0.75]	Signal - consistent, smaller		
Difficult abilities				
Telling jokes	0.11 [-0.02, 0.23]	No signal		
Playing chess	-0.33 [-0.46, -0.20]	Signal - consistent, smaller		
Juggling	-0.65 [-0.79, -0.51]	Signal - consistent, smaller		
Computer programming	-0.32 [-0.45, -0.19]	Signal - consistent, smaller		

Discussion

We replicated and extended the findings in Kruger's (1999) Study 1. Both the replication and the extension results provide strong support for above- and below-average effects, depending on difficulty. In addition, we present important boundary conditions. *First*, above-and-belowaverage effects appear stronger the more difficult the domain abilities are (compare Tables 8 and 11). *Second*, the difficulty of different activities (ability domains) might provoke or suppress below -or above-average-effects; we observed a below-average-effect when the presented abilities were difficult, and vice versa, an above-average-effect when the presented abilities were easy. In that context, we observed an interaction effect between manipulations (making the original scale easier or more difficult) and item-group-difficulty (easy vs difficult items), looking at comparative ability. Ambiguity was low across conditions with additional information introduced in the extensions decreasing ambiguity.

Replication

Egocentrism is a compelling, yet only one of many explanations for above-and-belowaverage-effects (Zell et al., 2020). Alternatively, judgments might be rationally based on differential access to information influencing predictions (Moore & Small, 2007). In other words, by having more information about the own than others' performance in different activities, others' performance is evaluated less extremely than the own performance (Moore & Healy, 2008).

Moreover, the replication advances our understanding of the conditions in which the above or below-average effects are more pronounced, i.e., when abilities' difficulty and supplied information about them differ. It complements a recent meta-analysis on the above-averageeffect (Zell et al., 2020), showing a larger effect when using the direct (compare oneself to others on a single scale with the midpoint defined as average) rather than indirect testing method (assess oneself and the comparison group independent from each other, with the average being defined as the difference between the two values). Fewer research center on the below-averageeffect, yet success in replicating the effect suggest that the same conditions may also be applicable in strengthening the below-average effect.

On the other hand, the replication's smaller effect sizes challenge the influence of certain established factors on the effects. For instance, people showed the strongest biases in comparative ability judgments when the comparison group was abstract instead of concrete, and no specific information and contact with the comparison group contributes to that abstractness (Alicke et al., 1995).

A notable discrepancy between the original and replication is the comparison group: original study participants compared themselves to other students from their psychology course, which was much more concrete than replication participants comparing themselves to others of the same age, gender, and socioeconomic background. The replication's smaller effects suggest that in contrast to past explanations, people may not display tendencies to choose vulnerable comparison targets to compare themselves with when given an abstract referent group (Chambers & Windschitl, 2004). As people display preferences in selecting representative targets, they might choose comparison targets of varying ability depending on task difficulty, and the availability of information and cognitive resources (Nisbett et al., 1983). This may have been the case for the current replication and is a promising direction for future research.

Extension

Both H_3 and H_4 were supported. We found lower domain difficulty ratings in the easy domain condition than the replication condition (d = 0.59) and higher domain difficulty ratings in the difficult domain condition than the replication condition (d = 1.15) supporting the first part of the extension hypotheses ($H_{3.4}$) on differences in domain difficulty. As interpretations of easy or difficult abilities contribute to different perceptions of domain difficulty, the observed results provide insight on how this affects participant interpretation of "average" ability. In a study by Kim and colleagues (2017), people construed below-median averages and showed above-average effects for abilities perceived as easy, and construed averages at or above the median for abilities perceived as difficult. For accurate assessments of comparative ability judgments, researchers not only need to ascertain how people interpret "average" ability, but also place efforts in lowering variations in the perceived difficulty of abilities. Hence, the original domain definitions may have been open to interpretation, influencing the results.

Moreover, we found support for the second part of H₃₋₄, that ambiguity was lower in the replication conditions. Eventually, more information provided might have led to clarification and hence decreased perceptions of ambiguity. Previous research showed a tendency to view oneself as above-average for ambiguous abilities (Dunning et al., 1989), and to select favorable, self-serving definitions amongst ambiguous traits describing a wide variety of behaviors (Gilovich, 1983; Kunda, 1987), which could not be reflected from our data. Finally, comparing comparative ability scores across conditions (replication vs extensions) and by the difficulty of the items (easy vs difficult), show an interaction effect. That indicates that both domain difficulty and ambiguity might influence comparative ability ratings and thereby above-and-below-average-effects. However, despite the presented extensions potentially presenting the influence of abilities'

difficulty and their definitions' ambiguity on the effects, more research is needed to address above-and-below-average-effects' boundary conditions.

Limitations and future directions

Deviating from the original study, in our replication we measured the continuous relationship between variables and analyzed data on participant and item levels. Moreover, possible inferences from comparisons between added and original study correlations between domain difficulty and comparative ability are limited. Our tests supported original ability categorizations as easy or difficult, all original study tests (including one-sample tests and correlations of ratings across all abilities) were also carried out for the replication condition. While we recommend future replications testing the continuous relationship between variables to avoid limitations in performing study comparisons, misclassification, and issues in categorizing continuous variables, we also caution of low reliability when using the presented scale and particularly the suggested (easy and difficult ability) subscales (Table 5).

Furthermore, the replication's ability domain definitions are all based on Kruger's (1999) original domains. Yet, these domains may not be as accurate and widely applicable at present. For example, a recent survey indicated that the easy ability "saving money" is challenging for the majority, with 69% of Americans having less than \$1000 in their savings accounts (Huddleston, 2019). For future tests, the current ability domains can be updated and pretested. Although Kim et al. (2017) found the above-average-effect, most of the 14-items they used were general abilities such as written or spoken expression. More relevant and comprehensive items can be included in future studies and bigger pretest samples (original study: n = 39) used to select ability domains and validate the instrument.

How do people assess task difficulty? This question goes beyond the scope of the current investigation yet is a critical open question if difficulty serves as a moderator between the above and below average effects. Difficulty has been described in previous research to increase as a function of cognitive and/or physical load, with those loads being rather additive than interactive components in making difficulty (Feghhi & Rosenbaum, 2019). Different factors might be linked to such perceptions, such as error probability, weights of errors (one error is worse than another), attention demands or potentially a cost-benefit calculation determining judgements of difficulty (Feghhi & Rosenbaum, 2019).

The underlying mechanisms of task difficulty judgments remain unclear, yet in our extension's stimuli, we attempted to embed quantitative numerical information regarding load constructed to be perceived as more and less difficult. We found that these were indeed rated as more and less difficult by the participants. This allows for the use of a quantifiable latent concept such as load as a predictor of difficulty. The operationalization of such latent concepts requires systematic testing in future research.

Together with many past studies, the present replication only establishes the ubiquity of the above and below-average effects. Much less is known about the effects' impacts, especially for the below-average effect. The directionality of the above-average effect's impacts is still debated. Tendencies to see oneself as better than others can serve a wide variety of affective, cognitive, and social functions such as temporary boosts in task performance, longer life expectancy, and well-being (Bopp et al., 2012; Ehrlinger & Dunning, 2003; Taylor & Brown, 1988; Zell et al., 2020). But it can also result in harmful long-term consequences of having unrealistic expectations, heightened disengagement, and decreased self-esteem (Polivy & Herman, 2000; Robins & Beer, 2001). In contrast, less research has been conducted on the below-average-effect's impacts, predominantly focusing on its negative consequences, such as lower grades (Mattern et al., 2010), or worse subjective well-being (Goetz et al., 2006). Other research suggested that the below-average-effect can also induce positive motivational and behavioral consequences in the long run (Whillans et al., 2020). This highlights the need for continued research on the below-and-above-average-effects' consequences.

Conclusion

We closely replicated Kruger's (1999) study, showing the above-and-below-average effects to be robust. Manipulating the difficulty of (easy and difficult) ability domains participants were to compare themselves with others, which showed that easier items might provoke the above-average effect but dampen the below-average effect and vice versa for more difficult items.

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<u>Kruger (1999): Replication and extensions</u> <u>Supplementary</u>

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Open Science disclosures

Main manuscript, data and code

The manuscript, data and code are shared using the Open Science Framework. Review link for data and code of the study: <u>osf.io/7yfkc</u>

Final pre-registration is on: <u>https://osf.io/byx4z</u>

(there was one previous pre-registration, 10 minutes before the final one. Both were conducted before data collection, and the second one simply fixed a minor glitch regarding a default set in one of the comparative questions. Previous pre-registration is on: <u>https://osf.io/nm568/</u>

Procedure and data disclosures

Data collection Data collection was completed before analysing the data. Conditions reporting All collected conditions are reported. Data exclusions Details are reported in the materials section of this document Variables reporting All variables collected for this study are reported and included in the provided data.

Exclusion criteria

The current replication's exclusion criteria are summarised in table 4.

Table 1.

Summary of exclusion criteria

Exclusion Criteria

Exclusion Criteria 1a

Participants indicating low proficiency of English.

Item: "On a scale from 1-7, what do you think is your proficiency of English?" (1 = being not proficient at all, 7 = being very proficient.)

Exclusion: if self-report less than 5 on a 1-7 scale

Exclusion Criteria 1b

Participants who self-report not being serious about filling in the survey.

Item: "On a scale from 1-5, what do you think is your seriousness in filling in the survey?" (1 = not serious at all, 5 = very serious.)

Exclusion: if self-report less than 4 on a 1-5 scale

Exclusion Criteria 1c

Participants who correctly guessed any one of the hypotheses of this study in the funnelling section.

Item: "What do you think the purpose of the last part was?" (If you are not sure please write "not sure")

Exclusion: if guessed correctly for both replication and extension

Without a fair proficiency of English participants may not fully understand the questions and may affect results.

Reason

Nonserious answering behavior increases noise and reduces experimental power. Excluding their response can increase data validity.

Participants who could guess any of the hypotheses of the study may commit experimental bias and do not reflect the true nature of the investigated phenomenon

Experimental bias in responses

Incomplete data

Item: "Have you ever seen the materials used in this study or similar before? If yes - please indicate where."

Participants who have already seen or done the survey before.

Exclusion: answered 'yes'

Exclusion Criteria 1d

Exclusion Criteria 1e

Participants who failed to complete the survey. (duration = 0, leave question blank)

Exclusion Criteria 1f

Participants not from the United States.

Item: "Which country are you originally from? (Country of birth)" Exclusion: if response is not part of the United States Does not fit our targeted population criteria

Additional Tables and Figures

Replication condition



Figure 1.1 Scatterplot for the correlation between mean comparative ability and mean domain difficulty ratings in the replication group.

Table 2

Predictor	b	b 95% CI [LL, UL]	beta	beta 95% CI [LL, UL]	sr ²	<i>sr</i> ² 95% CI [LL, UL]	r	Fit
(Intercept)	1.27	[-4.13, 6.67]						
kruger\$mea n_own_con dition1	9.51**	[8.57, 10.44]	0.90	[0.81, 0.99]	.45	[.36, .54]	.85 **	
kruger\$mea n_other_con dition1	-0.87	[-2.00, 0.26]	- 0.07	[-0.16, 0.02]	.00	[00, .01]	.53 **	
								$R^2 = .732^{**}$
								95% CI[0.68, 0.79]

Replication condition: regression results using mean comparative ability as the criterion

Note. A significant *b*-weight indicates the beta-weight and semi-partial correlation are also significant. *b* represents unstandardized regression weights. *beta* indicates the standardized regression weights. *sr*² represents the semi-partial correlation squared. *r* represents the zero-order correlation. *LL* and *UL* indicate the lower and upper limits of a confidence interval, respectively. ** indicates p < .01.



Figure 1.2. Scatterplot for the correlation between mean comparative ability and mean own absolute ability ratings in the replication group.



kruger\$mean_compare_condition1

Figure 1.3. Scatterplot for the correlation between mean comparative ability and mean others' absolute ability ratings in the replication group.



lm(kruger\$mean_compare_condition1 ~ kruger\$mean_own_condition1 + kruger\$mea ...

Figure 1.4. Residuals versus fitted plot for mean comparative ability predicted from mean own and others' ability in the replication group.



Im(kruger\$mean_compare_condition1 ~ kruger\$mean_own_condition1 + kruger\$mea ...

Figure 1.5. Normal Q-Q plot for mean comparative ability predicted from mean own and others' ability in the replication group.
Correlation Matrix Replication Condition

Table 3.1 Parson's r for m	aan waluus (aaros	a abilitias) i	a tha rapli	action (ari	and) condition	74
rerson's rjor ma	Comparative	Difficult	Own	Peers'	Desirabilit	
	Ability	у	ability	ability	У	Ambiguity
Comparative						
Ability	1.00					
Difficulty	0.16	1.00				
Own ability	0.85	0.21	1.00			
Peers' ability	0.53	0.34	0.67	1.00		
Desirability	0.11	0.06	0.14	0.20	1.00	
Ambiguity	-0.06	-0.01	-0.11	-0.13	-0.35	1.00

Table 3.2

P-values for correlations between mean values (across abilities) in the replication (original) condition

	Comparative Ability	Difficult y	Own ability	Peers' ability	Desirabilit y	Ambiguit y
Comparative Ability	0					
Difficulty	.012	0				
Own ability	<.001	.001	0			
Peers' ability	<.001	<.001	<.001	0		
Desirability	0.090	0.362	.025	.002	0	
Ambiguity	.340	.829	.093	.039	<.001	0

Easy domain condition



Figure 2.1. Scatterplot for the correlation between mean comparative ability and mean domain difficulty ratings in the easy domain group.

Table 4

Easy domain condition: regression results using mean comparative ability as the criterion

Predictor	b	b 95% CI [LL, UL]	beta	beta 95% CI [LL, UL]	sr ²	<i>sr</i> ² 95% CI [LL, UL]	r	Fit
(Intercept)	2.90	[-2.99, 8.80]						
kruger\$mean_o wn_condition2	8.92* *	[7.90, 9.93]	0.86	[0.76, 0.96]	.42	[.33, .51]	.83**	
kruger\$mean_o ther_condition2	-0.50	[-1.59, 0.59]	-0.04	[-0.14, 0.05]	.00	[00, .01]	.52**	
								$R^2 = .690^{**}$
								95% CI[0.62,0.76]

Note. A significant *b*-weight indicates the beta-weight and semi-partial correlation are also significant. *b* represents unstandardized regression weights. *beta* indicates the standardized regression weights. sr^2 represents the semi-partial correlation squared. *r* represents the zero-order correlation. *LL* and *UL* indicate the lower and upper limits of a confidence interval, respectively.

** indicates p < .01.



Figure 2.2. Scatterplot for the correlation between mean comparative ability and mean own absolute ability ratings in the easy domain group.



kruger\$mean_compare_condition2

Figure 2.3. Scatterplot for the correlation between mean comparative ability and mean others' absolute ability ratings in the easy domain group.



Im(kruger\$mean_compare_condition2 ~ kruger\$mean_own_condition2 + kruger\$mea ... Figure 2.4. Residuals versus fitted plot for mean comparative ability predicted from mean own and others' ability in the easy domain group.



Im(kruger\$mean_compare_condition2 ~ kruger\$mean_own_condition2 + kruger\$mea ... Figure 2.5. Normal Q-Q plot for mean comparative ability predicted from mean own and others' ability in the easy domain group.

Correlation Matrix Easy Extension

Table 5.1

Person's r for mean values (across abilities) in the easy (extension) condition

	Comparative Ability	Difficulty	Own ability	Peers' ability	Desirability	Ambiguity
Comparative						
Ability	1.00					
Difficulty	0.83	1.00				
Own ability	0.32	0.28	1.00			
Peers' ability	0.52	0.66	0.37	1.00		
Desirability	0.29	0.40	0.15	0.41	1.00	
Ambiguity	0.08	0.18	-0.06	0.23	0.43	1.00

Table 5.2

P-values for correlations between mean values (across abilities) in the easy (extension) condition

	Comparative Ability	Difficulty	Own ability	Peers' ability	Desirability	Ambiguity
Comparative Ability	0					
Difficulty	<.001	0				
Own ability	<.001	<.001	0			
Peers' ability	<.001	<.001	<.001	0		
Desirability	<.001	<.001	0.0228	<.001	0	
Ambiguity	0.2630	0.0056	0.3420	0.0006	<.001	0

Difficult domain condition



Figure 3.1. Scatterplot for the correlation between mean comparative ability and mean domain difficulty ratings in the difficult domain group.

Table 6

Difficult domain condition: regression results using mean comparative ability as the criterion

Predictor	b	b 95% CI [LL, UL]	beta	beta 95% CI [LL, UL]	sr ²	<i>sr</i> ² 95% CI [LL, UL]	r	Fit
(Intercept)	9.10**	[5.40, 12.80]						
kruger\$mean _own_condit ion3	8.39**	[7.33, 9.45]	0.90	[0.79, 1.01]	.27	[.19, .34]	.87 **	
kruger\$mean _other_condi tion3	-0.42	[-1.62, 0.78]	-0.04	[-0.15, 0.07]	.00	[- .00, .00]	.70 **	
								$R^2 = .755^{**}$
								95% CI[0.70, 0.81]

Note. A significant *b*-weight indicates the beta-weight and semi-partial correlation are also significant. *b* represents unstandardized regression weights. *beta* indicates the standardized regression weights. sr^2 represents the semi-partial correlation squared. *r* represents the zero-order correlation. *LL* and *UL* indicate the lower and upper limits of a confidence interval, respectively.

```
** indicates p < .01.
```



Figure 3.2. Scatterplot for the correlation between mean comparative ability and mean own absolute ability ratings in the difficult domain group.



Figure 3.3. Scatterplot for the correlation between mean comparative ability and mean others' absolute ability ratings in the difficult domain group.



Im(kruger\$mean_compare_condition3 ~ kruger\$mean_own_condition3 + kruger\$mea Figure 3.4. Residuals versus fitted plot for mean comparative ability predicted from mean own and others' ability in the difficult domain group.



Theoretical Quantiles Im(kruger\$mean_compare_condition3 ~ kruger\$mean_own_condition3 + kruger\$mea ... *Figure 3.5.* Normal Q-Q plot for mean comparative ability predicted from mean own and others' ability in the difficult domain group.

Correlation Matrices Difficult Extension

Table 7.1

Person's r for mean values (a	cross abilities) in the dij	fficult (extension) condition
-------------------------------	-----------------------------	-------------------------------

	Comparative Ability	Difficulty	Own ability	Peers' ability	Desirability	Ambiguity
Comparative Ability	1.00					
Difficulty	0.86	1.00				
Own ability	-0.13	-0.13	1.00			
Peers' ability	0.70	0.82	-0.03	1.00		
Desirability	0.20	0.13	0.27	0.22	1.00	
Ambiguity	-0.03	-0.09	0.27	0.01	0.43	1.00

Table 7.2

P- values for correlations between mean values (across abilities) in the difficult (extension) condition

	Comparative Ability	Difficulty	Own ability	Peers' ability	Desirability	Ambiguity
Comparative Ability	0					
Difficulty	<.0001	0				
Own ability	0.0498	0.0595	0			
Peers' ability	<.0001	<.0001	0.6070	0		
Desirability	0.0025	0.0467	<.0001	0.0007	0	
Ambiguity	0.6860	0.1850	<.0001	0.8370	<.0001	0

One-sample Wilcoxon-tests

Table 8.1

One-sample Wilcoxon tests testing median comparative ability scores against the scale mid-point in the original (replication) condition

		90%	6 CI	_	
Item	Median	Lower	Upper	P-value	Effect size <i>r</i>
Using mouse	75.50	73.00	78.00	<.001	0.81
Driving	70.50	67.70	73.00	<.001	0.61
Riding bicycle	64.50	61.00	67.50	<.001	0.52
Saving money	64.50	61.50	67.50	<.001	0.53
Telling jokes	53.00	50.00	56.50	0.0569	0.13
Playing chess	40.00	36.00	44.00	<.001	0.30
Juggling	28.00	24.00	33.50	<.001	0.55
Computer programming	40.00	36.00	44.00	<.001	0.30

Table 8.2

One-sample Wilcoxon tests testing median comparative ability scores against the scale mid-point in the easy domain (extension) condition

		90%	6 CI		
Item	Median	Lower	Upper	P-value	Effect size r
Using mouse	76.50	74.00	79.50	<.001	0.76
Driving	71.00	67.50	74.00	<.001	0.62
Riding bicycle	69.00	65.60	70.50	<.001	0.63
Saving money	66.50	62.50	70.50	<.001	0.49
Telling jokes	62.00	58.50	65.50	<.001	0.43
Playing chess	47.50	43.50	52.00	0.26	0.06
Juggling	46.00	41.00	50.50	0.085	0.08
Computer programming	49.50	46.00	53.50	0.85	0.01

Table 8.3

One-sample Wilcoxon tests results testing against the scale mid-point for comparative ability in difficult domain (extension) condition

		90% CI			
Item	Median	Lower	Upper	P-value	Effect size r
Using mouse	59.00	55.50	62.50	<.001	0.33
Driving	39.50	34.50	44.00	<.001	0.30
Riding bicycle	49.50	45.00	53.50	0.69	0.02
Saving money	66.50	62.50	70.50	<.001	0.46
Telling jokes	40.00	35.50	44.00	<.001	0.30
Playing chess	40.50	36.00	44.50	<.001	0.25

Juggling	37.50	33.00	42.00	<.001	0.35
Computer programming	45.00	40.50	49.00	0.01	0.16

One-sample t-tests

Table 9.1

One-sample t-tests results testing against the scale mid-point for comparative ability in original (replication) condition

					Lower	Upper
Item	estimate	statistic	p-value	df	CI	ĊI
Using mouse	71.20	18.34	1.6961E-47	239	68.92	73.47
Driving	65.17	10.64	6.7221E-22	239	62.36	67.97
Riding bicycle	61.01	8.33	6.3572E-15	239	58.41	63.62
Saving money	62.88	9.45	3.1702E-18	239	60.19	65.56
Telling jokes	52.42	1.66	0.0987806	239	49.54	55.30
Playing chess	40.98	-5.18	4.8043E-07	239	37.55	44.41
Juggling	31.98	-10.09	3.5936E-20	239	28.46	35.50
Computer						
programming	40.73	-4.92	1.6472E-06	239	37.01	44.44

Table 9.2

One-sample t-tests results testing against the scale mid-point for comparative ability in easy domain (extension) condition

Item	estimate	statistic	p-value	df	Lower CI	Upper CI
Using mouse	71.27	15.56	1.72E-37	224	68.58	73.97
Driving	66.32	10.77	4.63E-22	224	63.34	69.31
Riding bicycle	65.76	10.78	4.26E-22	224	62.88	68.64
Saving money	63.63	8.00	6.58E-14	224	60.27	66.98
Telling jokes	59.74	7.11	1.56E-11	224	57.04	62.44
Playing chess	47.81	-1.19	0.23413041	224	44.19	51.43
Juggling	46.76	-1.75	0.08125851	224	43.11	50.41
Computer						
programming	49.57	-0.25	0.80363761	224	46.20	52.95

Table 9.3

One-sample t-tests results testing against the scale mid-point for comparative ability in difficult domain (extension) condition

Item	estimate	statistic	p-value	df	Lower CI	Upper CI
Using mouse	55.79	4.12	5.2822E-05	225	53.02	58.56
Driving	40.63	-4.81	2.7508E-06	225	36.79	44.47
Riding bicycle	48.90	-0.60	0.54982103	225	45.29	52.51
Saving money	62.68	7.40	2.7397E-12	225	59.30	66.06
Telling jokes	40.82	-5.10	7.0415E-07	225	37.28	44.37

Kruger (1999): Replication and extensions (supplementary)

Playing chess	41.86	-4.49	1.1181E-05	225	38.29	45.43
Juggling	39.67	-5.61	5.7662E-08	225	36.04	43.29
Computer programming	45.36	-2.68	0.00792618	225	41.95	48.77

Table 9.4

One-sample t-tests results testing against the scale mid-point for desirability in original (replication) condition

Item	estimate	statistic	p-value	df	d	Lower CI	Upper CI
Using a computer mouse	8.654	34.058	1.11E-93	239	2.203	1.968	2.435
Driving	9.146	47.234	3.34E-123	239	3.055	2.750	3.354
Riding bicycle	7.996	27.992	2.14E-77	239	1.811	1.604	2.016
Saving money	9.129	45.568	7.60E-120	239	2.948	2.651	3.237
Telling jokes	7.500	20.858	9.87E-56	239	1.349	1.173	1.523
Playing chess	7.613	20.269	7.96E-54	239	1.311	1.138	1.483
Juggling	6.529	10.278	9.33E-21	239	0.665	0.524	0.804
Computer programming	8.663	33.998	1.58E-93	239	2.199	1.964	2.431

Power Simulation for Exploratory Analysis

Table 10

Power Simulation for Main and Interaction effects for 3(Condition)*2(Difficulty) mixed design

Effect	Power	Effect Size
Condition	100	0.12353699
Difficulty	100	0.28369743
Interaction	99.7	0.04595521

Power simulations in R using the "Superpower" package (Lakens & Caldwell, 2021) showed that using our sample of n = 691 (with sample size by cell/between factor: replication group n = 240, easy extension n = 225, difficult extension n = 226), near 100% power was reached to examine main & interaction effects. For some of the multiple comparisons we have however power close to 0%

Comparison	Power	Effect Size
Condition_Replication_Difficulty_Easy VS	100	1 2760622
Condition_Replication_Difficulty_Difficult	100	-1.3700023
Condition_Replication_Difficulty_Easy VS Condition_Easy	38	0 10723054
Extension_Difficulty_Easy	5.0	0.10/23934
Condition_Replication_Difficulty_Easy VS Condition_Easy	100	0 8515678
Extension_Difficulty_Difficult	100	-0.0313078
Condition_Replication_Difficulty_Easy VS Condition_Difficult	100	-0 7868727
Extension_Difficulty_Easy	100	-0.7606727
Condition_Replication_Difficulty_Easy VS Condition_Difficult	100	-1 25/3963
Extension_Difficulty_Difficult	100	-1.2343703
Condition_Replication_Difficulty_Difficult VS Condition_Easy	100	1 39440291
Extension_Difficulty_Easy	100	1.37440271
Condition_Replication_Difficulty_Difficult VS Condition_Easy	98 5	0 48786589
Extension_Difficulty_Difficult	70.5	0.+0700507
Condition_Replication_Difficulty_Difficult VS	99.2	0 53517156
Condition_Difficult Extension_Difficulty_Easy	<i>))</i> .2	0.55517150
Condition_Replication_Difficulty_Difficult VS	0.5	0 01012570
Condition_Difficult Extension_Difficulty_Difficult	0.5	0.01/12577
Condition_Easy Extension_Difficulty_Easy VS Condition_Easy	100	-0.8971173
Extension_Difficulty_Difficult	100	-0.0771175
Condition_Easy Extension_Difficulty_Easy VS	100	-0.8350101
Condition_Difficult Extension_Difficulty_Easy	100	-0.0557101
Condition_Easy Extension_Difficulty_Easy VS	100	-1 2817852
Condition_Difficult Extension_Difficulty_Difficult	100	-1.2017032
Condition_Easy Extension_Difficulty_Difficult VS	1	0 05121554
Condition_Difficult Extension_Difficulty_Easy	I	0.03121334
Condition_Easy Extension_Difficulty_Difficult VS	94 7	-0 /307807
Condition_Difficult Extension_Difficulty_Difficult	74.7	-0.+377007
Condition_Difficult Extension_Difficulty_Easy VS	98.2	-0 4847737
Condition_Difficult Extension_Difficulty_Difficult	10.2	-0.+0+//5/

Those are:

(1) Replication Condition Easy items compared to Easy Extension Condition Easy Items,

(2) Replication Condition Difficult Items vs Difficult Extension Difficult Items, and

(3) Easy Extension Difficulty Items vs Difficult Condition Easy Items.

Moreover, the sample size per cell was slightly too small to reach 95% power

Figure 2.13

Power Curves for Main and Interaction effects for 3(Condition)*2(Difficulty) mixed design



Left panel: 95% power. Right panel: 94% power.

Note: the sample size required to reach 95% power was n = 117 for each cell. Using this calculation, our collected sample was slightly too small for the extension conditions (easy extension: n = 225/2 = 112 each cell, and difficult extension: n = 226/2 = 113 each cell).

Equivalence Tests

EQ Test #	Correlation	Variable Controlled for	df	<i>r</i> diff	Upper 95% CI	Lower 95% CI	р	Conditio n
1	Comparative ability & domain difficulty (as in original)	desirability	5	0.08604	0.018	0.212	0.91	Replicat ion
2		ambiguity	5	-0.0085	-0.012	-0.005	0.33	Replicat ion
3	Comparative ability & domain difficulty (vector-wise)	desirability	1917	-0.0033	-0.016	0.007	0.55	Replicat ion
4	· · · ·	ambiguity	1917	-0.0085	-0.016	-0.004	0.002	Replicat ion
5	Comparative ability & domain difficulty (mean)	desirability	237	0.00527	-0.003	0.029	0.22	Replicat ion
б		ambiguity	237	0.00054	-0.008	0.016	0.69	Replicat ion
7	Comparative ability & domain difficulty (as in original)	desirability	5	0.09	0.02	0.159	0.005	Easy Extensio n
8	in original)	ambiguity	5	-0.084	-0.193	-0.011	0.03	Easy Extensio n
9	Comparative ability & domain difficulty (as in original)	desirability	5	0.04022	-0.238	0.126	0.67	Difficult Extensio n
10	in originar)	ambiguity	5	0.03	-0.009	0.578	0.91	Difficult Extensio n
11	Comparative ability & domain difficulty (vector-wise)	desirability	1798	0.006	-0.007	0.018	0.32	Easy Extensio n

Table 11. Equivalence tests

12		ambiguity	1798	-0.03	-0.041	-0.02	0.001	Easy Extensio n
13	Comparative ability & domain difficulty (vector-wise)	desirability	1806	0.023	0.015	0.034	0.002	Difficult Extensio n
14	× ,	ambiguity	1806	0.001	-0.0003	0.005	0.13	Difficult Extensio n
15	Comparative ability & domain difficulty (mean)	desirability	223	0.029	-0.0003	0.067	0.049	Easy Extensio n
16		ambiguity	223	-0.006	-0.028	0.002	0.15	Easy Extensio n
17	Comparative ability & domain difficulty (mean)	desirability	223	0.064	0.028	0.126	< .001	Difficult Extensio n
18	× ′	ambiguity	223	0.0025	-0.046	0.0349	0.93	Difficult Extensio n

Criteria for evaluation of replications

A simplified replication taxonomy for comparing replication effects to target article original findings by (LeBel et al., 2019)



Replication evaluation

We used the replication classification criteria by LeBel and colleagues' (2018) summarized in Table 6. We categorized the current replication as a "close replication" and provided details in Table 7. Variables and questions were the same as in the original, with the addition of extensions and adjustments to fit the MTurk sample, instead of Cornell university students.

Criteria for evaluation of replications by LeBel et al. (2018)

Target similarity	Highly similar			Highly d	issimilar
Category	Direct replication			Conceptual re	plication
Design facet	Exact	Very close	Close	Far	Very
	replication	replication	replication	replication	far
					replica
					tion
IV operationalization	Same/similar	Same/similar	Same/similar	Different	
DV operationalization	Same/similar	Same/similar	Same/similar	Different	
IV stimuli	Same/similar	Same/similar	Different		
DV stimuli	Same/similar	Same/similar	Different		
Procedural details	Same/similar	Different			
Physical setting	Same/similar	Different			
Contextual variables	Different				

A classification of relative methodological similarity of a replication study to an original study. "Same" ("different") indicates the design facet in question is the same (different) compared to an original study. IV = independent variable. DV = dependent variable. "Everything controllable" indicates design facets over which a researcher has control. Procedural details involve minor experimental particulars (e.g., task instruction wording, font, font size, etc.).

"Similar" category was added to the LeBel et al. (2018) typology to refer to minor deviations, aimed to adjust the study to the target sample, that are not expected to have major implications on replication success.

Correlations per condition

	Comparative ability	Domain Difficulty	Own Ability	Others' Ability	Desirability
Domain Difficulty	-0.35*** [-0.39, -0.31]				
Own Ability	0.81*** [0.79, 0.82]	-0.46*** [-0.50, -0.43]			
Others' Ability	0.50*** [0.46, 0.53]	-0.37*** [-0.41, -0.33]	0.64*** [0.62, 0.67]		
Desirability	0.30*** [0.25, 0.34]	-0.07** [-0.11, -0.02]	0.34*** [0.30, 0.38]	0.29*** [0.25, 0.33]	
Ambiguity	-0.10*** [-0.14, -0.06]	0.13*** [0.09, 0.17]	-0.15*** [-0.19, -0.10]	-0.20*** [-0.24, -0.15]	-0.17*** [-0.21, -0.12]

Correlation matrix for the replication condition

 $\overline{p < .05. ** p < .01. *** p < .001.}$

Correlation matrix for the easy extension condition

	Comparative ability	Domain Difficulty	Own Ability	Others' Ability	Desirability
Domain Difficulty	-0.27** [-0.31, -0.22]				
Own Ability	0.78*** [0.76, 0.80]	-0.37*** [-0.41, -0.33]			
Others' Ability	0.47*** [0.44, 0.51]	-0.24*** [-0.28, -0.20]	0.61*** [0.58, 0.64]		
Desirability	0.28*** [0.24, 0.32]	-0.02 [-0.06, 0.03]	0.36*** [0.31, 0.39]	0.34*** [0.29, 0.38]	
Ambiguity	-0.19*** [-0.23, -0.14]	0.19*** [0.15, 0.24]	-0.26*** [-0.30, -0.22]	-0.28*** [-0.32, -0.23]	-0.25*** [-0.29, -0.21]

* p < .05. ** p < .01. *** p < .001.

	Comparative ability	Domain Difficulty	Own Ability	Others' Ability	Desirability
Domain Difficulty	-0.31*** [-0.35, -0.27]				
Own Ability	0.78*** [0.76, 0.80]	-0.33*** [-0.37, -0.29]			
Others' Ability	0.45*** [0.41, 0.48]	-0.18*** [-0.23, -0.14]	0.56*** [0.52, 0.59]		
Desirability	0.13*** [0.08, 0.17]	0.14*** [0.09, 0.18]	0.14*** [0.09, 0.18]	0.15*** [0.10, 0.19]	
Ambiguity	-0.02 [-0.07, 0.02]	-0.03 [-0.08, 0.01]	-0.01 [-0.06, 0.04]	-0.01 [-0.06, 0.03]	-0.24*** [-0.28, -0.19]

Correlation matrix for the difficult extension condition

* p < .05. ** p < .01. *** p < .001.

			95%	% CI
Ability domain	р	r	Lower	Upper
Using a computer mouse	.768	-0.02	-0.15	0.11
Driving	.006	-0.18	-0.30	-0.05
Riding a bicycle	.790	0.02	-0.11	0.14
Saving money	.030	-0.14	-0.26	-0.01
Telling jokes	.161	-0.09	-0.22	0.04
Playing chess	.020	-0.15	-0.27	-0.02
Juggling	<.001	-0.25	-0.37	-0.13
Computer programming	<.001	-0.23	-0.34	-0.10

Replication condition: Item-wise correlations between domain difficulty and comparative ability ratings for each ability domain

Variable	Original domains condition (n = 240)	Easy domains condition (n = 225)	Difficult domains condition (n = 226)
Domain difficulty	.64 (.68, .48)	.76 (.76, .48)	.68 (.47, .61)
Comparative ability	.76 (.61, .72)	.77 (.67, .72)	.86 (.71, .83)
Own absolute ability	.71 (.51, .72)	.68 (.48, .69)	.85 (.65, .82)
Others' absolute ability	.74 (.59, .77)	.77 (.60, .76)	.90 (.78, .85)
Desirability	.69 (.56, .68)	.74 (.70, .65)	.77 (.67, .64)
Ambiguity	.70 (.62, .50)	.73 (.64, .60)	.81 (.75, .59)

Reliability for domains across conditions

Note: Reliabilities are Cronbach's α . Reporting structure is the following: full inventory (easy items, difficult items). Reliability met requirements ($\alpha \ge .7$, see Tavakol & Dennick, 2011).

	Ea	sy domaiı	n conditio	n	Difficult domain condition					
Ability domain	р	r	95%	95% CI		r	95%	6 CI		
			Lower	Lower Upper			Lower	Upper		
Using a computer mouse	.647	0.03	-0.10	0.16	<.001	-0.2	-0.37	-0.12		
Driving	.082	-0.12	-0.24	0.01	<.001	-0.27	-0.39	-0.15		
Riding a bicycle	.071	-0.12	-0.25	0.01	<.001	-0.24	-0.36	-0.12		
Saving money	.144	-0.10	-0.23	0.03	<.001	-0.36	-0.47	-0.24		
Telling jokes	.935	0.01	-0.13	0.14	<.001	-0.23	-0.35	-0.11		
Playing chess	<.001	-0.36	-0.47	-0.24	<.001	-0.27	-0.39	-0.15		
Juggling	<.001	-0.26	-0.38	-0.13	<.001	-0.25	-0.37	-0.12		
Computer programming	<.002	-0.22	-0.34	-0.09	.002	-0.20	-0.33	-0.08		

Extension conditions: correlations between comparative ability and domain difficulty ratings for each ability domain

Mixed Models

Replication Condition

Comp	parative A	bility N	Iodel 1	Co	mparative	Ability	v Model 2	Сог	nparative	Ability	Model 3	Сог	nparative	Ability	Model 4	
Predictors	Estimates	std. Error	CI	р	Estimates	std. Error	CI	р	Estimates	std. Error	CI	р	Estimates	std. Error	CI	р
(Intercept)	53.29	5.03	43.44 - 63.15	<0.001	12.56	1.33	9.95 - 15.18	<0.001	12.38	1.97	8.51 - 16.25	<0.001	8.72	2.40	4.01 - 13.43	<0.001
Own					7.18	0.16	6.86 – 7.50	<0.001	7.18	0.17	6.85 – 7.52	<0.001	7.07	0.18	6.73 – 7.42	<0.001
Other					-0.42	0.21	-0.84 0.01	0.045	-0.42	0.21	-0.84 0.00	0.047	-0.48	0.21	-0.90 0.06	0.025
Difficulty									0.02	0.16	-0.30 - 0.34	0.902	-0.04	0.16	-0.36 - 0.28	0.817
Desirability													0.57	0.21	0.16 – 0.99	0.007
Ambiguity													0.12	0.17	-0.21 - 0.45	0.480

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Э	7

Random Effect	ts			
σ^2	407.38	215.06	215.20	214.13
$ au_{00}$	159.27 _{ID}	37.78 _{ID}	37.73 _D	39.04 _{ID}
	195.08 ItemID	1.56 ItemID	1.58 ItemID	1.15 ItemID
ICC	0.47	0.15	0.15	0.16
Ν	240 _{ID}	240 ID	240 _{ID}	240 _{ID}
	8 ItemID	8 ItemID	8 ItemID	8 ItemID
Observations	1920	1920	1920	1920
Marginal R ² /	0.000 / 0.465	0.638 / 0.694	0.638 / 0.694	0.638 / 0.696
Conditional R ²				
AIC	17366.244	15990.513	15994.274	15993.984
log-	-8679.122	-7989.257	-7990.137	
Likelihood				

Easy Extension

	Cor	nparati	ive Ability Mode	el 1	Cor	nparati	ve Ability Mod	el 2	Con	nparati	ive Ability Mod	el 3	Con	nparati	ve Ability Mode	el 4
Predictors	Estimates	std. Error	CI	р	Estimates	std. Error	CI	р	Estimates	std. Error	CI	р	Estimates	std. Error	CI	р
(Intercept)	58.86	3.48	52.04 - 65.68	<0.001	15.48	1.30	12.94 - 18.02	<0.001	18.89	1.92	15.13 - 22.66	<0.001	18.60	2.35	13.99 - 23.21	<0.001
Own					6.56	0.16	6.25 - 6.88	<0.001	6.41	0.17	6.08 - 6.75	<0.001	6.37	0.18	6.02 - 6.71	<0.001
Other					-0.04	0.20	-0.43 - 0.36	0.861	-0.08	0.21	-0.48 - 0.32	0.685	-0.13	0.21	-0.54 - 0.28	0.546
Difficulty									-0.40	0.15	-0.700.10	0.009	-0.41	0.16	-0.720.11	0.008
Desirability													0.15	0.21	-0.26 - 0.56	0.468
Ambiguity													-0.10	0.19	-0.47 - 0.27	0.600

Random Effects

Kruger (1999): Replication and extensions (supplementary)

34

414.81	204.40	201.63	201.51
170.62 id	52.64 _{ID}	57.98 d	58.80 d
88.95 ItemID	0.36 ItemID	1.05 ItemID	1.01 ItemID
0.38	0.21	0.23	0.23
225 _{ID}	225 _{ID}	225 _{ID}	225 _{ID}
8 ItemID	8 ItemID	8 ItemID	8 ItemID
1800	1800	1800	1800
0.000 / 0.385	0.590 / 0.674	0.586 / 0.680	0.585 / 0.680
1 (210, 40)	14050 165	14048 412	1/05/ 310
16318.406	14950.105	14940.412	14754.517
	414.81 170.62 D 88.95 ItemID 0.38 225 D 8 ItemID 1800 0.000 / 0.385	414.81 204.40 170.62 ID 52.64 ID 88.95 ItemID 0.36 ItemID 0.38 0.21 225 ID 225 ID 8 ItemID 8 ItemID 1800 1800	414.81 204.40 201.63 170.62 ID 52.64 ID 57.98 ID 88.95 IdenilD 0.36 IdenilD 1.05 IdenilD 0.38 0.21 0.23 225 ID 225 ID 225 ID 8 IdenilD 8 IdenilD 8 IdenilD 1800 1800 1800

Difficult Extension

			Compare			(Compare			(Compare			(Compare	;
Predictors	Estimates	std. Error	CI	р												
(Intercept)	46.97	3.17	40.74 - 53.19	<0.001	16.53	1.49	13.61 – 19.44	<0.001	25.92	2.32	21.38 - 30.46	<0.001	25.57	2.66	20.36 - 30.79	<0.001
Own					6.40	0.16	6.09 – 6.72	<0.001	6.14	0.17	5.81 - 6.47	<0.001	6.11	0.17	5.78 – 6.45	<0.001
Other					-0.02	0.22	-0.44 - 0.41	0.940	-0.15	0.22	-0.58 - 0.27	0.478	-0.16	0.22	-0.59 – 0.26	0.451
Difficulty									-1.01	0.20	-1.400.62	<0.001	-1.04	0.20	-1.430.64	<0.001
Desirability													0.16	0.20	-0.22 - 0.55	0.405
Ambiguity													-0.17	0.19	-0.55 - 0.21	0.370

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J	U

ts			
399.17	227.50	222.88	223.05
305.86 _{ID}	71.00 _{ID}	76.39 _{ID}	75.65 _{ID}
68.00 ItemID	5.13 ItemID	3.51 ItemID	3.88 ItemID
0.48	0.25	0.26	0.26
226 _{ID}	226 _{ID}	226 _{ID}	226 _{ID}
8 ItemID	8 ItemID	8 ItemID	8 ItemID
1808	1808	1808	1808
0.000 / 0.484	0.558 / 0.669	0.556 / 0.673	0.556 / 0.673
16434.072	15249.889	15228.477	15233.599
	s 399.17 305.86 ID 68.00 ItemID 0.48 226 ID 8 ItemID 1808 0.000 / 0.484 16434.072 \$213.036	s 399.17 227.50 305.86 m 71.00 m 68.00 hem/D 5.13 hem/D 0.48 0.25 226 m 226 m 8 hem/D 8 hem/D 1808 1808 0.000 / 0.484 0.558 / 0.669 16434.072 15249.889 8213.036 7618.945	s 227.50 222.88 305.86 µ 71.00 µ 76.39 µ 68.00 µemµD 5.13 µemµD 3.51 µemµD 0.48 0.25 0.26 226 µ 226 µ 226 µ 8 µemµD 8 µemµD 8 µemµD 1808 1808 1808 0.000 / 0.484 0.558 / 0.669 0.556 / 0.673

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<u>Kruger (1999): Replication and extensions</u> <u>Supplementary</u>

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Main manuscript, data and code

The manuscript, data and code are shared using the Open Science Framework. Review link for data and code of the study: <u>osf.io/7yfkc</u>

Final pre-registration is on: <u>https://osf.io/byx4z</u>

(there was one previous pre-registration, 10 minutes before the final one. Both were conducted before data collection, and the second one simply fixed a minor glitch regarding a default set in one of the comparative questions. Previous pre-registration is on: <u>https://osf.io/nm568/</u>

Procedure and data disclosures

Data collection

Data collection was completed before analysing the data.

Conditions reporting

All collected conditions are reported.

Data exclusions

Details are reported in the materials section of this document

Variables reporting

All variables collected for this study are reported and included in the provided data.

Analysis of the original article

Original article methods

Type of study

The original article was a comparative study.

Experimental design

The study was a within-subject design with 1 independent and 6 dependent variables.

Independent variables (IV)

Independent variable 1: ability domains - easy VS difficult domains

- Participants were assigned to a total of 8 ability domains. The 4 easy domains were using mouse, driving, riding bicycle, and saving money; the 4 difficult domains were telling jokes, playing chess, juggling, and computer programming.

Dependent variables

The original study had 6 dependent variables, all of which were participant ratings in response to each of the 8 ability domains. For each ability domain, the order in which the dependent variables were presented were counterbalanced across participants.

Dependent variable 1: comparative ability rating

- For each ability, participants compared themselves to other students from their course by writing down a percentile ranging from 0 (I'm at the very bottom) to 50 (I'm exactly average) to 100 (I'm at the very top). The exact wording of the question was not provided.

Dependent variable 2: own absolute ability rating

Participants' estimates of their own absolute ability on a scale from 1 (very unskilled) to 10 (very skilled) for each ability domain.

Dependent variable 3: peers' absolute ability rating

• Participants' estimates of their peers' absolute ability on a scale from 1 (very unskilled) to 10 (very skilled) for each ability domain.

For dependent variables 2 and 3, the judgmental weight of own absolute ability and peers' absolute ability ratings in predicting comparative ability ratings (dependent variable) were measured. A series of multiple regressions were conducted to test how well the two estimates predict comparative ability ratings.

Dependent variable 4: desirability rating

- For each ability, participants indicated whether "it is better to be very unskilled or very skilled at this ability." The rating ranged from a scale of 1 (very unskilled) to 10 (very skilled).

Dependent variable 5: ambiguity rating

- For each ability, participants indicated the ambiguity of the ability. The rating ranged from a scale of 1 (very ambiguous - has many meanings) to 10 (very concrete - has one meaning). The exact wording of the question was not provided.

Dependent variable 6: experience in the ability domain

- For each ability, participants indicated whether they had any experience in the domain. The exact wording of the question and the scale used to measure this indication were not provided. *Procedure.* Participants completed a questionnaire in which eight abilities were described. For each ability, participants first compared themselves with other students from their course by writing down a percentile from 0 (*I'm at the very bottom*) to 50 (*I'm exactly average*) to 99 (*I'm at the very top*). Second, participants provided separate estimates of their own absolute ability and the absolute ability of their classmates, each on a scale from 1 (*very unskilled*) to 10 (*very skilled*). Third, they rated the desirability of the ability by indicating whether "it is better to be very unskilled or very skilled at this ability" on a similar scale. Fourth, participants rated the ambiguity of the ability on a scale from 1 (*very ambiguous—has many meanings*) to 10 (*very concrete—has one meaning*). Finally, participants indicated whether they had any experience in the ability domain. The order

Screenshot 1. Screenshot of original study on independent variables 2, 3, and all dependent variables

Original article results

Sample size before and after exclusions

The original study sample size was 37. In addition to the original study's sample of participants, Kruger also conducted two separate tests. Prior to conducting the original study, a pretest of 39 participants was conducted. Pretest participants provided domain difficulty ratings to determine the level of difficulty (easy or difficult) of the 8 ability domains used in the original study. To confirm it was domain difficulty, instead of the rarity or importance of the abilities, that led to the original study's results, another test of 48 Cornell undergraduates was conducted. For the three samples used, exclusions were not specified.

The age of the original sample was not specified in the original study. For gender, the sample consisted of 8 males and 29 females. Participants were university students from Cornell University enrolled in an introductory psychology course, and the study took place in New York, the United States.

Relationship between absolute and comparative ability

Table 1 provides a summary of the original study correlations and partial correlations. The correlation between participants' comparative ability ratings and their own absolute ability ratings was highly significant at r = .95, p < .001, 95% CI [0.90, 0.97]. For each of the 8 abilities, a series of multiple regressions predicting comparative ability ratings from participant ratings of their own and their peers' absolute ability were conducted. Participant ratings of their own absolute ability, rather than ratings of their peers' absolute ability, better predicted comparative ability ratings (p < .01 for all abilities).

Control variable	Variable	Comparative ability
	Domain difficulty	96***
	Own absolute ability	.95***
	Desirability	.77*
Desirability	Domain difficulty	93**
Ambiguity	Domain difficulty	97***

Table 1Correlations and Partial correlations between comparative ability judgments and ratings acrossall abilities

*p < .05. **p < .01. *** p < .001

Relationship between domain difficulty and comparative ability

In the original study's pretest, 39 participants provided domain difficulty ratings for each of the 8 abilities. In study one, 37 participants then provided a series of ratings on comparative ability, own and others' absolute abilities, desirability, and ambiguity for each of the 8 abilities. As shown in Table 1, the correlation between participants' comparative ability ratings and pretest domain difficulty was highly significant at r = -0.96, p < .001, 95% CI [-0.98, -0.92]. Higher domain difficulty scores were significantly correlated with lower percentiles of participants' comparative ability judgments.

To test whether traditional motivational accounts hold true, correlational and partial correlational studies were conducted to determine if the observed results can be explained by factors of desirability or ambiguity. For desirability, the correlation between desirability and comparative ability estimates was significant, r = .77, p < .025, 95% CI [0.60, 0.87]. The positive correlation shows that participants consider themselves to be below average even in difficult domains that were high in desirability. The partial correlation between comparative ability and domain difficulty while holding desirability constant was also highly significant, r = .93, p < .01, 95% CI [-0.96, -0.870]. Similarly, the partial correlation between comparative ability and domain difficulty while holding ambiguity constant was highly significant, r = .97, p < .001, 95% CI [-0.98, -0.94]. Both partial correlations demonstrate that the results cannot be explained by desirability or ambiguity, rejecting the motivational account.

One sample experiment

For each ability, one sample t-tests were conducted to compare comparative ability estimates with the midpoint on the scale (50th percentile) ranging from 0 to 99. Participant comparative judgments were compared to the midpoint of the scale indicating "same amount of ability." An above average effect would be above the 50th percentile, whereas a below average effect would be below the 50th percentile. One sample T-tests were also used for comparing the

mean desirability ratings for easy and difficult abilities respectively, measuring whether it was better to be skilled or unskilled at the abilities. The mean desirability ratings were compared to the midpoint of the scale indicating "same amount of desirability."

For mean comparative ability ratings comparing own ability to other students' ability, percentile ratings were given on a scale from 0 to 99. The sample size was 37. The mean, degrees of freedom, and p value for each ability are listed below:

1. Mean:

Mean of easy abilities:

- Using a mouse: 58.8
- Driving: 65.4
- Riding bicycle: 64.0
- Saving money: 61.5

Mean of difficult abilities:

- Telling jokes: 46.4
- Playing chess: 27.8
- Juggling: 26.5
- Computer programming: 24.8
- 2. The reported degrees of freedom of the mean comparative ratings for each ability was 36.
- 3. The reported p-values:
- Across easy abilities: p <.01
- Across difficult abilities: 3 less than p<.0001, 1 not significant (specific p=value unreported)
- 4. The reported t-statistic:
- Easy and difficult abilities: unreported

For mean desirability ratings comparing own ability to other students' ability, ratings were given on a scale from 1 to 10. The sample size was 37. The mean, degrees of freedom, and p value for the easy and difficult abilities are listed below:

- 1. Mean
- Desirability rating for easy abilities: 7.6
- Desirability rating for difficult abilities: unspecified, exceeded midpoint by more than a full scale point
- 2. The reported degrees of freedom of the mean desirability ratings for the easy and difficult abilities was 36.
- 3. The reported p-values
- Desirability rating for easy abilities: p < .0001
- Desirability rating for difficult abilities: p <.0001
- 4. The reported t-statistic
- Desirability rating for easy abilities: t = 13.51
- Desirability rating for difficult abilities: t = 5.06

For all four easy abilities, participants gave significantly higher comparative ability estimates (p < .01) than the midpoint. For three of the four difficult abilities, participants gave significantly lower comparative ability estimates (p < .0001) than the midpoint. The results thus
support the above average effect for easy ability domains and the below average effect for difficult ability domains.

Effect size calculations of the original study effects

Effect size and confidence intervals for correlations and partial correlations

All correlation effect sizes in correlation coefficient (r) are summarised in Table 1 under the section ""relationship between absolute and comparative ability." The effects sizes of the correlations and partial correlations were also reported in p.224, under the "results" section of the original article in correlation coefficient (r):

participants' estimates of how they compare with their peers: The correlation between domain difficulty and participants' comparative ability estimates across the eight abilities was -.96 (df = 6, p < .001). Similarly, the correlation between participants' ratings of their own absolute abilities and their comparative abilities was .95 (df = 6, p < .001).

Screenshot 2.1 Screenshot of original study on the effect sizes of the correlations between comparative ability and domain difficulty or own absolute abilities.

the correlation between mean percentile estimates and desirability ratings across abilities was .77 (df = 6, p < .025)—but the fact

Screenshot 2.2 Screenshot of original study on the effect sizes of correlation between

comparative ability and desirability ratings.

explained by traditional motivational accounts. Indeed, the high correlation between domain difficulty and participants' comparative ability estimates reported above remained strong after desirability was held constant, r(5) = -.93, p < .01.

Screenshot

2.3 Screenshot of original study on the effect sizes of correlation between domain difficulty and comparative ability, holding desirability constant.

perceptions of how one compares with others. As was the case with desirability, the correlation between pretest difficulty ratings and mean percentile estimates is highly significant after ambiguity was held constant, r(5) = -.97, p < .001.

Screenshot 2.4 Screenshot of original study on the effect sizes of correlation between domain difficulty and comparative ability, holding ambiguity constant.

1. CIr(r, n, level = 0.95)

For correlations:

The R code used to calculate the confidence intervals for correlations:

Where r = correlation coefficient, n = sample size, level = significance level for constructing the CI

Formula: CIr(r, n, level = 0.95)

- Domain difficulty and comparative ability: r = -.96, n = 39 r = -.96, 95% CI [-0.98, -0.93]
- Own absolute ability and comparative ability: r = .95, n = 37 r = .95, 95% CI [0.90, 0.97]
- 3. Others' absolute ability and comparative ability: r = .77, n = 37 r = .77, 95% CI [0.59, 0.88]

The input and calculated confidence intervals for correlations and partial correlations:

> #correlation between domain difficulty and comparative ability across abilities > CIr(r=-.96, n = 39, level = .95) [1] -0.9789858 -0.9245153 > #correlation between own difficulty and comparative ability across abilities > CIr(r=.95, n = 37, level = .95) [1] 0.9043590 0.9741562 > #correlation between desirability and comparative ability ratings across abilities > CIr(r=.77, n = 37, level = .95) [1] 0.5942409 0.8755692

The formula used to calculate the confidence intervals for partial correlations:

The formula used to calculate the confidence intervals for partial correlations was referenced from <u>https://online.stat.psu.edu/stat505/lesson/6/6.3</u> (The Pennsylvania State University, 2020). Screenshots 3.6 and 3.7 show the steps of first computing the Fisher's transformation and obtaining the intervals from the Fisher's transformation correlation. The current partial correlation confidence interval calculations will follow the steps listed in screenshot 3.7, which shows an example of how the intervals are calculated



2.5. Screenshot showing the formula for partial correlation confidence intervals.



Screenshot 2.6. Screenshot showing an example of computing the partial correlation confidence intervals.

Following the three steps in screenshot 3.7, the fisher z-transformation is conducted in step one. For step one, the fisher z-transformation is first calculated in r. The calculated z-scores are then applied into steps two and three to calculate the confidence intervals. Step one (*the fisher z-transformation from r to z-score*):

> #correlation between domain difficulty and comparative ability, holding desirability
constant
> fisherz(-.93)
[1] -1.65839
> #correlation between domain difficulty and comparative ability, holding ambiguity
constant
> fisherz(-.97)
[1] -2.092296

For the partial correlations between domain difficulty and comparative ability, holding desirability constant:

Step two:

$$\underbrace{Z_{jk} - \frac{Z_{al/2}}{\sqrt{n-3-k}}}_{Z_{j}}, \underbrace{Z_{jk} + \frac{Z_{al/2}}{\sqrt{n-3-k}}}_{Z_{al}}, \underbrace{Z_{al/2}}_{Z_{al}}$$

$$\begin{split} & Z_{I} = -1.65839 - (1.96 / (\sqrt{39} - 3 - 2)) \\ & = -1.994527 \\ & Z_{U} = -1.65839 + (1.96 / (\sqrt{39} - 3 - 2)) \\ & = -1.322253 \\ & Step three: \end{split}$$

$$\left(\frac{e^{2Z_i}-1}{e^{2Z_i}+1}, \frac{e^{2Z_U}-1}{e^{2Z_U}+1}\right)$$

 $Z_I = Exp (2 x - 1.994527) - 1 / Exp (2 x - 1.994527) + 1 = -0.9636389$ $Z_U = Exp (2 x - 1.322253) - 1 / Exp (2 x - 1.322253) + 1 = -0.8673431$ r = -.93, 95% CI [-0.964, -0.867] For the partial correlations between domain difficulty and comparative

For the partial correlations between domain difficulty and comparative ability, holding ambiguity constant:

Step two:

$$\left(\underbrace{\frac{Z_{jk} - \frac{Z_{a/2}}{\sqrt{n-3-k}}}_{Z_{1}}, \underbrace{Z_{jk} + \frac{Z_{a/2}}{\sqrt{n-3-k}}}_{Z_{U}}\right)$$

$$\begin{split} &Z_I = -2.092296 - (1.96 / (\sqrt{39} - 3 - 2)) \\ &= -2.428433 \\ &Z_U = -2.092296 + (1.96 / (\sqrt{39} - 3 - 2)) \\ &= -1.756159 \\ &Step three: \end{split}$$

$$\left(\frac{e^{2Z_i}-1}{e^{2Z_i}+1}, \frac{e^{2Z_U}-1}{e^{2Z_U}+1}\right)$$

$$\begin{split} &Z_I = Exp~(2~x~-2.428433)~-1~/~Exp~(2~x~-2.428433)~+1 = = 0.9845703\\ &Z_U = Exp~(2~x~-1.756159)~-1~/~Exp~(2~x~-1.756159)~+1 = -0.9420725\\ &r = -.97,~95\%~CI~[-0.985,~-0.942] \end{split}$$

Effect size and confidence intervals for one sample experiment

For the one sample experiments regarding participant comparative ability judgments, the t-statistic, standard deviation, and standard error were not reported in the original study. The esc_t package in R was used to compute the effect sizes.

- The R code used to calculate the effects:
 - esc_t(p = X, totaln = X) Where p = the p-value of the t-test, total n = total sample size.
 ES t opa(t = X df = X)
 - 2. ES.t.one(t = X, df = X)

Where t = t-statistic, df = degree of freedom

The R code used to calculate the confidence intervals:

 cohen.d.ci(d=X, n1 = X, alpha = X) Where d = Cohen's d statistic, n1 = sample size, alpha = 1-alpha is the width of the confidence interval

For comparative ability judgments for each of the 4 easy ability domains:

Formula: $esc_t(p = X, totaln = X)$

p < .01, total n = 37

Cohen's d = 0.896, 95% CI [0.22, 1.57]

The calculated effect size and confidence intervals for comparative ability judgments across the 4 easy ability domains:

> #effect size of comparative ability ratings for the easy abilities

 $> esc_t(p = 0.01, totaln = 37)$

Effect Size Calculation for Meta Analysis Conversion: t-value to effect size d Effect Size: 0.8956 Standard Error: 0.3449 Variance: 0.1189 Lower CI: 0.2196 Upper CI: 1.5715 Weight: 8.4071

For comparative ability judgments for each of the 4 difficult ability domains (excluding telling jokes):

Formula: $esc_t(p = X, totaln = X)$ p < .0001, total n = 37 **Cohen's d = 1.443, 95% CI [0.72, 2.17]** *The calculated effect size and confidence intervals for comparative ability judgments across the 4 difficult ability domains:*

> #effect size of comparative ability ratings for the difficult abilities

 $> esc_t(p = 0.0001, totaln = 37)$

Effect Size Calculation for Meta Analysis

Conversion: t-value to effect size d Effect Size: 1.4430 Standard Error: 0.3691 Variance: 0.1362 Lower CI: 0.7196 Upper CI: 2.1665 Weight: 7.3396

The original study notes that for 3 of the 4 difficult abilities, the mean percentile estimates were significantly less than 50%. The t-statistic, SE, and SD are unreported for the not

significant ability domain (telling jokes). The effect size and confidence interval calculations thus does not include calculations for the ability domain telling jokes.

Table 2 shows, the mean percentile estimates for these abilities ranged from 24.8 to 46.4, all but one significantly less than 50% at p < .0001. This was true despite the fact that participants also

Screenshot 3. Screenshot of original study on comparative ability judgments across the 4 difficult ability domains.

For mean desirability rating across the 4 easy ability domains: Formulas: 1. ES.t.one(t = X,df = X) t = 13.51, df = 36 2. cohen.d.ci(d=X, n1 = X, alpha = X) d = 2.25, n1 = 37, alpha = .05 Cohen's d = 2.252, 95% CI [1.64, 2.86] The calculated effect size for mean desirability rating across the 4 easy ability domains:

> #effect size of mean desirability rating across the easy abilities > ES.t.one(t = 13.51, df=36) effect size (Cohen's d) of one-sample t test d = 2.251667 alternative = two.sided

The calculated confidence intervals for mean desirability rating across the 4 easy ability domains:

For mean desirability rating across the 4 difficult ability domains:

Formula: 1. ES.t.one(t = X, df = X) t = 5.06, df = 362. cohen.d.ci(d=X, n1 = X, alpha = X) d = 0.84, n1 = 37, alpha = .05 **Cohen's d = 0.843, 95% CI [0.46, 1.22]** The calculated effect size for mean desirability rating across the 4 easy ability domains:

> #mean desirability rating across the difficult abilities

> ES.t.one(t = 5.06, df=36)

effect size (Cohen's d) of one-sample t test

d = 0.8433333 alternative = two.sided

The calculated confidence intervals for mean desirability rating across the 4 difficult ability domains:

> #confidence intervals of mean desirability rating across the difficult abilities > cohen.d.ci(d=0.8433333, n1 = 37, alpha = .05) lower effect upper [1,] 0.4628362 0.8433333 1.215157 Effect size and confidence intervals for paired sample t test The R code used to calculate the effects and confidence intervals: 1. ES.t.paired (t=X, df=X)Where t = t statistic, df = degree of freedom 2. cohen.d.ci(d=0.5666667, n1 = 37, alpha = .05) Where d = Cohen's d statistic, n1 = sample size, alpha = 1-alpha is the width of the confidence interval For ambiguity ratings between easy and difficult abilities: Formulas: 1. ES.t.paired (t=X,df=X) t = 3.40, df = 362. cohen.d.ci(d=X, n1 = X, alpha = X) d = 0.57, n1 = 37, alpha = .05Cohen's d = 0.57, 95% CI [0.22, 0.91] The calculated effect size for ambiguity ratings between easy and difficult abilities: > #paired sample t-test > #ambiguity ratings between easy and difficult abilities > ES.t.paired(t=3.40,df=36) effect size (Cohen's d) of paired two-sample t test d = 0.5666667alternative = two.sided NOTE: The alternative hypothesis is md != 0small effect size: d = 0.2medium effect size: d = 0.5large effect size: d = 0.8

The calculated confidence intervals for ambiguity ratings between easy and difficult abilities:

> #confidence intervals of ambiguity ratings between easy and difficult abilities > cohen.d.ci(d=0.5666667, n1 = 37, alpha = .05)

lower effect upper

 $[1,] \ 0.2156665 \ 0.5666667 \ 0.9108903$

Effect size for multiple regressions

In the original study, table 2 in p. 224 shows the standardised betas for the multiple regressions conducted to predict comparative ability estimates from participant (N = 37) estimates of their own and their peers' absolute abilities. Table 2 below shows the standardised betas for the eight regressions in the columns "own ability" and "Peers' ability."

Of the 8 standardised betas reported, the smallest significant beta was -.25 for the abilities driving and saving money. The effect size for driving / saving money was therefore calculated. Computation of the effect size was first done by converting the standardised β coefficient, -.25, to r. The standardised β coefficient was entered into the table under the "imputation of r from standardised β weights from multiple regression analysis" section in the psychometrica website: *https://www.psychometrica.de/effect_size.html*, adapted from Lenhard & Lenhard (2016). The resulting r value was -.3.

Table 2

Original study results showing the standardised betas from multiple regressions predicting comparative ability judgments from own and peers' absolute abilities

Table 2

Mean Comparative Ability Estimates and Judgmental Weight of Own Versus Peers' Abilities by Domain Difficulty, Study 1 (N = 37)

			Judgmental weight of			
Ability	Domain difficulty ^a	Percentile estimate ^b	Own ability ^c	Peers' ability		
Easy	*					
Using mouse	3.1	58.8**	.21	.06		
Driving	3.6	65.4****	.89****	25*		
Riding bicycle	3.9	64.0****	.61****	02		
Saving money	4.3	61.5**	.90****	25***		
Difficult						
Telling jokes	6.1	46.4	.91****	03		
Playing chess	7.1	27.8****	.96****	22**		
Juggling	8.3	26.5****	.89****	16		
Computer programming	8.7	24.8****	.85****	10		

"Higher numbers reflect greater difficulty. "Mean percentile estimates above 50 reflect an above-average effect, estimates below 50 reflect a below-average effect. "Standardized betas from multiple regressions predicting participants' comparative ability (percentile) estimates from their estimates of their own absolute ability and the absolute ability of their peers, respectively.

p < .05. p < .01. p < .01. p < .001. p < .001. p < .0001.

12. Imputation of r from standardized β weights from multiple regression analysis

Studies based on regression analysis are hard to include in meta analytic research, if they only report standardized β coefficients. It is debated, if an imputation is possible and advisable in this case. On the other hand, power of the analyses is reduced if to many studies cannot be included, which itself distorts the representativeness of the results. Peterson and Brown (2005) suggest a procedure for converting standardized β weights to r, if the β weights range between -0.5 and 0.5. *r* can then be used directly as an effect size or converted into d or other metrices. Peterson and Brown (2005, p. 180) conclude: "However, despite the potential usefulness of the proposed imputation approach, meta-analysts are still encouraged to make every effort to obtain original correlation coefficients."

Standardized β weight	r
-0.25	-0.3

Screenshot 4. Screenshot showing input to calculate r from standardised β coefficient in the Psychometrica website: <u>https://www.psychometrica.de/effect_size.html</u>.

The resulting value is r = -.3, and $r^2 = 0.9$. $r^2 = 0.9$ was then applied into the equation $f^2 = r^2 / (1 - r^2)$ to find the effect size f^2 (Cohen, 2013).

$$\mathbf{f}^2 = \frac{\mathbf{r}^2}{1-\mathbf{r}^2}$$

Figure 1. f² formula. Adapted from 'Statistical Power Analysis for the Behavioral Sciences' by J. Cohen, 2013, *Academic Press*, p. 422.

$$\begin{aligned} f^2 &= r^2 / \left(1 - r^2\right) \\ f^2 &= \left(0.09\right) / \left(1 - \left(0.09\right)\right) \\ f^2 &= 0.099 \end{aligned}$$

The resulting value is $f^2 = 0.099$.

Confidence intervals for multiple regressions

The R code used to calculate the confidence intervals: CI.Rsq(rsq, n, k, level = 0.95) Where rsq = squared multiple correlation, n = sample size, k = number of predictors in model, level = significance level for constructing the CI For comparative ability estimates from participant estimates of their own and their peers' absolute abilities: Formula: CI.Rsq(rsq, n, k, level = 0.95) rsq = 0.09, SErsq = 0.079, n = 37, k =2, level = 0.95 **95% CI [-0.07, 0.25]** The input and calculated confidence intervals for multiple regressions: > #multiple regression > #own ability and others ability predicting comparative ability

> CI.Rsq(0.09, 37, 2, level = 0.95)

Rsq SErsq LCL UCL

1 0.09 0.07935943 -0.06554162 0.2455416

Power analysis of original study effect to assess required sample for replication

Minimum required sample size for replication

All power analysis calculations were done using the G* Power 3.1 program (Buchner et al, 2007) downloaded from the website:

<u>http://www.psychologie.hhu.de/arbeitsgruppen/allgemeine-psychologie-und-</u> <u>arbeitspsychologie/gpower.html</u>. The current replication aimed for a power of .95, and the alpha error probability was set at .05.

Since a total of 11 effect sizes were calculated, 11 power analyses based on the 11 effect sizes were conducted. Of the 11 power analyses, 5 of them tested for hypotheses 1, 2 and 3 of the original study, whereas the other 6 did not test for the main hypotheses. Therefore, the 5 power analyses testing for the original study's hypotheses were used to calculate the minimum required sample size needed for replication.

Table 3 summarises the 11 power analyses and the 5 primary power analyses are labelled with ^a. From table 3, power analyses for hypotheses 1, 2 and 3 showed that the minimum required sample size in this study would be 160 participants. For the current replication, we aimed to collect more than three times the minimum sample size of 500 participants. The following section is the protocol of inputs and outputs from G^* Power.

Table 3

Summary table of power analysis

Variables	Required sample size
Correlational study	
Correlation between domain difficulty and comparative ability $(2) (3)^{a}$	6
Correlation between own absolute ability and comparative ability $(1)^{a}$	7
Correlation between others' absolute ability and comparative ability	15
Correlation between domain difficulty and comparative ability, holding desirability constant	8
Correlation between domain difficulty and comparative ability, holding ambiguity constant	7
One sample experiment	
Comparative ability judgments across the 4 easy ability domains (2) ^a	19
Comparative ability judgments across the 4 difficult ability domains (3) ^a	9
Mean desirability ratings across the 4 easy ability domains	5
Mean desirability ratings across the 4 difficult ability domains	21
Paired sample t-test	
Ambiguity ratings between easy and difficult abilities	43
Multiple regression	
Comparative ability estimates from participant estimates of their own and their peers' absolute abilities (driving / saving money) (1) ^a	160

Note. Variables with (1), (2), or (3) are power analysis for hypothesis 1, 2, or 3 respectively. Variables not marked with (1), (2), or (3) do not test for the main effects of interest in this study.

^aCalculations related to the main effects of interest in the original study.

G* power protocol

Power analysis for correlations



Power (1-β err prob) Correlation ρ H0Output:Lower critical r Upper critical r Total sample size Actual power) = = = =	= 0 = -0.8 6 0.96	0.95 -0.8114014 114014 541635
--	--------------------	----------------------------------	--



Output:	Correlation ρ H1 α err prob Power (1- β err prob) Correlation ρ H0 Lower critical r Upper critical r Total sample size Actual power	= = = = = =	$\begin{array}{rcr} 0.95 \\ 0.05 \\ = & 0.95 \\ 0 \\ -0.7544922 \\ 0.7544922 \\ 7 \\ 0.0780873 \end{array}$	
	Actual power	=	0.9780873	



Analysis:	A priori: Compute required sample size				
Input:	Tail(s)	=	Two		
	(Correlation p H1	=	0.77	
	C	a err prob	=	0.05	
	F	Power (1- β err prob)		=	0.95
	(Correlation p H0	=	0	
Output:	Ι	Lower critical r	=	-0.513	39775
	τ	Upper critical r	=	0.513	9775
]	Fotal sample size	=	15	
	A	Actual power	=	0.955	1823

Power analysis for partial correlations



	Power (1- β err prob) Number of tested pre	Power (1-β err prob) = Number of tested predictors		0.95	2
	Total number of pred	ictors		=	3
Output:	Noncentrality parame Critical F	eter $λ$	6.9442	= 2719	51.2154000
	Numerator df		=	2	
	Total sample size		=	4 8	
	Actual power		=	0.9856	5512



Output:	Number of tested predict Total number of predicto Noncentrality parameter	ors rs λ		=	2 3 111.4433
Guiput	Critical F = Numerator df Denominator df Total sample size		9.5520 = = =)945 2 3 7	111.1135
	Actual power		=	0.9986	5048





Input:	Tail(s)	=	Two		
	Effect size	e d	=	0.8956	5
	α err prob		=	0.05	
	Power (1-	β err prob)		=	0.95
Output:	Noncentra	lity parame	eter δ	=	3.9038299
	Critical t		=	2.1009	9220
	Df		=	18	
	Total sam	ple size		=	19



	Effect size d	=	1.443()
	α err prob	=	0.05	
	Power (1- β err prob)		=	0.95
Output:	Noncentrality parame	eter δ	=	4.3290000
	Critical t	=	2.3060	0041
	Df	=	8	
	Total sample size		=	9
	Actual power		=	0.9647894



Analysis:	A priori: Compute required sample size				
Input:	Tail(s)	=	Two		
	Effect siz	ze d	=	2.25	1667
	a err pro	0	=	0.05	
	Power (1	-β err prot)	=	0.95
Output:	Noncentr	ality parar	neter δ	=	5.0348805
	Critical t		=	2.77	64451
	Df		=	4	
	Total san	nple size		=	5
	Actual po	ower		=	0.9570378



Analysis:	A priori: Compute required sample size				
Input:	Tail(s)	=	Two		
	Effect size	e d	=	0.843	33333
	α err prob	1	=	0.05	
	Power (1-	β err prob)	=	0.95
Output:	Noncentra	ality paran	neter δ	=	3.8646387
	Critical t		=	2.085	59634
	Df		=	20	
	Total sam	ple size		=	21
	Actual po	wer		=	0.9566675

Power analysis for paired sample t-test



t tests - Means: Difference between two dependent means (matched pairs)						
Analysis:	Analysis: A priori: Compute required sample size					
Input:	Tail(s) =	Two				
	Effect size dz	=	0.566	6667		
	a err prob	=	0.05			
	Power $(1-\beta \text{ err prob})$	1	=	0.95		
Output:	Noncentrality param	eter δ	=	3.7158820		
	Critical t	=	2.018	0817		
	Df	=	42			
	Total sample size		=	43		
	Actual power		=	0.9525090		

Power analysis for multiple regression

For comparative ability estimates from participant estimates of their own and their peers' absolute abilities



Materials and scales used in the replication + extension experiment

Extension introduction and explanation

For extension one, two additional conditions were added: the easy domain and the difficult domain conditions. For extension two, an additional dependent variable of domain difficulty ratings is added. Domain difficulty would be scored on a scale from 1 (very easy) to 10 (very difficult).

Table of design

The table of design is found under Table 7 of the methods section in the main manuscript.

Instructions and experimental material

Consent

All participants first had to give consent before being randomly assigned to one of the three conditions.

Consent Form

This study is conducted by Gilad Feldman of the psychology department at University of Hong Kong and colleagues. If you have questions or concerns regarding this project, please do not hesitate to contact Gilad Feldman gfeldman@hku.hk at any time.

Purpose of the study

To understand how people think, feel, make decisions, and act in various types of situations. Preferences and individual differences between people, as well as both internal and external factors, may affect these types of responses and this research intends to uncover and/or understand these processes.

Procedures.

This study will ask you to complete a set of questionnaires requiring decision making in various scenarios. The duration of this study has been indicated on the Amazon Mechanical Turk HIT that you accepted.

Potential risks. This procedure has no known risks greater than those of ordinary daily life.

Potential benefits.

This study aims to add to existing research line in the field of social-cognitive-personality psychology. We also hope that this study can provide you with a learning experience of participating in psychological research and possibly learning more about yourself and your beliefs, evaluations, preferences, personality, etc..

Compensation.

Compensation is offered through the Amazon Mechanical Turk platform. The level of compensation has been indicated on the Amazon Mechanical Turk HIT that you accepted.

Confidentiality.

Your questionnaire responses are anonymous and strictly confidential. No personal identifiers are kept. Information obtained will only be used as aggregates for research purposes.

Participation and withdrawal.

Your participation is voluntary. This means that you can choose to stop at any time without negative consequences. If at any time you wish to withdraw, please simply indicate eight zeros as your completion code on MTurk, and you will receive compensation regardless.

Questions and concerns

If you have any questions about the research, please feel free to contact Gilad Feldman at the University of Hong Kong (gfeldman@hku.hk). If you have questions about your rights as a research participant, contact the Human Research Ethics Committee, HKU (+852 2241-5267).

Please print a copy of this consent form for your records, if you so desire.

Consent agreement

Please select the message box below to indicate that you are 18 years old or older and have read and agree to the above.

I fully understand the contents of this consent form and agree to participate in this study. I also agree not to disclose the details of the study to other parties.

(Participants would provide a tick to this statement to give consent)

Instruction

In this study, you will be presented with a series of questions on different abilities. Please read and answer all questions carefully. When you are ready to begin, please select >> (Next) to proceed to the study.

Ability domains

Participants were then randomly assigned into one of the three conditions: original domain group, easy domain group, or difficult domain group. Depending on the condition, participants were shown one of the three versions of eight ability domain descriptions.

Ratings

For each of the eight ability domains, participants provided seven ratings.

1.Domain difficulty

Question: Please rate the difficulty of this ability from 1 (very easy) to 10 (very difficult):

- Scale: 1 (very easy) to 10 (very difficult)

2.Comparative ability

Question: Please compare yourself with other MTurk workers of the same age, gender, and socioeconomic background as you on this ability from 0 to 100. Please click on the bar to indicate your rank compared to others on this ability.

- Scale: 0 (I'm at the very bottom) to 50 (I'm exactly average) to 100 (I'm at the very top).

3.Own absolute ability

Question: For this ability, please rate your own ability from 1 (very unskilled) to 10 (very skilled):

- Scale: 1 (very unskilled) to 10 (very skilled)

4.Others' absolute ability

Question: For this ability, please rate the ability of other MTurk workers of the same age, gender, and socioeconomic background as you from 1 (very unskilled) to 10 (very skilled):

Scale: 1 (very unskilled) to 10 (very skilled)

5.Desirability

Question: Please rate ability desirability: is it better to be very unskilled or very skilled at this ability from 1 (better to be very unskilled) to 10 (better to be very skilled).

- Scale: 1 (better to be very unskilled) to 10 (better to be very skilled)

6.Ambiguity

Question: Please rate the ambiguity of the phrase used for this ability "(ability domain)" from 1 (very ambiguous, has many meanings) to 10 (very clear, has one meaning).

- Scale: 1 (very ambiguous, has many meanings) to 10 (very clear, has one meaning) <u>7.Experience in the ability domain</u>

Question: Please rate your experience in using this ability from 1 (no experience at all) to 10 (very experienced).

- Scale: 1 (no experience at all) to 10 (very experienced)

Funnelling section

Five funnelling questions were presented:

- 1. How serious were you in filling out this questionnaire?
- 1 (not at all) to 5 (very much)
- 2. Have you ever seen the materials used in this study or similar before? If yes please indicate where.
- 3. What do you think the purpose of the last part was? (one sentence)
- 4. Help us improve for the next studies Did you spot any errors? Anything missing or wrong? Something we should pay attention to in next runs? (briefly)
- 5. Please rate your satisfaction with the pay/compensation offered for this MTurk HIT (note this will not impact your pay in any way)
- 0 (extremely unsatisfied) to 3 (neutral) to 6 (very satisfied)

Demographics

Four questions on demographics were presented:

- 1. Please indicate your gender
 - Male
 - Female
 - Other/Would rather not disclose
- 2. Which country are you originally from? (Country of birth)
 - (type country of birth)
- 3. Please estimate your family's social class
 - Lower class
 - Working class
 - Lower Middle class
 - Middle class
 - Upper Middle class
 - Upper class
- 4. How would you generally rate your understanding of English used in this study?
 - Very bad
 - Bad
 - Poor
 - Neither good or bad
 - Fair

- Good
- Very good

Exclusion criteria

The current replication's exclusion criteria are summarised in table 4.

Table 4.

Summary of exclusion criteria

Exclusion Criteria

Reason

Exclusion Criteria 1a

Participants indicating low proficiency of English.

Item: "On a scale from 1-7, what do you think is your proficiency of English?" (1 = being not proficient at all, 7 = being very proficient.)

Exclusion: if self-report less than 5 on a 1-7 scale

Exclusion Criteria 1b

Participants who self-report not being serious about filling in the survey.

Item: "On a scale from 1-5, what do you think is your seriousness in filling in the survey?" (1 = not serious at all, 5 = very serious.)

Exclusion: if self-report less than 4 on a 1-5 scale

Exclusion Criteria 1c

Participants who correctly guessed any one of the hypotheses of this study in the funnelling section.

Item: "What do you think the purpose of the last part was?" (If you are not sure please write "not sure")

Exclusion: if guessed correctly for both replication and extension

Without a fair proficiency of English participants may not fully understand the questions and may affect results.

Nonserious answering behavior increases noise and reduces experimental power. Excluding their response can increase data validity.

Participants who could guess any of the hypotheses of the study may commit experimental bias and do not reflect the true nature of the investigated phenomenon

Experimental bias in Participants who have already seen or done the survey before. responses

Item: "Have you ever seen the materials used in this study or similar before? If yes - please indicate where."

Exclusion: answered 'yes'

Exclusion Criteria 1d

Exclusion Criteria 1e

Participants who failed to complete the survey. (duration = 0, leave question blank)

Exclusion Criteria 1f

Participants not from the United States.

Item: "Which country are you originally from? (Country of birth)" Exclusion: if response is not part of the United States

Does not fit our targeted population criteria

Incomplete data

Comparisons and deviations

Similarities and differences between the original study and replication study

	Original	Replication	Reason for change
Study design	Within-subjects design	Mixed design	From one condition to three conditions (add two extension conditions to test hypotheses 3 &4)
Procedure	Participants were all assigned to the same condition and were presented with the same ability domains.	Participants were randomly assigned to one of the three conditions, and in each condition participants were presented with different versions (original, easy interpretations, difficult interpretations) of the 8 ability domains.	Extension: changed independent variable of ability domain definitions
Conditions	One condition: original ability domains.	Three conditions: 1. original domain group, 2. easy domain group, and 3. difficult domain group.	Extension: changed independent variable of ability domain definitions
Domain difficulty ratings	Ratings obtained in pretest by a separate group of participants (N = 39).	Ratings obtained for each of the eight abilities across all three conditions.	Extension: additional dependent variable of domain difficulty ratings
Measures / stimulus	Written questionnaire	Online Qualtrics survey	
	4 easy abilities, 4 difficult abilities	8 abilities, abilities not categorised as easy or difficult.	Issues with categorising continuous variables (see adjustments to original study)
	Comparison group: other students from their psychology course	Comparison group: others of the same age, gender, and socioeconomic background as you	Used Mturk instead of college setting to recruit participants
	DV2: Comparative ability rating (scale from 0 to 99)	DV2: Comparative ability rating (scale from 0 to 100)	Use 100 instead of 99 for easier understanding and comparison

Location	Introductory psychology students at Cornell University, New York	Online	Recruit participants online on MTurk
Remuneration	Extra course credit	Money	Used Mturk instead of college setting to recruit participants
Calculations	One sample t -tests, correlations, multiple regressions	Correlations, Hotelling- Williams-test, multiple regressions, ANOVA	Issues with categorising continuous variables (section: "adjustments to original study" in main manuscript)

Pre-exclusions versus post-exclusions

Overview of pre-exclusions and post-exclusions

	Before exclusion	Fulfilled any of the exclusion criteria	After exclusion
Total number of cases	756	65	691
Summary of exclusions			
Exclusion Criteria		Cases fulfilling the exclusion criteria	Cases remaining after exclusion
Exclusion Criteria 1a		10	746
Participants indicating English.	low proficiency of		
Exclusion Criteria 1b		19	727
Participants who self-reader about filling in the surve	eport not being serious ey.		
Exclusion Criteria 1c Participants who correct	tly guessed any one of	0	727
section.	study in the funnelling		
Exclusion Criteria 1d		7	720
Participants who have a survey before.	lready seen or done the		
Exclusion Criteria 1e		0	720
Participants who failed	to complete the survey.		
Exclusion Criteria 1f		20	601
Participants not from the	e United States.	27	071

Pre-registration plan versus final report

See	Preregistration	Planning and	Deviation 1	Documentation	(PPDD)	document for	latest updates
							1

Compone nts in your preregistr ation	Locati on of 1) prereg istered decisio n/plan and 2) ration al for decisio n/plan	Were there deviatio ns? What type? minor	If yes - describe details of deviation(s)	Rationale for deviation	How might the results be differe nt if you had/ha d not deviate d	Date/tim e of decision for deviatio n + stage
Study design		No	/	/	/	/
Measured variables		No	/	/	/	/
Exclusion criteria		No	/	/	/	/
IV		No	/	/	/	/
DV		No	/	/	/	/
Data analysis		Minor	 Added Welch's T- tests ander the section comparisons between the three groups" in the main manuscript. Added one-sample T-tests and correlations for ratings across all abilities under "Replication: original domain condition" in the main manuscript. Condensed code files into 1 R file. Redundant calculations on both JAMOVI and R during pre-registration. 	 Shapiro-wilk and Levene's tests show that assumptions of normality and homogeneity of variance are not met Pre-registered that if the paired samples t-test for the replication condition is significant, original study analysis will be carried out. Easier viewing, avoid redundancy 	1. No differe nce, added tests to supple ment data analysi s 2. No differe nce 3. No differe nce	1, 2, & 3: 03/07/20 20, after data collectio n

Table notes: Locations should include page number (section) and paragraph or line number (as specific as possible). Where possible, please embed in-document hyperlinks to make browsing easier. *Categories for deviations: Minor - Change probably did not affect results or interpretations; Major - Change likely affected results or interpretations.

Variable computation

Non-excluded variables Columns from file: Kruger (1999) non-excluded dataset Variable: easy abilities difficulty (non-excluded, replication) mouse difficulty + drive difficulty + ride difficulty + saving difficulty (4 columns combined into one total column) Variable: difficult abilities difficulty (non-excluded, replication) joke difficulty + chess difficulty + juggle difficulty + program difficulty (4 columns combined into one total column) Variable: difficulty across all abilities (replication, non-excluded) $mouse_difficulty + drive_difficulty + ride_difficulty + saving_difficulty + joke_difficulty + joke_d$ chess difficulty + juggle difficulty + program difficulty (8 columns combined into one total column) Variable: compare across all abilities (replication, non-excluded) mouse_compare_8 + drive_compare_8 + ride_compare_8 + saving_compare_8 + joke compare 8 + chess compare 8 + juggle comapre 8 + program compare 8(8 columns combined into one total column) Variable: Own ability across all abilities(replication, non-excluded) mouse_own + drive_own + ride_own + saving_own + joke_own + chess_own + juggle_own + program own (8 columns combined into one total column) **Excluded** variables Columns from file: Kruger (1999) excluded dataset Variable: easy abilities difficulty (replication group) mouse_difficulty + drive_difficulty + ride_difficulty + saving_difficulty (4 columns combined into one total column) Variable: difficult abilities difficulty (replication group) joke difficulty + chess difficulty + juggle difficulty + program difficulty (4 columns combined into one total column) Variable: easy abilities difficulty (easy group) mouse difficulty e + drive difficulty e + ride difficulty e + saving difficulty e(4 columns combined into one total column) Variable: difficult abilities difficulty (easy group) joke_difficulty_e + chess_difficulty_e + juggle_difficulty_e + program_difficulty_e (4 columns combined into one total column) Variable: easy abilities difficulty (difficult group) mouse_difficulty_d + drive_difficulty_d + ride_difficulty_d + saving_difficulty_d (4 columns combined into one total column) Variable: difficult abilities difficulty (difficult group) joke_difficulty_d + chess_difficulty_d + juggle_difficulty_d + program_difficulty_d (4 columns combined into one total column) Variable: difficulty across all abilities (replication group)

 $mouse_difficulty + drive_difficulty + ride_difficulty + saving_difficulty + joke_difficulty + chess_difficulty + juggle_difficulty + program_difficulty$

(8 columns combined into one total column)

Variable: compare across all abilities (replication group)

mouse_compare_8 + drive_compare_8 + ride_compare_8 + saving_compare_8 +

joke_compare_8 + chess_compare_8 + juggle_comapre_8 + program_compare_8 (8 columns combined into one total column)

Variable: own absolute ability across all abilities (replication group)

 $mouse_own + drive_own + ride_own + saving_own + joke_own + chess_own + juggle_own + program_own$

(8 columns combined into one total column)

Pre-exclusion versus post-exclusion results

Summary of pre-exclusion versus post-exclusion main results for the replication condition

Test	Pre-exclusion (<i>N</i> = 756)	Post-exclusion (<i>N</i> = 691)
Paired samples t-test Domain difficulty ratings between easy and difficult abilities	<i>t</i> (1031) = -29.3, <i>p</i> <.001	<i>t</i> (959) = -29.1, <i>p</i> <.001
Correlational studies Domain difficulty and comparative ability across all abilities	<i>r</i> = -0.31, <i>p</i> <.001, 95% CI [-0.35, -0.27]	<i>r</i> = -0.35, <i>p</i> <.001, 95% CI [-0.39, -0.31]
Own absolute ability and comparative ability across all abilities	<i>r</i> = 0.81, <i>p</i> <.001, 95 % CI [0.80, 0.83]	<i>r</i> = 0.81, <i>p</i> <.001, 95 % CI [0.79, 0.83]
Mean domain difficulty and mean comparative ability across all abilities	<i>r</i> = 0.27, <i>p</i> < .001, 95 % CI [0.15, 0.38]	<i>r</i> = 0.16, <i>p</i> = 0.012, 95% CI [0.04, 0.28]
Mean own absolute ability and mean comparative ability across all abilities	<i>r</i> = 0.87, <i>p</i> <.001, 95 % CI [0.83, 0.89]	<i>r</i> = 0.85, <i>p</i> <.001, 95% CI [0.82, 0.89]
Multiple regression Mean own and others' absolute ability ratings predicting mean comparative ability judgments	F(2, 255) = 384.4, $p < .001$, with an R^2 of 0.75.	F(2, 237) = 323.9, $p < .001$, with an R^2 of 0.73.

Note. No significant differences in main results were found for pre-exclusion versus postexclusion analysis for the replication condition.
Statistical assumptions and normality Tests

<u>File: Kruger (1999) excluded final.R</u> Effect size and confidence intervals for independent samples t-tests between the replication and easy or difficult domain conditions: Domain difficulty ratings between the replication condition and easy domain condition

> #cohen's d domaindifficulty1and2

> ES.t.two(m1=6.05,m2=5.22,sd1=1.15,sd2=1.63,n1=240,n2=225)

effect size (Cohen's d) of independent two-sample t test

d = 0.5916382 alternative = two.sided

NOTE: The alternative hypothesis is m1 != m2 small effect size: d = 0.2 medium effect size: d = 0.5 large effect size: d = 0.8

-

Domain difficulty ratings between the replication condition and difficult domain condition

> #cohen's d domaindifficulty1and3 > ES.t.two(m1=6.05,m2=7.39,sd1=1.15,sd2=1.19,n1=240,n2=226) effect size (Cohen's d) of independent two-sample t test d = 1.145723 alternative = two.sided NOTE: The alternative hypothesis is m1 != m2 small effect size: d = 0.2 medium effect size: d = 0.5 large effect size: d = 0.8 > d.ci(1.15,n=466,n1=240,n2=226,alpha=.05) lower effect upper [1,] 0.953311 1.15 1.345615

Ambiguity ratings between the replication condition and easy domain condition

> #cohen's d ambiguity1and2 > ES.t.two(m1=8.00,m2=8.32,sd1=1.24,sd2=1.23,n1=240,n2=225) effect size (Cohen's d) of independent two-sample t test d = 0.2590732 alternative = two.sided NOTE: The alternative hypothesis is m1 != m2 small effect size: d = 0.2 medium effect size: d = 0.5 large effect size: d = 0.5 large effect size: d = 0.8 > d.ci(0.26,n=465,n1=240,n2=225,alpha=.05) lower effect upper [1,] 0.07721565 0.26 0.442508

Ambiguity ratings between the replication condition and difficult domain condition

> #cohen's d ambiguity1and3 > ES.t.two(m1=8.00,m2=8.24,sd1=1.24,sd2=1.43,n1=240,n2=226) effect size (Cohen's d) of independent two-sample t test d = 0.1797061 alternative = two.sided NOTE: The alternative hypothesis is m1 != m2 small effect size: d = 0.2 medium effect size: d = 0.5 large effect size: d = 0.8 > d.ci(0.18,n=466,n1=240,n2=226,alpha=.05) lower effect upper [1,] -0.00213244 0.18 0.3619412

Confidence intervals for paired sample t-test results comparing the domain difficulty ratings between easy and difficult abilities:

> #confidence intervals for paired sample t-test comparing the domain difficulty ratings between easy and difficult abilities > #replication condition > cohen.d.ci(d=-0.939, n1 = 960, alpha = .05) lower effect upper [1,] -1.014767 -0.939 -0.8628849 > #easy domain condition > cohen.d.ci(d=-0.624, n1 = 900, alpha = .05) lower effect upper [1,] -0.6952683 -0.624 -0.5524394 > #difficult domain condition > cohen.d.ci(d=-0.429, n1 = 904, alpha = .05) lower effect upper [1,] -0.4970143 -0.429 -0.3607673

R^2 confidence intervals for multiple regressions on mean own and others' absolute abilities predicting mean comparative ability:

> #Multiple regression CI for the replication condition > CI.Rsq(0.7322,239, 2, level = 0.95) SErsq Rsq LCL UCL 1 0.7322 0.02909147 0.6751818 0.7892182 > #Multiple regression CI for the easy domain condition > CI.Rsq(0.6896, 224, 2, level = 0.95) SErsq LCL UCL Rsq 1 0.6896 0.03375872 0.6234341 0.7557659 > #Multiple regression CI for the difficult domain condition > CI.Rsq(0.7546, 225, 2, level = 0.95) SErsq LCL UCL Rsq 1 0.7546 0.0278593 0.6999968 0.8092032

Independent sample t-tests for comparisons between the three conditions: Shapiro-wilk test for normality

R codes for Shapiro-wilk tests for mean domain difficulty and ambiguity ratings for all three conditions. The hypotheses of normality is rejected for mean domain difficulty ratings for the conditions, p < .001. Welch's t-tests are therefore also included in the main manuscript to supplement the Student's t-tests.

Domain difficulty (replication condition)

> shapiro.test(kruger\$mean_domaindifficulty_condition1)

Shapiro-Wilk normality test

data: kruger\$mean_domaindifficulty_condition1 W = 0.96995, p-value = 0.00005811

Domain difficulty (easy domain condition)

> shapiro.test(kruger\$mean_domaindifficulty_condition2)

Shapiro-Wilk normality test

data: kruger\$mean_domaindifficulty_condition2 W = 0.93229, p-value = 0.0000000113

Domain difficulty (difficult domain condition)

> shapiro.test(kruger\$mean_domaindifficulty_condition3)

Shapiro-Wilk normality test

data: kruger\$mean_domaindifficulty_condition3 W = 0.94822, p-value = 0.0000003177

Ambiguity (replication condition)

> shapiro.test(kruger\$mean_ambiguity_condition1)

Shapiro-Wilk normality test

data: kruger\$mean_ambiguity_condition1 W = 0.96538, p-value = 0.00001442 Ambiguity (easy domain condition)

> shapiro.test(kruger\$mean_	_ambiguity_	_condition2)
------------------------------	-------------	--------------

Shapiro-Wilk normality test

data: kruger\$mean_ambiguity_condition2 W = 0.94575, p-value = 0.0000001912

Ambiguity (difficult domain condition)

> shapiro.test(kruger\$mean_ambiguity_condition3)

Shapiro-Wilk normality test

data: kruger\$mean_ambiguity_condition3 W = 0.89103, p-value = 0.0000000001025

F-test for equality in variances

R codes for F-tests for mean domain difficulty and ambiguity ratings between the replication and easy domain groups, and the replication and difficult domain groups. Apart from mean ambiguity ratings in the replication and difficult domain condition (p = .029), the p values for all other conditions were all larger than 0.05, meaning that variances were equal across groups. Domain difficulty ratings between the replication condition and easy domain condition

```
> var.test(kruger$mean_domaindifficulty_condition1,
kruger$mean_domaindifficulty_condition2,
```

```
+ alternative = c("two.sided"),
```

```
+ \operatorname{conf.level} = 0.95)
```

F test to compare two variances

data: kruger\$mean_domaindifficulty_condition1 and kruger\$mean_domaindifficulty_condition2 F = 0.49985, num df = 239, denom df = 224, p-value = 0.0000001639 alternative hypothesis: true ratio of variances is not equal to 1 95 percent confidence interval: 0.3858126 0.6468819 sample estimates: ratio of variances 0.4998488

Domain difficulty ratings between the replication condition and difficult domain condition

> var.test(kruger\$mean_domaindifficulty_condition1,

```
kruger$mean_domaindifficulty_condition3,
+ alternative = c("two.sided"),
```

```
+ conf.level = 0.95)
```

F test to compare two variances

```
data: kruger$mean_domaindifficulty_condition1 and
kruger$mean_domaindifficulty_condition3
F = 0.93829, num df = 239, denom df = 225, p-value = 0.6271
alternative hypothesis: true ratio of variances is not equal to 1
95 percent confidence interval:
0.7244734 1.2139816
sample estimates:
ratio of variances
0.9382927
```

Ambiguity ratings between the replication condition and easy domain condition

```
> var.test(kruger$mean_ambiguity_condition1, kruger$mean_ambiguity_condition2,
+ alternative = c("two.sided"),
+ conf.level = 0.95)
F test to compare two variances
data: kruger$mean_ambiguity_condition1 and kruger$mean_ambiguity_condition2
F = 1.0099, num df = 239, denom df = 224, p-value = 0.9415
alternative hypothesis: true ratio of variances is not equal to 1
95 percent confidence interval:
0.7795024 1.3069713
sample estimates:
ratio of variances
1.009903
```

Ambiguity ratings between the replication condition and difficult domain condition

> var.test(kruger\$mean_ambiguity_condition1, kruger\$mean_ambiguity_condition3,

```
+ alternative = c("two.sided"),
```

+ $\operatorname{conf.level} = 0.95$)

F test to compare two variances

data: kruger\$mean_ambiguity_condition1 and kruger\$mean_ambiguity_condition3
F = 0.74993, num df = 239, denom df = 225, p-value = 0.0286
alternative hypothesis: true ratio of variances is not equal to 1
95 percent confidence interval:
0.5790329 0.9702707
sample estimates:
ratio of variances
0.7499273

Additional Tables and Figures

Replication condition

Non-excluded

Table 5.1.

Partial correlations between mean comparative ability estimates and domain difficulty, holding desirability or ambiguity ratings constant

Variables	Control variable	Correlatio n (p.xy)	Partial correlation (p.xy.z)	p	Difference (<i>p.xy</i> - <i>p.xy.z</i>)
Comparative ability, domain difficulty	Desirability	0.27	0.26	0.093	0.01 [-0.00, 0.04]
Comparative ability, domain difficulty	Ambiguity	0.27	0.27	0.346	0.00 [-0.00, 0.02]

Note. The replication group did not find a significant difference between the zero order correlation (*p.xy*) and partial correlation (*p.xy.z*) between comparative ability and domain difficulty ratings while holding desirability or ambiguity constant. Both tests were not able to reject the null hypothesis: $\rho.xy - \rho.xy.z = 0$.

Excluded

Table 5.2.

Partial correlations between mean comparative ability estimates and domain difficulty, holding desirability or ambiguity ratings constant

Variables	Control variable	Correlatio n (p.xy)	Partial correlation (p.xy.z)	р	Difference (p.xy - p.xy.z)
Comparative ability, domain difficulty	Desirability	0.16	0.16	0.212	0.01 [-0.00, 0.03]
Comparative ability, domain difficulty	Ambiguity	0.16	0.16	0.659	0.001 [-0.01, 0.02]

Note. The replication group did not find a significant difference between the zero order correlation (*p.xy*) and partial correlation (*p.xy.z*) between comparative ability and domain difficulty ratings while holding desirability or ambiguity constant. Both tests were not able to reject the null hypothesis: $\rho.xy - \rho.xy.z = 0$.

Non-excluded



Figure 2.1 Scatterplot for the correlation between mean comparative ability and mean domain difficulty ratings in the replication group.

Excluded



Figure 2.2 Scatterplot for the correlation between mean comparative ability and mean domain difficulty ratings in the replication group.

Non-excluded

Table 5.3

Replication condition: regression results using mean comparative ability as the criterion

Predictor	b	b 95% CI [LL, UL]	beta	beta 95% CI [LL, UL]	sr ²	<i>sr</i> ² 95% CI [LL, UL]	r	Fit
(Intercept)	-1.80	[-6.80, 3.20]						
kruger\$mea n_own_con dition1	9.46**	[8.53, 10.38]	0.88	[0.80, 0.97]	.39	[.31, .48]	.87 **	
kruger\$mea n_other_con dition1	-0.27	[-1.34, 0.80]	- 0.02	[-0.11, 0.06]	.00	[00, .01]	.60 **	
								$R^2 = .751^{**}$
								95% CI[0.70, 0.80]

Note. A significant *b*-weight indicates the beta-weight and semi-partial correlation are also significant. *b* represents unstandardized regression weights. *beta* indicates the standardized regression weights. *sr*² represents the semi-partial correlation squared. *r* represents the zero-order correlation. *LL* and *UL* indicate the lower and upper limits of a confidence interval, respectively. ** indicates p < .01.

Excluded

Table 5.4

D	• •	1	•	1.	•		, •	1 • 1 • .	.1	•, •
Roni	ication	condition	rearession	roculte	usina	moan	comparative	ability	as the	critorion
περι	icanon	conunion.	regression	resuits	using	mean	comparative	adilly	us me	Criterion
1			0		0		1	~		

Predictor	b	b 95% CI [LL, UL]	beta	beta 95% CI [LL, UL]	sr ²	<i>sr</i> ² 95% CI [LL, UL]	r	Fit
(Intercept)	1.27	[-4.13, 6.67]						
kruger\$mea n_own_con dition1	9.51**	[8.57, 10.44]	0.90	[0.81, 0.99]	.45	[.36, .54]	.85 **	
kruger\$mea n_other_con dition1	-0.87	[-2.00, 0.26]	- 0.07	[-0.16, 0.02]	.00	[00, .01]	.53 **	
								$R^2 = .732^{**}$
								95% CI[0.68, 0.79]

Note. A significant *b*-weight indicates the beta-weight and semi-partial correlation are also significant. *b* represents unstandardized regression weights. *beta* indicates the standardized regression weights. *sr*² represents the semi-partial correlation squared. *r* represents the zero-order correlation. *LL* and *UL* indicate the lower and upper limits of a confidence interval, respectively. ** indicates p < .01.



Figure 2.3. Scatterplot for the correlation between mean comparative ability and mean own absolute ability ratings in the replication group.

Excluded



kruger\$mean_compare_condition1





Figure 2.5. Scatterplot for the correlation between mean comparative ability and mean others' absolute ability ratings in the replication group.



kruger\$mean_compare_condition1

Figure 2.6. Scatterplot for the correlation between mean comparative ability and mean others' absolute ability ratings in the replication group.



Figure 2.7. Residuals versus fitted plot for mean comparative ability predicted from mean own and others' ability in the replication group.

Excluded



Im(kruger\$mean_compare_condition1 ~ kruger\$mean_own_condition1 + kruger\$mea ... Figure 2.8. Residuals versus fitted plot for mean comparative ability predicted from mean own and others' ability in the replication group.



Theoretical Quantiles Im(kruger\$mean_compare_condition1 ~ kruger\$mean_own_condition1 + kruger\$mea ... Figure 2.9. Normal Q-Q plot for mean comparative ability predicted from mean own and others' ability in the replication group.





Im(kruger\$mean_compare_condition1 ~ kruger\$mean_own_condition1 + kruger\$mea ...

Figure 2.10. Normal Q-Q plot for mean comparative ability predicted from mean own and others' ability in the replication group.

Correlation Matrix Condition 1

Table 5.5						
Person's r for me	ean values (acros	s abilities) in	n the repli	cation (orig	ginal) condition	n
	Comparative	Difficult	Difficult Own		Desirabilit	
	Ability	У	ability	ability	У	Ambiguity
Comparative						
Ability	1.00					
Difficulty	0.16	1.00				
Own ability	0.85	0.21	1.00			
Peers' ability	0.53	0.34	0.67	1.00		
Desirability	0.11	0.06	0.14	0.20	1.00	
Ambiguity	-0.06	-0.01	-0.11	-0.13	-0.35	1.00

Table 5.6

P-values for correlations between mean values (across abilities) in the replication (original) condition

	Comparative Ability	Difficult y	Own ability	Peers' ability	Desirabilit y	Ambiguit y
Comparative Ability	0					
Difficulty	.012	0				
Own ability	<.001	.001	0			
Peers' ability	<.001	<.001	<.001	0		
Desirability	0.090	0.362	.025	.002	0	
Ambiguity	.340	.829	.093	.039	<.001	0

Easy domain condition

Non-excluded

Table 6.1

Easy domain group: partial correlations between mean comparative ability estimates and

don	nain	difficulty,	holding	desirability	or ambiguity	ratings	constant
		<i>,</i> ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,					0011010111

Variables	Control variable	Correlatio n (p.xy)	Partial correlation (p.xy.z)	p	Difference (p.xy - p.xy.z)
Comparative ability, domain difficulty	Desirability	0.35	0.33	0.139	0.02 [-0.01, 0.05]
Comparative ability, domain difficulty	Ambiguity	0.35	0.35	0.097	-0.01 [-0.03, 0.00]

Note. The replication group did not find a significant difference between the zero order correlation (*p.xy*) and partial correlation (*p.xy.z*) between comparative ability and domain difficulty ratings while holding desirability or ambiguity constant. Both tests were not able to reject the null hypothesis: $\rho.xy - \rho.xy.z = 0$.

Excluded

Table 6.1

Easy domain group: partial correlations between mean comparative ability estimates and

Variables	Control variable	Correlatio n (p.xy)	Partial correlation (p.xy.z)	р	Difference (<i>p.xy</i> - <i>p.xy.z</i>)
Comparative ability, domain difficulty	Desirability	0.32	0.29	0.052	0.03 [-0.001, 0.07]
Comparative ability, domain difficulty	Ambiguity	0.32	0.32	0.188	-0.01 [-0.03, 0.00]

domain difficulty, holding desirability or ambiguity ratings constant

Note. The replication group did not find a significant difference between the zero order correlation (*p.xy*) and partial correlation (*p.xy.z*) between comparative ability and domain difficulty ratings while holding desirability or ambiguity constant. Both tests were not able to reject the null hypothesis: $\rho.xy - \rho.xy.z = 0$.





kruger\$mean_compare_condition2





kruger\$mean_compare_condition2

Figure

3.2. Scatterplot for the correlation between mean comparative ability and mean domain difficulty ratings in the easy domain group.

Non-excluded

Excluded

Table 6.3

r	1 .	1	•	1, •		· •	1 . 1	.1	•, •
Easv a	lomain	condition	regression	results using	т теан сот	inarative	ability	as the	criterion
Lasyt	ioman	contantion.	regression	i contro notite		paranve	aoniny	us inc	critcrion

Predictor	b	b 95% CI [LL, UL]	beta	beta 95% CI [LL, UL]	sr ²	<i>sr</i> ² 95% CI [LL, UL]	r	Fit
(Intercept)	2.20	[-3.53, 7.93]						
kruger\$mean _own_condit ion2	8.69* *	[7.69, 9.69]	0.83	[0.74, 0.93]	.38	[.30, .47]	.82 **	
kruger\$mean _other_condi tion2	-0.14	[-1.21, 0.94]	-0.01	[-0.11, 0.08]	.00	[00, .00]	.54 **	
								$R^2 = .679^{**}$
								95% CI[0.61,0 .74]

Note. A significant *b*-weight indicates the beta-weight and semi-partial correlation are also significant. *b* represents unstandardized regression weights. *beta* indicates the standardized regression weights. *sr*² represents the semi-partial correlation squared. *r* represents the zero-order correlation. *LL* and *UL* indicate the lower and upper limits of a confidence interval, respectively. ** indicates p < .01.

Excluded

Table 6.4

r	1 .	1	•	1, •		· •	1 • 1 • .	.1	•, •
HAGW	domain	condition	rearession	roculte neu	ra moan	comparative	ability a	s tho	criterion
Lusy	aomam	conunion.	regression	i contro uoti	ig mean	comparance	uoiii v u	s inc	Criterion
~			0		0	1	~		

Predictor	b	b 95% CI [LL, UL]	beta	beta 95% CI [LL, UL]	sr ²	<i>sr</i> ² 95% CI [LL, UL]	r	Fit
(Intercept)	2.90	[-2.99, 8.80]						
kruger\$mean _own_condit ion2	8.92* *	[7.90, 9.93]	0.86	[0.76, 0.96]	.42	[.33, .51]	.83 **	
kruger\$mean _other_condi tion2	-0.50	[-1.59, 0.59]	-0.04	[-0.14, 0.05]	.00	[00, .01]	.52 **	
								$R^2 = .690^{**}$
								95% CI[0.62,0 .76]

Note. A significant *b*-weight indicates the beta-weight and semi-partial correlation are also significant. *b* represents unstandardized regression weights. *beta* indicates the standardized regression weights. *sr*² represents the semi-partial correlation squared. *r* represents the zero-order correlation. *LL* and *UL* indicate the lower and upper limits of a confidence interval, respectively. ** indicates p < .01.



Figure 3.3. Scatterplot for the correlation between mean comparative ability and mean own absolute ability ratings in the easy domain group.





kruger\$mean_compare_condition2

Figure 3.4. Scatterplot for the correlation between mean comparative ability and mean own absolute ability ratings in the easy domain group.



Figure 3.5. Scatterplot for the correlation between mean comparative ability and mean others' absolute ability ratings in the easy domain group.

Excluded



kruger\$mean_compare_condition2

Figure 3.6. Scatterplot for the correlation between mean comparative ability and mean others' absolute ability ratings in the easy domain group.

Non-excluded



Im(kruger\$mean_compare_condition2 ~ kruger\$mean_own_condition2 + kruger\$mea Figure 3.7. Residuals versus fitted plot for mean comparative ability predicted from mean own and others' ability in the easy domain group.





Im(kruger\$mean_compare_condition2 ~ kruger\$mean_own_condition2 + kruger\$mea ... Figure 3.8. Residuals versus fitted plot for mean comparative ability predicted from mean own and others' ability in the easy domain group.



Im(kruger\$mean_compare_condition2 ~ kruger\$mean_own_condition2 + kruger\$mea Figure 3.9. Normal Q-Q plot for mean comparative ability predicted from mean own and others' ability in the easy domain group.

Excluded



Im(kruger\$mean_compare_condition2 ~ kruger\$mean_own_condition2 + kruger\$mea ... Figure 3.10. Normal Q-Q plot for mean comparative ability predicted from mean own and others' ability in the easy domain group.

Correlation Matrix Condition 2

Table 6.5

Person's r for mean values (across abilities) in the easy (extension) condition

	Comparative Ability	Difficulty	Own ability	Peers' ability	Desirability	Ambiguity
Comparative						
Ability	1.00					
Difficulty	0.83	1.00				
Own ability	0.32	0.28	1.00			
Peers' ability	0.52	0.66	0.37	1.00		
Desirability	0.29	0.40	0.15	0.41	1.00	
Ambiguity	0.08	0.18	-0.06	0.23	0.43	1.00

Table 6.6

P-values for correlations between mean values (across abilities) in the easy (extension) condition

	Comparative Ability	Difficulty	Own ability	Peers' ability	Desirability	Ambiguity
Comparative Ability	0					
Difficulty	<.001	0				
Own ability	<.001	<.001	0			
Peers' ability	<.001	<.001	<.001	0		
Desirability	<.001	<.001	0.0228	<.001	0	
Ambiguity	0.2630	0.0056	0.3420	0.0006	<.001	0

Difficult domain condition

Non-excluded

Table 7.1.

Difficult domain group: partial correlations between mean comparative ability estimates and domain difficulty, holding desirability or ambiguity ratings constant

Variables	Control variable	Correlatio n (p.xy)	Partial correlation (p.xy.z)	p	Difference (<i>p.xy - p.xy.z</i>)
Comparative ability, domain difficulty	Desirability	-0.07	-0.15	<.001	0.08 [0.04, 0.14]
Comparative ability, domain difficulty	Ambiguity	-0.07	-0.07	.99	-0.001 [-0.05, 0.05]

Note. The replication group found a significant difference between the zero order correlation (p.xy) and partial correlation (p.xy.z) between comparative ability and domain difficulty ratings while holding desirability constant. No significant difference was found between the zero order correlation (p.xy) and partial correlation (p.xy.z) between comparative ability and domain difficulty ratings defined to the zero order correlation (p.xy) and partial correlation (p.xy.z) between comparative ability and domain difficulty ratings while holding ambiguity constant.

Excluded

Table 7.2.

Difficult domain group: partial correlations between mean comparative ability estimates and domain difficulty, holding desirability or ambiguity ratings constant

Variables	Control variable	Correlatio n (p.xy)	Partial correlation (p.xy.z)	p	Difference (<i>p.xy - p.xy.z</i>)
Comparative ability, domain difficulty	Desirability	-0.13	-0.20	<.001	0.06 [0.03, 0.12]
Comparative ability, domain difficulty	Ambiguity	-0.13	-0.13	.954	-0.003 [-0.04, 0.04]

Note. The replication group found a significant difference between the zero order correlation (p.xy) and partial correlation (p.xy.z) between comparative ability and domain difficulty ratings while holding desirability constant. No significant difference was found between the zero order correlation (p.xy) and partial correlation (p.xy.z) between comparative ability and domain difficulty ratings while holding ambiguity constant.

Non-excluded



Figure 4.1. Scatterplot for the correlation between mean comparative ability and mean domain difficulty ratings in the difficult domain group.

Excluded



Figure 4.2. Scatterplot for the correlation between mean comparative ability and mean domain difficulty ratings in the difficult domain group.

Non-excluded

Table 7.3.

Predictor	b	b 95% CI [LL, UL]	beta	beta 95% CI [LL, UL]	sr ²	<i>sr</i> ² 95% CI [LL, UL]	r	Fit
(Intercept)	8.765	[5.21, 12.28]						
kruger\$mean _own_condit ion2	8.32* *	[7.28, 9.36]	0.90	[0.78, 1.01]	.24	[.17, .31]	.87 **	
kruger\$mean _other_condi tion2	-0.28	[-1.46, 0.90]	-0.03	[-0.14, 0.09]	.00	[00, .00]	.73 **	
								$R^2 = .764^{**}$
								95% CI[0.71, 0.81]

Difficult domain condition: regression results using mean comparative ability as the criterion

Note. A significant *b*-weight indicates the beta-weight and semi-partial correlation are also significant. *b* represents unstandardized regression weights. *beta* indicates the standardized regression weights. *sr*² represents the semi-partial correlation squared. *r* represents the zero-order correlation. *LL* and *UL* indicate the lower and upper limits of a confidence interval, respectively. ** indicates p < .01.

Excluded

Table 7.4.

Difficult	domain	<i>condition:</i>	regression	results using	mean	comparative	ability as	the	criterion
55			0			T T T T T T T T T T T T T T T T T T T			

Predictor	b	b 95% CI [LL, UL]	beta	beta 95% CI [LL, UL]	sr ²	<i>sr</i> ² 95% CI [LL, UL]	r	Fit
(Intercept)	9.10**	[5.40, 12.80]						
kruger\$mean _own_condit ion3	8.39**	[7.33, 9.45]	0.90	[0.79, 1.01]	.27	[.19, .34]	.87 **	
kruger\$mean _other_condi tion3	-0.42	[-1.62, 0.78]	-0.04	[-0.15, 0.07]	.00	[- .00, .00]	.70 **	
								$R^2 = .755^{**}$
								95% CI[0.70, 0.81]

Note. A significant *b*-weight indicates the beta-weight and semi-partial correlation are also significant. *b* represents unstandardized regression weights. *beta* indicates the standardized regression weights. *sr*² represents the semi-partial correlation squared. *r* represents the zero-order correlation. *LL* and *UL* indicate the lower and upper limits of a confidence interval, respectively. ** indicates p < .01.





Figure 4.3. Scatterplot for the correlation between mean comparative ability and mean own absolute ability ratings in the difficult domain group.





Figure 4.4. Scatterplot for the correlation between mean comparative ability and mean own absolute ability ratings in the difficult domain group.



Figure 4.5. Scatterplot for the correlation between mean comparative ability and mean others' absolute ability ratings in the difficult domain group.





Figure 4.6. Scatterplot for the correlation between mean comparative ability and mean others' absolute ability ratings in the difficult domain group.





Figure 4.7. Residuals versus fitted plot for mean comparative ability predicted from mean own and others' ability in the difficult domain group.

Excluded



lm(kruger\$mean_compare_condition3 ~ kruger\$mean_own_condition3 + kruger\$mea Figure 4.8. Residuals versus fitted plot for mean comparative ability predicted from mean own and others' ability in the difficult domain group. Non-excluded



Im(kruger\$mean_compare_condition3 ~ kruger\$mean_own_condition3 + kruger\$mea Figure 4.9. Normal Q-Q plot for mean comparative ability predicted from mean own and others' ability in the difficult domain group.



Excluded

Theoretical Quantiles Im(kruger\$mean_compare_condition3 ~ kruger\$mean_own_condition3 + kruger\$mea ... *Figure 4*.10. Normal Q-Q plot for mean comparative ability predicted from mean own and others' ability in the difficult domain group.

Correlation Matrices Condition 3

Table 7.5

Person's r for mean values (across abilities) in the difficult (extension) condition

	Comparative Ability	Difficulty	Own ability	Peers' ability	Desirability	Ambiguity
Comparative Ability	1.00					
Difficulty	0.86	1.00				
Own ability	-0.13	-0.13	1.00			
Peers' ability	0.70	0.82	-0.03	1.00		
Desirability	0.20	0.13	0.27	0.22	1.00	
Ambiguity	-0.03	-0.09	0.27	0.01	0.43	1.00

Table 7.6

P- values for correlations between mean values (across abilities) in the difficult (extension) condition

	Comparative Ability	Difficulty	Own ability	Peers' ability	Desirability	Ambiguity
Comparative Ability	0					
Difficulty	<.0001	0				
Own ability	0.0498	0.0595	0			
Peers' ability	<.0001	<.0001	0.6070	0		
Desirability	0.0025	0.0467	<.0001	0.0007	0	
Ambiguity	0.6860	0.1850	<.0001	0.8370	<.0001	0

Comparisons between the three conditions

Excluded

Table 8.2.

Student's t-tests comparing ratings between the replication and easy or difficult domain groups

								95% confidence intervals	
Variable	n	Mean	SD	t- statistic	df	p	d	Lower Upper	
Replication and easy domain conditions									
Domain difficulty (replication)	240	6.05	1.15	6.38	463	<.001	0.59	0.40 0.78	
Domain difficulty (easy domain)	225	5.22	1.63						
Ambiguity (replication)	240	8.00	1.24	-2.79	463	.005	0.26	0.08 0.44	
Ambiguity (easy domain)	225	8.32	1.23						
Replication and difficult domain conditions									
Domain difficulty (replication)	240	6.05	1.15	-12.27	464	<.001	1.15	0.95 1.35	
Domain difficulty (difficult domain)	226	7.39	1.19						

Ambiguity (replication)	240	8.00	1.24	-1.92	464	.055	0.18	-0.00 0.36
Ambiguity (difficult domain)	226	8.24	1.43					

One-sample Wilcoxon-tests

Table 9.1

One-sample Wilcoxon tests testing median comparative ability scores against the scale mid-point in the original (replication) condition

		90%	6 CI		
Item	Median	Lower	Upper	P-value	Effect size <i>r</i>
Using mouse	75.50	73.00	78.00	<.001	0.81
Driving	70.50	67.70	73.00	<.001	0.61
Riding bicycle	64.50	61.00	67.50	<.001	0.52
Saving money	64.50	61.50	67.50	<.001	0.53
Telling jokes	53.00	50.00	56.50	0.0569	0.13
Playing chess	40.00	36.00	44.00	<.001	0.30
Juggling	28.00	24.00	33.50	<.001	0.55
Computer programming	40.00	36.00	44.00	<.001	0.30

Table 9.2

One-sample Wilcoxon tests testing median comparative ability scores against the scale mid-point in the easy domain (extension) condition

		90%	6 CI		
Item	Median	Lower	Upper	P-value	Effect size r
Using mouse	76.50	74.00	79.50	<.001	0.76
Driving	71.00	67.50	74.00	<.001	0.62
Riding bicycle	69.00	65.60	70.50	<.001	0.63
Saving money	66.50	62.50	70.50	<.001	0.49
Telling jokes	62.00	58.50	65.50	<.001	0.43
Playing chess	47.50	43.50	52.00	0.26	0.06
Juggling	46.00	41.00	50.50	0.085	0.08
Computer programming	49.50	46.00	53.50	0.85	0.01

Table 9.3

One-sample Wilcoxon tests results testing against the scale mid-point for comparative ability in difficult domain (extension) condition

		90%	6 CI		
Item	Median	Lower	Upper	P-value	Effect size r
Using mouse	59.00	55.50	62.50	<.001	0.33
----------------	-------	-------	-------	-------	------
Driving	39.50	34.50	44.00	<.001	0.30
Riding bicycle	49.50	45.00	53.50	0.69	0.02
Saving money	66.50	62.50	70.50	<.001	0.46
Telling jokes	40.00	35.50	44.00	<.001	0.30
Playing chess	40.50	36.00	44.50	<.001	0.25
Juggling	37.50	33.00	42.00	<.001	0.35
Computer	45.00	40.50	49.00	0.01	
programming	.2.00			0.01	0.16

Table 9.4

One-sample Wilcoxon-tests results testing against the scale mid-point for desirability in the easy domain (extension) condition

		90%	5 CI		
Item	Median	Lower	Upper	P-value	Effect size r
Using mouse	9.00	8.50	9.00	<.001	0.88
Driving	9.50	9.00	9.50	<.001	0.89
Riding bicycle	8.00	8.00	8.50	<.001	0.85
Saving money	9.50	9.00	9.50	<.001	0.89
Telling jokes	7.50	7.50	8.00	<.001	0.80
Playing chess	7.50	8.00	8.50	<.001	0.80
Juggling	6.50	7.00	7.50	<.001	0.56
Computer programming	9.00	9.00	9.00	<.001	0.87

Table 9.5

One-sample Wilcoxon-tests results testing against the scale mid-point for desirability in easy domain (extension) condition

		90%	6 CI		
Item	Median	Lower	Upper	P-value	Effect size r
Using mouse	8.50	8.50	9.00	<.001	0.84
Driving	9.00	9.00	9.50	<.001	0.87
Riding bicycle	8.00	8.00	8.50	<.001	0.78
Saving money	9.00	8.50	9.00	<.001	0.87
Telling jokes	8.00	7.50	8.00	<.001	0.81
Playing chess	8.00	8.00	8.50	<.001	0.76
Juggling	7.00	6.50	7.50	<.001	0.57
Computer	8 50	8 50	8 50	<.001	
programming	0.50	0.50	0.50		0.84

Table 9.6

One-sample Wilcoxon-tests results testing against the scale mid-point for desirability in difficult domain (extension) condition

		90%	6 CI		
Item	Median	Lower	Upper	P-value	Effect size r
Using mouse	7.00	8.50	9.00	<.001	0.61
Driving	8.50	9.00	9.50	<.001	0.81
Riding bicycle	8.00	8.00	8.50	<.001	0.78
Saving money	8.50	8.50	9.00	<.001	0.84
Telling jokes	8.00	7.50	8.00	<.001	0.74
Playing chess	8.50	8.00	8.50	<.001	0.79
Juggling	8.00	6.50	7.50	<.001	0.67
Computer	8.00	8 50	8 50	<.001	
programming	0.00	0.50	0.50		0.72

One-sample t-tests

Table 10.1

One-sample t-tests results testing against the scale mid-point for comparative ability in original (replication) condition

Itom	ostimato	statistic	n-voluo	đf	Lower	Upper CI
	estimate	statistic	p-value	ui	CI	U
Using mouse	71.20	18.34	1.6961E-47	239	68.92	73.47
Driving	65.17	10.64	6.7221E-22	239	62.36	67.97
Riding bicycle	61.01	8.33	6.3572E-15	239	58.41	63.62
Saving money	62.88	9.45	3.1702E-18	239	60.19	65.56
Telling jokes	52.42	1.66	0.0987806	239	49.54	55.30
Playing chess	40.98	-5.18	4.8043E-07	239	37.55	44.41
Juggling	31.98	-10.09	3.5936E-20	239	28.46	35.50
Computer						
programming	40.73	-4.92	1.6472E-06	239	37.01	44.44

Table 10.2

One-sample t-tests results testing against the scale mid-point for comparative ability in easy domain (extension) condition

Item	estimate	statistic	p-value	df	Lower CI	Upper CI
Using mouse	71.27	15.56	1.72E-37	224	68.58	73.97
Driving	66.32	10.77	4.63E-22	224	63.34	69.31
Riding bicycle	65.76	10.78	4.26E-22	224	62.88	68.64
Saving money	63.63	8.00	6.58E-14	224	60.27	66.98
Telling jokes	59.74	7.11	1.56E-11	224	57.04	62.44
Playing chess	47.81	-1.19	0.23413041	224	44.19	51.43
Juggling	46.76	-1.75	0.08125851	224	43.11	50.41
Computer						
programming	49.57	-0.25	0.80363761	224	46.20	52.95

Table 10.3

Item	estimate	statistic	p-value	df	Lower CI	Upper CI
Using mouse	55.79	4.12	5.2822E-05	225	53.02	58.56
Driving	40.63	-4.81	2.7508E-06	225	36.79	44.47
Riding bicycle	48.90	-0.60	0.54982103	225	45.29	52.51
Saving money	62.68	7.40	2.7397E-12	225	59.30	66.06
Telling jokes	40.82	-5.10	7.0415E-07	225	37.28	44.37
Playing chess	41.86	-4.49	1.1181E-05	225	38.29	45.43
Juggling	39.67	-5.61	5.7662E-08	225	36.04	43.29
Computer programming	45.36	-2.68	0.00792618	225	41.95	48.77

One-sample t-tests results testing against the scale mid-point for comparative ability in difficult domain (extension) condition

Table 10.4

One-sample t-tests results testing against the scale mid-point for desirability in original (replication) condition

Item	estimate	statistic	p-value	df	d	Lower CI	Upper CI
Using a computer mouse	8.654	34.058	1.11E-93	239	2.203	1.968	2.435
Driving	9.146	47.234	3.34E-123	239	3.055	2.750	3.354
Riding bicycle	7.996	27.992	2.14E-77	239	1.811	1.604	2.016
Saving money	9.129	45.568	7.60E-120	239	2.948	2.651	3.237
Telling jokes	7.500	20.858	9.87E-56	239	1.349	1.173	1.523
Playing chess	7.613	20.269	7.96E-54	239	1.311	1.138	1.483
Juggling	6.529	10.278	9.33E-21	239	0.665	0.524	0.804
Computer programming	8.663	33.998	1.58E-93	239	2.199	1.964	2.431

Correlation Matrices for all DV's Across Conditions

Figure 2.11

Correlation matrix for domains in the replication condition.



Note: (Person's r) for variables across abilities in the replication condition. Panel A: Absolute value correlations. Panel B: Mean value correlations. See tables 5.5-5.8 in the supplementary for exact *r*- and *p*-values. *p < .05. **p < .01. ***p < .001.



Figure 2.12



Panel A: easy extension condition absolute scores. Panel B difficult extension condition absolute scores. Panel C: easy extension condition mean scores. Panel D difficult extension condition mean scores.

p* <.05. *p* <.01. ****p* <.001

Note: Bigger circles indicate stronger correlations. See supplementary Tables 6.5-6.8 and 7.5-7.8 for exact *r* and *p*-values.

Power Simulation for Exploratory Analysis

Table 10.5

Power Simulation for Main and Interaction effects for 3(Condition)*2(Difficulty) mixed design

Effect	Power	Effect Size
Condition	100	0.12353699
Difficulty	100	0.28369743
Interaction	99.7	0.04595521

Power simulations in R using the "Superpower" package (Lakens & Caldwell, 2021) showed that using our sample of n = 691 (with sample size by cell/between factor: replication group n = 240, easy extension n = 225, difficult extension n = 226), near 100% power was reached to examine main & interaction effects. For some of the multiple comparisons we have however power close to 0%

Comparison	Power	Effect Size
Condition_Replication_Difficulty_Easy VS	100	1 2760622
Condition_Replication_Difficulty_Difficult	100	-1.5700025
Condition_Replication_Difficulty_Easy VS Condition_Easy	38	0 10723054
Extension_Difficulty_Easy	5.0	0.10/23934
Condition_Replication_Difficulty_Easy VS Condition_Easy	100	-0.8515678
Extension_Difficulty_Difficult	100	-0.0313070
Condition_Replication_Difficulty_Easy VS Condition_Difficult	100	-0 7868727
Extension_Difficulty_Easy	100	-0.7000727
Condition_Replication_Difficulty_Easy VS Condition_Difficult	100	-1 25/13963
Extension_Difficulty_Difficult	100	-1.25+5705
Condition_Replication_Difficulty_Difficult VS Condition_Easy	100	1 39440291
Extension_Difficulty_Easy	100	1.37440271
Condition_Replication_Difficulty_Difficult VS Condition_Easy	98 5	0 48786589
Extension_Difficulty_Difficult	70.5	0.40700507
Condition_Replication_Difficulty_Difficult VS	99.2	0 53517156
Condition_Difficult Extension_Difficulty_Easy	<i>))</i> .2	0.55517150
Condition_Replication_Difficulty_Difficult VS	0.5	0 01912579
Condition_Difficult Extension_Difficulty_Difficult	0.5	0.01/1257/
Condition_Easy Extension_Difficulty_Easy VS Condition_Easy	100	-0.8971173
Extension_Difficulty_Difficult	100	-0.0771175
Condition_Easy Extension_Difficulty_Easy VS	100	-0.8350101
Condition_Difficult Extension_Difficulty_Easy	100	-0.0337101
Condition_Easy Extension_Difficulty_Easy VS	100	-1 2817852
Condition_Difficult Extension_Difficulty_Difficult	100	-1.2017032
Condition_Easy Extension_Difficulty_Difficult VS	1	0.05121554
Condition_Difficult Extension_Difficulty_Easy	I	0.03121337
Condition_Easy Extension_Difficulty_Difficult VS	94 7	-0 /397807
Condition_Difficult Extension_Difficulty_Difficult	77.7	0.7377007
Condition_Difficult Extension_Difficulty_Easy VS	98.2	-0 4847737
Condition_Difficult Extension_Difficulty_Difficult	10.2	-0.+0+//5/

Those are:

(1) Replication Condition Easy items compared to Easy Extension Condition Easy Items,

(2) Replication Condition Difficult Items vs Difficult Extension Difficult Items, and

(3) Easy Extension Difficulty Items vs Difficult Condition Easy Items.

Moreover, the sample size per cell was slightly too small to reach 95% power

Figure 2.13

Power Curves for Main and Interaction effects for 3(Condition)*2(Difficulty) mixed design



Left panel: 95% power. Right panel: 94% power.

Note: the sample size required to reach 95% power was n = 117 for each cell. Using this calculation, our collected sample was slightly too small for the extension conditions (easy extension: n = 225/2 = 112 each cell, and difficult extension: n = 226/2 = 113 each cell).

Equivalence Tests

EQ Test #	Correlation	Variable Controlled for	df	<i>r</i> diff	Upper 95% CI	Lower 95% CI	р	Conditio n
1	Comparative ability & domain difficulty (as in original)	desirability	5	0.08604	0.018	0.212	0.91	Replicat ion
2		ambiguity	5	-0.0085	-0.012	-0.005	0.33	Replicat ion
3	Comparative ability & domain difficulty (vector-wise)	desirability	1917	-0.0033	-0.016	0.007	0.55	Replicat ion
4	· · · ·	ambiguity	1917	-0.0085	-0.016	-0.004	0.002	Replicat ion
5	Comparative ability & domain difficulty (mean)	desirability	237	0.00527	-0.003	0.029	0.22	Replicat ion
6		ambiguity	237	0.00054	-0.008	0.016	0.69	Replicat ion
7	Comparative ability & domain difficulty (as in original)	desirability	5	0.09	0.02	0.159	0.005	Easy Extensio n
8	in original)	ambiguity	5	-0.084	-0.193	-0.011	0.03	Easy Extensio n
9	Comparative ability & domain difficulty (as in original)	desirability	5	0.04022	-0.238	0.126	0.67	Difficult Extensio n
10	in originar)	ambiguity	5	0.03	-0.009	0.578	0.91	Difficult Extensio n
11	Comparative ability & domain difficulty (vector-wise)	desirability	1798	0.006	-0.007	0.018	0.32	Easy Extensio n

12		ambiguity	1798	-0.03	-0.041	-0.02	0.001	Easy Extensio n
13	Comparative ability & domain difficulty (vector-wise)	desirability	1806	0.023	0.015	0.034	0.002	Difficult Extensio n
14	× ,	ambiguity	1806	0.001	-0.0003	0.005	0.13	Difficult Extensio n
15	Comparative ability & domain difficulty (mean)	desirability	223	0.029	-0.0003	0.067	0.049	Easy Extensio n
16		ambiguity	223	-0.006	-0.028	0.002	0.15	Easy Extensio n
17	Comparative ability & domain difficulty (mean)	desirability	223	0.064	0.028	0.126	< .001	Difficult Extensio n
18	× ′	ambiguity	223	0.0025	-0.046	0.0349	0.93	Difficult Extensio n

Criteria for evaluation of replications

A simplified replication taxonomy for comparing replication effects to target article original findings by (LeBel et al., 2019)



Replication evaluation

We used the replication classification criteria by LeBel and colleagues' (2018) summarized in Table 6. We categorized the current replication as a "close replication" and provided details in Table 7. Variables and questions were the same as in the original, with the addition of extensions and adjustments to fit the MTurk sample, instead of Cornell university students.

Criteria for evaluation of replications by LeBel et al. (2018)

Target similarity	Highly similar			Highly d	issimilar
Category	Direct replication			Conceptual re	plication
Design facet	Exact	Very close	Close	Far	Very
	replication	replication	replication	replication	far
					replica
					tion
IV operationalization	Same/similar	Same/similar	Same/similar	Different	
DV operationalization	Same/similar	Same/similar	Same/similar	Different	
IV stimuli	Same/similar	Same/similar	Different		
DV stimuli	Same/similar	Same/similar	Different		
Procedural details	Same/similar	Different			
Physical setting	Same/similar	Different			
Contextual variables	Different				

A classification of relative methodological similarity of a replication study to an original study. "Same" ("different") indicates the design facet in question is the same (different) compared to an original study. IV = independent variable. DV = dependent variable. "Everything controllable" indicates design facets over which a researcher has control. Procedural details involve minor experimental particulars (e.g., task instruction wording, font, font size, etc.).

"Similar" category was added to the LeBel et al. (2018) typology to refer to minor deviations, aimed to adjust the study to the target sample, that are not expected to have major implications on replication success.

Correlations per each condition

	Comparative ability	Domain Difficulty	Own Ability	Others' Ability	Desirability
Domain Difficulty	-0.35*** [-0.39, -0.31]				
Own Ability	0.81*** [0.79, 0.82]	-0.46*** [-0.50, -0.43]			
Others' Ability	0.50*** [0.46, 0.53]	-0.37*** [-0.41, -0.33]	0.64*** [0.62, 0.67]		
Desirability	0.30*** [0.25, 0.34]	-0.07** [-0.11, -0.02]	0.34*** [0.30, 0.38]	0.29*** [0.25, 0.33]	
Ambiguity	-0.10*** [-0.14, -0.06]	0.13*** [0.09, 0.17]	-0.15*** [-0.19, -0.10]	-0.20*** [-0.24, -0.15]	-0.17*** [-0.21, -0.12]

Correlation matrix for the replication condition

* p < .05. ** p < .01. *** p < .001.

Correlation matrix for the easy extension condition

	Comparative ability	Domain Difficulty	Own Ability	Others' Ability	Desirability
Domain Difficulty	-0.27** [-0.31, -0.22]				
Own Ability	0.78*** [0.76, 0.80]	-0.37*** [-0.41, -0.33]			
Others' Ability	0.47^{***} [0.44, 0.51]	-0.24*** [-0.28, -0.20]	0.61*** [0.58, 0.64]		
Desirability	0.28*** [0.24, 0.32]	-0.02 [-0.06, 0.03]	0.36*** [0.31, 0.39]	0.34*** [0.29, 0.38]	
Ambiguity	-0.19*** [-0.23, -0.14]	0.19*** [0.15, 0.24]	-0.26*** [-0.30, -0.22]	-0.28*** [-0.32, -0.23]	-0.25*** [-0.29, -0.21]

* p < .05. ** p < .01. *** p < .001.

	Comparative ability	Domain Difficulty	Own Ability	Others' Ability	Desirability
Domain Difficulty	-0.31*** [-0.35, -0.27]				
Own Ability	0.78*** [0.76, 0.80]	-0.33*** [-0.37, -0.29]			
Others' Ability	0.45*** [0.41, 0.48]	-0.18*** [-0.23, -0.14]	0.56*** [0.52, 0.59]		
Desirability	0.13*** [0.08, 0.17]	0.14*** [0.09, 0.18]	0.14*** [0.09, 0.18]	0.15*** [0.10, 0.19]	
Ambiguity	-0.02 [-0.07, 0.02]	-0.03 [-0.08, 0.01]	-0.01 [-0.06, 0.04]	-0.01 [-0.06, 0.03]	-0.24*** [-0.28, -0.19]

Correlation matrix for the difficult extension condition

* p < .05. ** p < .01. *** p < .001.

			95% CI		
Ability domain	р	r	Lower	Upper	
Using a computer mouse	.768	-0.02	-0.15	0.11	
Driving	.006	-0.18	-0.30	-0.05	
Riding a bicycle	.790	0.02	-0.11	0.14	
Saving money	.030	-0.14	-0.26	-0.01	
Telling jokes	.161	-0.09	-0.22	0.04	
Playing chess	.020	-0.15	-0.27	-0.02	
Juggling	<.001	-0.25	-0.37	-0.13	
Computer programming	<.001	-0.23	-0.34	-0.10	

Replication condition: Item-wise correlations between domain difficulty and comparative ability ratings for each ability domain

Variable	Original domains condition (n = 240)	Easy domains condition (n = 225)	Difficult domains condition (n = 226)
Domain difficulty	.64 (.68, .48)	.76 (.76, .48)	.68 (.47, .61)
Comparative ability	.76 (.61, .72)	.77 (.67, .72)	.86 (.71, .83)
Own absolute ability	.71 (.51, .72)	.68 (.48, .69)	.85 (.65, .82)
Others' absolute ability	.74 (.59, .77)	.77 (.60, .76)	.90 (.78, .85)
Desirability	.69 (.56, .68)	.74 (.70, .65)	.77 (.67, .64)
Ambiguity	.70 (.62, .50)	.73 (.64, .60)	.81 (.75, .59)

Reliability for domains across conditions

Note: Reliabilities are Cronbach's α . Reporting structure is the following: full inventory (easy items, difficult items). Reliability met requirements ($\alpha \ge .7$, see Tavakol & Dennick, 2011).

	Easy domain condition				Difficult domain condition			
Ability domain	p	r	95% CI		p	r	95%	6 CI
			Lower	Upper			Lower	Upper
Using a computer mouse	.647	0.03	-0.10	0.16	<.001	-0.2	-0.37	-0.12
Driving	.082	-0.12	-0.24	0.01	<.001	-0.27	-0.39	-0.15
Riding a bicycle	.071	-0.12	-0.25	0.01	<.001	-0.24	-0.36	-0.12
Saving money	.144	-0.10	-0.23	0.03	<.001	-0.36	-0.47	-0.24
Telling jokes	.935	0.01	-0.13	0.14	<.001	-0.23	-0.35	-0.11
Playing chess	<.001	-0.36	-0.47	-0.24	<.001	-0.27	-0.39	-0.15
Juggling	<.001	-0.26	-0.38	-0.13	<.001	-0.25	-0.37	-0.12
Computer programming	<.002	-0.22	-0.34	-0.09	.002	-0.20	-0.33	-0.08

Extension conditions: correlations between comparative ability and domain difficulty ratings for each ability domain

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