# Does learning more about others impact liking them?:

# Replication and extension Registered Report of Norton et al. (2007)’s Lure of Ambiguity[Stage 1]

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## Declaration of conflict of interest

The authors declared no potential conflicts of interests with respect to the authorship and/orpublication of this article.

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## Authorship declaration:

Zöe Horsham, Ashleigh Haydock-Symonds, and Hirotaka Imada revised the designs and experimental materials, wrote the analysis scripts, conducted the data analyses, and drafted the manuscript for submission.

Hiu Ching Tai, Wing Lam Lau , Tsz Lui Shum, and Yuqing Zeng designed the study, developed the experimental materials for each study respectively, and wrote an initial draft of the Registered Report Stage 1. Hiu Tang Chow provided feedback and guidance in the initial stages.

Gilad Feldman guided the replication efforts, supervised each step in the project, ran data collection and conducted the pre-registration, and edited the manuscript for submission.

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**Important links and information**

Citation of the target research article:

Norton, M. I., Frost, J. H., & Ariely, D. (2007). Less is more: The lure of ambiguity, or why familiarity breeds contempt. *Journal of Personality and Social Psychology*, 92(1), 97-105. DOI: 10.1037/0022-3514.92.1.97

## Contributor Roles Taxonomy

In the table below, we employed CRediT ([Contributor Roles Taxonomy](https://www.casrai.org/credit.html)) to identify the contribution and roles played by the contributors in the current project.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Role | Zoe Horsham | Ashleigh | Hirotaka Imada | Gilad Feldman | Hiu Ching Tai, Wing Lam Lau , Tsz Lui Shum, and Yuqing Zeng | Hiu Tang Chow |
| Conceptualization |  |  |  | X |  |  |
| Pre-registration | X | X  | X | X | X |  |
| Data curation |  |  | X | X |  |  |
| Formal analysis | X |  | X |  | X |  |
| Funding acquisition |  |  |  | X |  |  |
| Investigation  |  |  |  | X | X |  |
| Pre-registration peer review / verification | X | X | X | X |  | X |
| Data analysis peer review / verification | X | X | X |  | X |  |
| Methodology | X | X | X | X | X |  |
| Project administration |  |  |  | X |  |  |
| Resources |  |  |  | X |  |  |
| Software | X |  |  |  |  |  |
| Supervision |  |  |  | X |  | X |
| Validation | X | X | X |  |  |  |
| Visualization | X | X | X |  | X |  |
| Writing-original draft | X | X | X |  | X |  |
| Writing-review and editing | X | X | X | X |  |   |

# Abstract

[IMPORTANT: Abstract, method, and results were written using a randomized dataset produced by Qualtrics to simulate what these sections will look like after data collection. These will be updated following the data collection. For the purpose of the simulation, we wrote things in past tense, but no pre-registration or data collection took place yet.]

Norton et al. (2007) demonstrated a counterintuitive phenomenon that knowing other people better and/or having more information about them is associated with decreased likings. They summarized it as - ambiguity leads to liking, whereas familiarity can breed contempt. In a Registered Report with a US Prolific undergraduate student sample *(N= 800),* we directly replicated Studies 1a, 1b, and 2, and conceptually replicated Studies 3 and 4 from Norton et al. (2007). Extending on their research, we also proposed that curiosity provides an alternative path to liking, hypothesizing that curiosity mediates the relationship between knowledge and liking. [The following is a demo placeholder based on the random simulated and will be updated following data collection in Stage 2] Overall, we found [weak/medium/strong] support for the original findings. With our extensions to the replication study, we found… [To be completed in Stage 2]. Materials, data, and code are available on: <https://osf.io/j6tqr/>

*Keywords:* impression formation, liking, less is more, similarity, ambiguity, curiosity, registered replication, decision making

# PCIRR-Study Design Table

| Question | Hypothesis(es) | Sampling Plan | Analysis Plan | Rationale for Sensitivity of Hypothesis test  | Interpretation Given Different Outcomes | Theory Shown Wrong  |
| --- | --- | --- | --- | --- | --- | --- |
| Do people believe that they prefer those who they know more or less about? | H1a: Individuals believe they prefer a person who they know more about compared to one who they know less about. | 800 US Americans will be recruited via Prolific. This was determined based on a priori power analysis from target effect sizes for direct replication (summarized in Table 1) along with the Simonsohn (2015) rule of thumb of multiplying the largest sample size by 2.5 and additional analyses requiring larger sample sizes for which target effect sizes and confidence intervals could not be calculated from the original paper.  | Chi-Square comparing the number of participants who prefer a target who they know more or fewer pieces of information about (1 vs. 2 traits, 2 vs. 4 traits, 3 vs. 6 traits, 4 vs. 8 traits and 5 vs. 10 traits respectively). | [General: All analysis plans below are in line with Norton et al.’s (2007) original approach.]We conducted power analyses based on reported results in Norton et al. (2007), using {WebPower} R package. The analyses revealed that N = 88 would be sufficient to detect effects of *r* = .61 (Study 1A) and *r* = .33 (Study 1B) with 90% power and alpha = 5%.  | If supported, then we were able to successfully replicate Norton et al. 's (2007) findings regarding that research question If not supported, then we failed to replicate their findings, and the need to adjust our priors regarding the robustness and replicability of the findings. | N/A |
|
|
| Chi-Square comparing number of participants who believe they will prefer someone they know more about vs. number of participants who believe they will prefer someone they know less about. |
| H1b: Individuals believe that more information leads to more liking rather than less liking. |
|
| Will more information lead to less liking? | H2-1: The number of pieces of information about a person negatively correlates with the degree of liking of the person. | One-tailed Pearson’s r correlation with number of traits known as predictor variable and degree of liking as outcome variable. | We conducted power analyses based on reported results in Norton et al. (2007), using {WebPower} R package. The analyses revealed that N = 51 would be sufficient to detect effects of *r* = .43 with 90% power and alpha = 5%.  | Norton et al. 's (2007) *less is mor*e effect. |
| H2-2: The more pieces of information about a person people receive, the less they like the person. | 1x4 (number of presented traits: 4 vs. 6 vs. 8 vs. 10) between-participants ANOVA with degree of liking as the dependent variable/ Post-hoc pairwise comparisons for each number of traits (4 vs. 6, 6 vs. 8 and 8 vs. 10), with p-values adjusted by the holm method. | Since Norton et al. (2007) did not address them, we did not conduct a priori power analysis. We will conduct a post-hoc sensitivity analysis.  |
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|
| Does perceived similarity mediate the effect of amount of information known on liking? | H3: Perceived similarity mediates the relationship between the number of pieces of information about a person and liking towards them. | Partial mediation analysis with number of traits as predictor perceived similarity as mediator and degree of liking as outcome variable.  | Based on the reported correlations between knowledge, similarity, and liking (Study 3 in Norton et al., 2007), we conducted a power analysis. It revealed that N = 310 and 400 would achieve statistical power of 80% and 90% respectively to detect the mediation effect.  | N/A. |
| Does early evidence of dissimilarity foster later levels of dissimilarity during impression formation? | H4-1: Those presented with initial evidence of dissimilarity to the target perceive subsequent attributes as being more dissimilar to themselves than those presented with initial evidence of similarity to the target. | Welch’s t-test with quasi IV of whether the first trait is rated as similar or dissimilar as the IV and rating of similarity of subsequent traits as the DV.  | Using {WebPower} R package. The analyses revealed that N = 49 would be sufficient to detect effects of d = .66 with 90% power and alpha = 5% (H4-1).For the remaining hypotheses, since Norton et al. (2007) did not address them, we did not conduct a priori power analysis. We will conduct a post-hoc sensitivity analysis.  | N/A. |
| H4-2: Those presented with initial evidence of dissimilarity to the target like the target less than those presented with initial evidence of similarity to the target | Welch’s t-test with quasi IV of whether the first trait is rated as similar or dissimilar to themselves as the IV and degree of liking as DV.  |
| Extension H8-People in the dissimilar condition (i.e., those who perceive the first presented trait as evidence of dissimilarity) will like the target less as they receive more pieces of information about them. | We will test the cascading effect on liking (H8) and perceived dissimilarity (H9) using linear mixed effect models in which liking/similarity is predicted by three fixed effects (N of presented traits, condition (similar vs dissimilar), and the interaction) and intercepts are allowed to vary for each participant (participant ID as a random effect) | For extension analyses, post hoc sensitivity tests will be conducted as we do not have effect sizes from the original study from which to compute a priori power analyses.  | Extension |
| Extension H9- People will perceive the target to be more and more dissimilar to them as they receive more pieces of information about the person. |
| If similarity leads to liking, will an individual’s levels of curiosity alter the strength of this relationship? | Extension H5- The number of pieces of information people have will negatively correlate with curiosity towards them. | One-tailed Pearson’s r correlation with number of traits known as predictor variable and curiosity as outcome variable. |
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|
| Extension H6- Curiosity is positively correlated with liking. | One-tailed Pearson’s r correlation with curiosity as predictor variable and degree of liking as outcome variable.  |
| Extension H7- Curiosity has a significant indirect effect for the relationship between knowledge and liking, partly explaining the *less is more* effect. | Mediation analysis with number of known traits as predictor variable, curiosity as mediator variable and degree of liking as outcome variable. |
|

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[IMPORTANT: Section is written in the past tense to simulate what the manuscript will look like after data collection, yet no pre-registration or data collection took place.]

Initial encounters are abundant in our social lives, and multiple encounters with the same acquaintance[[1]](#footnote-2) are regular occurrences (Krasnow et al., 2013; see also Milgram et al., 1992). People often wish to keep and build a relationship with some acquaintances , actively seeking to meet them to establish friendships and romantic relationships. However, when meeting someone for the first time, there is virtually no information about an individual. How do people form and develop initial impressions of others and how does our knowledge of them influence our liking towards them? We argue it is imperative to accurately understand how people form social perceptions and evaluations of new individuals as they acquire more information about them, thus helping us predict and elucidate how people develop new relationships.

Addressing this question, Norton et al. (2007) stipulated that a lack of information about others, which forms ambiguous positive expectations, increases the perceived attractiveness of others, a.k.a., the *lure of ambiguity* effect. Furthermore, they asserted that these overly positive initial impressions decrease as people begin to know more about others, since this reveals dissimilarities rather than similarities. They coined this notion the “*less is more”* effect. Intuitively, though, it is tempting to assume that we like others more as we know more about them, and there are studies suggesting so; familiarity is an essential component in the formation of both romantic and non-romantic relationships (Collins & Miller, 1994; Reis et al., 2011; Sprecher, 2019; see also Byrne, 1997). Reis et al. (2011) also claimed that individuals actively highlight commonalities with others to promote an engaging conversation, thus leading to favorable impressions and subsequent attraction. Given the degree of homophily identified amongst society (Stets et al., 2021; see also McPherson et al., 2001), more information appears to lead to more liking as a result of previously unknown similarities that are accentuated during initial encounters. Nevertheless, supporting the *less is more* effect, Norton et al. (2007) demonstrated that people’s liking of others is greater when they know less about them. The authors argued - and provided further support in a later publication (Norton et al., 2013) - that the *less is more* effect can be observed within everyday life, such as the cessation of friendships, business relationships, and marriages.

Norton et al. (2007) highlighted the lure of ambiguity during impression formation. The authors drew on the *person positivity bias* during initial encounters, in that people tend to view strangers positively when there is little information available about them (Iyengar et al., 2013; see also Sears, 1983). Specifically, they suggested that ambiguous targets are initially perceived as being more similar (Krueger & Clement, 1997, Rowatt et al., 1998; 1999), with skewed assumptions that others may share some features with them such as personality traits. This misperception of similarity may result in the initial liking of the target (see Byrne, Clore et al., 1971; Byrne, Gouaux et al., 1986). Once information about the ambiguous target is revealed, this overly positive state and overestimation of similarity wane and correspondingly, liking is reduced. In other words, the authors suggested that perceived similarity mediates the relationship between knowledge and liking. Furthermore, they proposed that when erroneous assumptions of similarity are met with unexpected evidence of dissimilarity, subsequent information is interpreted as compounding evidence of further dissimilarity.

## Target for replication: Norton et al. (2007)

We chose Norton et al. (2007) for a direct replication for three reasons: its impact, mixed findings in the literature, and the lack of direct replications. Norton et al. (2007) conducted a series of studies examining whether manipulating the amount of information presented about others impacts perceived liking, and showed that those presented with higher numbers of pieces of information regarding others’ traits tended to report less liking towards them (i.e., the *less is more* effect).

First, the article has undoubtedly had an impact on the literature, with 362 Google Scholar citations at the time of writing (July 2023). Second, previous studies collated mixed evidence as to how knowledge influences liking. Norton et al. 's (2007) findings, in fact, are inconsistent with well-established literature suggesting the opposite, which led to a debate between Reis et al. (2011) and Norton et al. (2011). Reis and colleagues discussed the nature of the relationship between familiarity and/or information and liking, using different paradigms. This led to an attempt by authors on both sides to integrate the findings into one unified paradigm (Finkel et al., 2015), though this paradigm still requires further empirical testing.

Ullrich et al. (2013) also challenged the findings by Norton et al. (2007). Using the same materials and between-participants design as Norton et al. (2007), they found no support for more information being associated with decreased liking. There were, however, minor modifications to Norton et al. 's (2007) methodological approach, such as the use of a single-item measure of self-esteem and changes to the wording of instructions, that diminish the ability to directly compare their findings to the target article. To review or resolve these disagreements is beyond our intended scope, yet we consider it a necessary first step to revisit the findings to ensure they are reliable, consistent, and generalizable.

To the best of our knowledge, there are currently no published direct pre-registered independent replications of the target article nor any of the follow-up articles, which raises the need for a direct replication registered report employing open science best practices with high statistical power.

## Replication: Norton et al. (2007) Studies 1a/b, 2, 3, and 4

We planned a direct replication of Norton et al.’s (2007) Studies 1a, 1b, and 2, and we aimed to conceptually replicate Studies 3 and 4[[2]](#footnote-3). We did not include Studies 3 and 5 as targets of direct replications as these involved experiments using real online dating platforms. In addition, we did not directly replicate Study 4 as we planned to extend their findings with several modifications. Our replication hypotheses and target effect sizes for replication are summarized in Table 1.

### Direct replications of Studies 1a, 1b, and 2

In Studies 1a and 1b, Norton et al. (2007) found that whether presented with a set number of traits (e.g., 1 versus 2 traits or 3 versus 6 traits) or hypothetical scenario, student participants believed that they would like those they know more about more than those they know less about. More specifically, in Study 1a, participants compared expected liking of targets with different numbers of known traits (e.g., contrasting a person about whom they knew one trait versus a person about whom they knew two traits, etc.). In Study 1b, participants were asked to indicate whether, when meeting an individual for the first time, they tended to like a person more when they know more or less about the person. Across the two studies, they demonstrated that people believe there is a positive relationship between the number of known traits about others and their liking of them. In other words, people intuitively believe that knowing more about others leads to liking them more, in stark contrast with the *less is more* effect. We would like to note that Norton et al. (2007) claimed that their studies offered evidence for the association between perceived familiarity and liking, as they operationally defined the number of known traits as an index of perceived familiarity. Nevertheless, they did not measure perceived familiarity and the psychological mechanisms underlying the relationship warrant further elucidation, which we turn to later with our extension.

In Study 2, participants were presented with either 4, 6, 8 or 10 randomly selected traits from the list of 28 traits taken from prior research (Asch, 1946; Edwards & Weary, 1993; Pavelchak, 1989), and asked to rate how much they would like an individual with these traits. They thus had a 1 x 4 between-subject design. Despite the experimental design, they treated the manipulated number of presented traits as a continuous variable and computed its correlation with liking, an empirical shortcoming which we aimed to address with our extension (see “Extensions” section). They found support for a negative relationship, resulting in the claim that more knowledge led to less liking. Whilst people believe that the more they know about others, the more they like them (Studies 1a and 1b), the level of information they had about a person was in fact associated with lower levels of liking(Study 2). These contrasting results revealed a contradiction between the lay intuition about their liking of new individuals (i.e., more is more) and their actual tendencies (i.e., less is more).

It is worth noting that the discrepancies in experimental design between Studies 1 and 2 may bear some part in the findings. Study 1 used a within-participants design based on a mere comparison of the number of unspecified traits a person possesses, whereas Study 2 used a between-participants design which involved rating liking towards a series of specific traits in turn. It may be that when traits are not specified, individuals assume these unspecified traits are ones they themselves possess. This may explain why individuals showed greater preference towards a person with a higher number of traits in Study 1; if they assumed these traits were ones they themselves possessed, a higher number of similar traits may lead to more liking. Furthermore, the comparative nature of Study 1 means the linearity of the relationship between the number of traits and liking towards the target is difficult to establish. It is possible that there is a diminishing or even curvilinear relationship between these factors. Alongside the direct replication of the correlation, we carried out a 1 x 4 ANOVA and post-hoc pairwise comparisons to extend Norton et al. 's (2007) methods aiming to more accurately test their claim and go beyond their correlational result (see Table 1).

### Conceptual replications of Studies 3 and 4

In Study 3, Norton et al. (2007) examined the mediating effect of similarity on the relationship between the number of pieces of information people had about another person and the liking of the person. Study 3 meant to replicate the effect found in Study 2, using a more ecologically valid series of self-generated traits. We chose to not conduct a direct replication of Study 3 because: 1) the article did not specify the list of traits, and 2) Study 3 had similar design and methodology to that of Study 2, and with our unified design having both studies run together would be too repetitive. To address the added contributions of Study 3, we instead added the measure of perceived similarity from Study 3 to our replication of Study 2, and tested the mediation in that design. As such, our replication of Study 2 served as both a direct replication of Study 2 and a conceptual replication of Study 3, measuring against a slightly smaller range of traits presented to the original Study 3.

In Study 4, Norton et al. (2007) tested a cascading effect of dissimilarity that was argued to be responsible for the emergence of the *less is more* effect. They argued that a cascade exists during impression formation, where one instance of dissimilarity causes subsequent information about others to be interpreted as further evidence of dissimilarity. Using 10 random traits taken from Study 2, student participants were asked whether each trait was one they would use to describe themselves. Norton et al. (2007) found that participants saw the second to tenth presented traits as instances of dissimilarity more often when the first presented trait was one that did not describe themselves, compared to when it was one that did. They thus treated the study as a quasi-experimental design by categorizing participants into one of the two groups, based on whether they found the first presented trait to be similar or dissimilar to themselves. Norton and colleagues then computed a correlation between the number of traits that participants found to be similar to themselves and liking of the target (a binary variable: Yes/No to the question asked if they liked the person). They found a positive correlation between the number of traits participants rated as similar to themselves and perceived liking. The authors concluded that the first instance of dissimilarity is associated with less liking because this leads people to see newly obtained information about others as further evidence of dissimilarity (i.e., the cascading effect), and this increase in perceived dissimilarity leads to less liking. However, we found the choice of analytic strategies somewhat arbitrary; to directly test the effect of the quasi-experimental condition on liking, it is sensible to conduct a t-test rather than computing the correlation. We computed this correlation for the purpose of replication, and included this analysis in the supplementary materials. Our primary analysis, included in the main manuscript, was a t-test to assess whether the quasi-experimental condition influenced liking.

We would also like to note that their Study 4 did not in fact allow us to observe and test the cascading nature of dissimilarity, as they did not measure perceived dissimilarity and track its change overtime. To address this, we introduced questions to measure perceived (dis)similarity and liking when participants were presented with the first trait, the fifth trait, and the tenth (last) trait, such that we could directly demonstrate the cascading effect. Given these new stimuli our replication of Study 4 was conceptual rather than direct (see “Replication closeness evaluation” section).

## Extension: Curiosity about the target

Within the replication of Study 2, we introduced an additional variable as an extension: curiosity towards the target. Curiosity is broadly defined as the desire for new information (Lievens et al., 2022; Litman & Spielberger, 2003), which past research has identified as a separate construct within the broader category of information-seeking (Deci, 1975; Gruber et al, 2014; Jirout & Klahr, 2012). Curiosity can be conceptualized as either a trait or state construct; trait curiosity encapsulates an individual’s innate tendency to experience curiosity, whilst state curiosity refers to the variability in curiosity experienced during a given context (Grossnickle, 2016; Kidd & Hayden, 2015). Given the methodological approach to assess immediate liking in response to information presentation during impression formation, we focused on state curiosity in this study.

We chose curiosity as it relates directly to ambiguity studied in the target article, whereby knowing less information about a given target may result in an increased curiosity towards them. Both constructs relate to information gaps occurring in ambiguous scenarios (Golman et al., 2021; Loewenstein, 1994), in which curiosity is either positively motivated by the anticipation of new information, or negatively motivated by the feeling of deprivation from lack of information (Litman & Jimerson, 2004). Regardless of the motivations underlying curiosity, ambiguous contexts may generate an information-seeking mindset that is associated with heightened levels of curiosity. This curiosity may be associated with levels of liking towards the target (Huang et al., 2017). In other words, we anticipated that curiosity would generate an alternative pathway to the *less is more* effect; the more people get to know about others, the less curious they feel about them and in turn, the less they like them.

###### Table 1 *Summary of hypotheses and effect sizes of the target article and replication*

| Study | Operationalized hypothesis | Replication | Effect type | Target article’s effects | Replication effect |
| --- | --- | --- | --- | --- | --- |
| Effect size [95% CI] | Conclusion | Effect size [95% CI] | Conclusion |
| 1a | H1a: Individuals prefer a person who they know more about compared to a person they know less about. | Direct | *r* | .62 [0.52, 0.70] | H1a supported | .04 [-0.01, 0.09] | No signal- inconsistent (replication CI includes 0 and excluded the original ES). |
| 1b | H1b: Individuals believe that more information leads to more liking rather than less liking. | Direct | *r* | .34 [0.21, 0.45] | H1b supported | .03 [-0.02, 0.08] | No signal- inconsistent (replication CI includes 0 and excluded the original ES). |
| 2 | H2-1: The number of pieces of information someone knows about a person negatively correlates with the degree of liking towards them. | Direct | *r* | -.23 [-0.43, -0.005] | H2-1 supported | .01 [-0.05, 0.06] | No signal- inconsistent (replication CI includes 0 and excluded the original ES). |
| 2 | H2-2: The more pieces of information about a person someone receives, the less they will like the person. | Conceptual | *Cohen’s d* | N/A | N/A | N/A | N/A |
| 2 | H3: Perceived similarity mediates the relationship between the number of pieces of information about a person and liking towards them. | Conceptual | *r* | -.006 | H3 supported | -.00001 [-0.001, 0.001] | No signal- inconsistent (replication CI includes 0 and excluded the original ES). |
| 4 | H4-1: Those presented with initial evidence of dissimilarity to the target will perceive subsequent attributes as more dissimilar to themselves than those presented with initial evidence of similarity to the target. | Conceptual | *Cohen’s d* | 0.66 [0.37, 0.95] | H4-1 supported | -0.05 [-0.15, 0.06] | No signal- inconsistent (replication CI includes 0 and excluded the original ES). |
| 4 | H4-2: Those presented with initial evidence of dissimilarity to the target will like the target more than those presented with initial evidence of similarity to the target. | Conceptual | *Cohen’s d* | N/A | N/A | N/A | No signal- inconsistent (replication CI includes 0 and excluded the original ES). |
|  | H5: The number of pieces of information someone knows about a person negatively correlates with curiosity towards them. | Extension | *r* | N/A | N/A | .005 [-0.06, 0.05] | No support for a relationship between the number of pieces of information known about the target and curiosity towards them. |
|  | H6: Curiosity is positively correlated with degree of liking. | Extension | *r* | N/A | N/A |  < .001 [-.05, .05] | No relationship between curiosity and degree of liking.  |
|  | H7: Curiosity has a significant indirect effect between the number of traits known about a person and degree of liking towards them. | Extension |  | N/A | N/A | N/A | No support for curiosity as mediating between knowledge and liking. |
|  | H8: People in the dissimilar condition (i.e., those who perceive the first presented trait as evidence of dissimilarity) will like the target less as they receive more pieces of information about them.  | Extension | *R (Regression beta)* | N/A | N/A | -0.05 [-0.15, 0.06]; 0.02 [-0.09, 0.12] | There is no change in liking towards the target for those in the dissimilar condition as they receive more pieces of information about them. |
|  | H9: People will perceive the target to be more and more dissimilar to them as they receive more pieces of information about the person.  | Extension | *R (Regression beta)* | N/A | N/A | 0.05 [-0.05, 0.15]; -0.08 [-0.19, 0.02] | There is no change in similarity perceptions towards the target as they receive more pieces of information about them. |

*Note*: ES: effect size. Further details on the evaluation criteria using LeBel et al. (2019) are provided in the supplementary material. H2-2 aids H2-1 with experimental approaches, and serves as a conceptual replication. As such, there is no original effect size for this hypothesis. Based on the reported numbers and statistics, we could not compute the confidence interval for the effect size for H3. Effect size for H7 is not reported due to mediation analysis not being conducted, as H5 and 6 were not supported. Effect sizes for H9 refer to perceived similarity when five traits have been presented and when 10 traits have been presented, respectively.

## Pre-registration and open-science

We provided all materials, data, and code on: <https://osf.io/j6tqr/>. This project received Peer Community in Registered Report Stage 1 in-principle acceptance ((ENTER LINK AFTER IPA); (ENTER LINK AFTER IPA)) after which we created a frozen pre-registration version of the entire Stage 1 packet (ENTER LINK AFTER IPA) and proceeded to data collection. All measures, manipulations, exclusions conducted for this investigation are reported, and data collection was completed before analyses. This Registered Report was written using the Registered Report template by Feldman (2023).

# Method

[IMPORTANT: Methods and results were written using a randomized dataset produced by Qualtrics to simulate what these sections will look like after data collection. These will be updated following the data collection. For the purpose of the simulation, we wrote these sections in past tense, but no pre-registration or data collection took place yet.]

## Power and sensitivity analyses

We first computed target effect sizes for direct replication (summarized in Table 1). Effect size and confidence intervals were calculated with R (Version: 4.1.2; R Core Team, 2020) with the help of a guide by Jané et al. (2024), and power analyses were then conducted with a combination of R and GPower (Version 3.1.9.6; Faul et al., 2007) for the factors that the authors found support for in the target article (flagged as significant results). We conducted a series of a priori power analyses based on these effect sizes and we found that we require 289 participants to detect the effects reported in the target article with 95% statistical power[[3]](#footnote-4) at alpha = .05 (see supplementary materials Table S1 and analysis code for more details).

Given the likelihood that the original effects are overestimated, we used the suggested Simonsohn (2015) small telescopes approach with the generalized rule of thumb of multiplying the largest required sample size among all target studies (208) by 2.5 to 723, rounding up to 800 participants. A sensitivity analysis indicated that a sample of 800 would allow the detection of *d* = 0.23 for independent t-test contrasts and *r* = .12 (both 95% power, alpha = .05, one-tail), typically considered weak to medium effects in social psychology research (Jané et al., 2024), and half or less than the effects reported in the target article.

## Participants and design

[To demonstrate what the results would look like after data collection we simulated a dataset of 1383 participants using Qualtrics and reported our analyses below based on that dataset. Results will later be updated in full to a sample of ~800 with the real data.]

A total of 1383 US college students were recruited via Prolific[[4]](#footnote-5). We targeted US American students using Prolific’s filters. We restricted the location to the US using “standard sample”, we set it to “Nationality: United States”, “Country of birth: United States”, “Place of most time spent before turning 18: United States”, “Student status: Yes”, “Minimum Approval Rate: 95, Maximum Approval Rate: 100”, “Minimum Submissions: 100, Maximum Submissions: 10000”.

[Stage 1 note: We will first pretest the survey duration and technical feedback with 30 participants to make sure our time run estimate was accurate and adjusted pay as needed. The data of these 30 participants will not be analyzed to test the outlined hypotheses in this paper prior to full data collection, other than to assess survey completion duration, feedback regarding possible technical issues and payment, and needed pay adjustments. Unless in the case of serious technical issues that affect data quality and require survey modification, these participants will be included in the overall analyses conducted with the full sample. ]

[An example placeholder, to be updated in Stage 2: We first pretested survey duration with 30 participants to test time run estimate and adjusted pay based on the duration. The data of the 30 participants was not analyzed other than to assess technical issues, survey completion duration, and needed pay adjustments, and were included in the final data analysis.]

######

###### Table 2*Difference and similarities between original study and replication*

|  |  |  |
| --- | --- | --- |
|  | Norton et al. (2007) | Replication |
|  | Study 1a | Study 1b | Study 2 | Study 4 |  |
| Sample size | 294 | 49 | 76 | 190 | 1383 |
| Geographic origin | Not provided | Not provided | Not provided | Not provided | US American students |
| Gender  | Not provided | 24 males, 25 females | 30 males, 44 females, 2 did not disclose | 68 males, 122 females,  | 345 males, 342 females, 345 other, 351 did not disclose |
| Median age (years) | Not provided | Not provided | Not provided | Not provided | 50.00 |
| Average age (years) | Not provided | 19.7 | 24.1 | 34.1 | 49.98 |
| Standard deviation age (years) | Not provided | 2.5 | 10.3 | 11.9 | 28.94 |
| Age range (years) | Not provided | Not provided | Not provided | Not provided | 0-100 |
| Medium (location) | Computer (online) | MIT campus | MIT campus | Computer (online) | Computer (online) |
| Compensation | Not provided | Not provided | Not provided | Not provided | Nominal payment |
| Year  | 2007 | 2007 | 2007 | 2007 | 2023 |

## Procedure

[*For review: The Qualtrics survey .QSF file and an exported DOCX file are provided on the OSF folder. A preview link of the Qualtrics survey is provided on:*<https://hku.au1.qualtrics.com/jfe/preview/previewId/ebec0377-716a-4de1-abe5-b80b1ef289a6/SV_1ET6P6IhIII1QaO?Q_CHL=preview&Q_SurveyVersionID=current> ]

Participants completed an online survey which consisted of a consent form and replications of Studies 1a and 1b, 2, and 4, followed by funneling and demographic information sections. The display of the studies and the conditions within each study were randomized.

We ran the four studies together in a single data collection. Combining several studies from a single target article in a single data collection has previously been successfully tested in several replications and extensions conducted by our team (e.g., Chen et al., 2023; Petrov et al., 2023; Vonasch et al., 2023; Yeung & Feldman, 2022; Zhu & Feldman, 2023), and is especially powerful in addressing concerns about the target sample (naivety, attentiveness, etc.) when some studies replicate successfully whereas others do not, as well as in the potential in drawing inferences about the links between the different studies and consistency in participants’ responding to similar decision-making paradigms. Unless explicitly noted, our measures are identical to those employed in Norton et al. (2007).

## Study 1a Replication

Following the methods in Norton et al. (2007)’s Study 1a, participants were asked to indicate which of two individuals about whom they know two different numbers of traits they think they would like more. More specifically, they were asked about a person about whom they knew 1 versus 2 traits, 2 versus 4 traits, 3 versus 6 traits, 4 versus 8 traits or 5 versus 10 traits. The question read “Whom do you think you would like more, someone about whom you knew **X trait(s)** or someone about whom you knew **Y traits**?” with a binary choice between the two.

**Study 1b: Replication**

Participants indicated a choice between two options: “When you meet an individual for the first time, you tend to like that person more when...” with the choice between “I know more about that person” and “I know less about that person”. This served as the direct replication of Study 1b.

## Study 2: Replication

Following Norton et al.’s Study 2, participants were presented with a randomly selected set of traits taken from a previous study. Participants were randomly assigned to one of the four conditions varying in the number of the presented traits (4 vs. 6 vs. 8 vs. 10 traits). These traits were randomly selected from a list of 28 traits generated by Norton et al. (2007; page 99, footnote 3): *ambitious, boring, bright, critical, cultured, deliberate, dependable, emotional, enthusiastic, idealistic, imaginative, impulsive, individualistic, industrious, intelligent, level-headed, methodical, observant, open-minded, opinionated, polite, reliable, resourceful, self-disciplined, sensitive, stubborn, studious*, and *talkative*.

Participants rated how much they would like an individual who possessed these traits – “How much do you think you would like a person with the listed traits?” (1 = *Wouldn’t like at all*; 10 = *Would like very much*).

## Study 2: Extension and a Conceptual Replication of Study 3 in Norton et al. (2007)

### Curiosity (Extension)

As an extension to Study 2, after completing the procedure detailed above participants also rated how curious they would be towards a person who possessed these traits – “How curious would you be about a person with the listed traits?” (1 = *Not at all curious*; 10 = *Extremely curious*).

### Similarity (Conceptual Replication)

Participants rated how similar they perceive themselves to be to a person with these traits – “How similar is the person with the listed traits to you?”(1 = *Not at all*; 10 = *Extremely similar*).

## Study 4: Conceptual Replication/Extension

Participants saw ten randomly selected traits out of the list of 28 traits taken from Norton et al. (2007) detailed above. These ten traits were shown on different pages. Participants were asked to rate whether or not each of the ten traits described themselves using a binary yes/no measure – “Would you say that this trait describes you?” (1 = *Yes*, 0 = *No*). Once all 10 traits were shown, participants were asked whether they would like a person who possessed these traits using a binary yes/no measure – “Would you like a person who has the above 10 traits?” (1 = *Yes*, 0 = *No*).

In addition, as an extension, we introduced continuous measurements of perceived similarity and liking of the target person after the first, fifth, and tenth traits. The questions read: 1) Similarity - “So far, how dissimilar/similar do you think the person to you? (1 = *Extremely dissimilar*; 10 = *Extremely similar*)”, and 2) Liking - “So far, how much do you like the person (1 = *do not like the person at all*, 10 = *like the person very much*)” respectively for perceived similarity and liking.

## Data analysis strategy

[Analysis codes of all the following based on a simulated random dataset were made available on the project’s OSF folder.]

### Replication Hypotheses: H1a-H4-3

Evaluations of replication were made based on the LeBel et al. (2019) criteria. Following Norton et al. (2007), we will conduct a chi-square test to test H1a that people prefer a person whom they know more about over a person whom they know less about.

To test H1b, we will run a chi-square test, examining the correlation between the number of traits described for a target person and the liking of that person.

To test H2-1, we will compute a correlation between the number of pieces of information about a person and the degree of liking. To test Hypothesis 2-2, we will conduct a 1 x 4 (the number of pieces of information: 4 vs. 6 vs. 8 vs. 10) between-subjects design ANOVA on liking and follow-up the analysis with post-hoc pairwise comparisons with p-values adjusted by the holm method. To meet the hypotheses, the three comparisons (4 vs. 6, 6 vs. 8, and 8 vs. 10) should all have a signal such that participants like the person less when they receive more pieces of information about the person.

To test H3, we will test a mediation model in which perceived similarity mediates the relationship between the number of pieces of information about a person and how much participants like the person. While Norton et al. (2007) tested the mediating effect with the method proposed by Baron and Kenny (1986), we will test the mediation effect with adjusted bootstrap percentile (BCa) methods.

To test H4-1 and H4-3, we will first create quasi-experimental conditions based on whether participants find the first presented trait of a person similar or dissimilar to themselves. Then, we will conduct a Welch’s t-test to examine whether those in the dissimilar condition rate the subsequently presented traits as being more dissimilar than those in the similar condition (H4-1). To test H4-3, we will conduct the same analysis on liking.

### Extensions

As an extension, using data from the replication of Study 2, we first compute bivariate correlations among the number of pieces of information available, curiosity, and liking. We have the following two extension hypotheses; H5: The number of pieces of information someone knows about a person negatively correlates with curiosity towards them; H6: curiosity is positively correlated with degree of liking. If H5 and H6 are supported, we will build a mediation model in which the number of pieces of available information about a person has indirect effects via perceived similarity and curiosity. We expect that curiosity then has a significant indirect effect between knowledge and liking, partly explaining the *less is more* effect (H7).

To better elucidate the cascading effect of the instance of dissimilarity, using data from the replication of Study 4, we will examine how perceived similarity and liking change over time (i.e., when they are presented with the first trait, fifth, and tenth trait). We expect that people in the dissimilar condition (i.e., those who perceive the first presented trait as evidence of dissimilarity) liked less and less as they received more pieces of information about the target person (H8). Similarly, we predict that they perceive the target to be more and more dissimilar to them as they receive more pieces of information about the person (H9). To test the hypotheses, we will focus on participants in the dissimilar condition and build a linear mixed model in which liking or perceived similarity is regressed on the two dummy-coded variables of the number of presented traits (5 vs. 1 and 10 vs. 5). Given participants rate liking and perceived similarity three times, we treat participants as a random effect in the model and let the intercept vary.

### Order effects

One deviation from the target article is that all participants completed all scenarios in random order. We considered this to be a stronger design with many advantages, yet one disadvantage is that answers to one scenario may bias participants’ answers to the following scenarios.

We therefore pre-register that if we fail to find support for our hypotheses that we rerun exploratory analyses for the failed study by focusing on the participants that completed that study first, and examine order as a moderator. To compensate for multiple comparisons and increased likelihood of capitalizing on chance, we will set the alpha for the additional analyses to a stricter .005. Our planned sample size (800) is large enough to provide sufficient statistical power to conduct moderation analyses and examine the order effects, if needed.

[TBD conclusion based on our experience with a unified design so far: We found [no] differences in conclusions]

### Outliers and exclusions

We did not classify outliers in this study. All data from participants who successfully completed the survey were included.

## Replication closeness evaluation

We provided details on the classification of the replications using the criteria by LeBel et al. (2019) criteria in Table 3. We summarized the replication as a close replication.

######

######

###### Table 3*Classification of the replications (Studies 1a, 1b, 2, and 4), based on LeBel et al. (2018)*

| **Design facet** | **Replication** | **Details of deviation** | **Reason for deviation** |
| --- | --- | --- | --- |
| Effect/hypothesis | **Same** |  |  |
|  Studies 1a and 1b | Same |  |  |
|  Study 2 | Same+ | We retain Norton et al.’s (2007) hypotheses but also include additional hypotheses (H5-7)  | This allows us to explore curiosity as a potential pathway between knowledge and degree of liking |
|  Study 4 | Same+ | We retain Norton et al.’s (2007) hypotheses but also include additional hypotheses H8 and H9.  | This allows us to further elucidate the effect of dissimilarity cascades and their influence on liking.  |
| IV construct | **Same** |  |  |
| DV construct | **Same** |  |  |
|  Studies 1a and 1b | Same |  |  |
|  Study 2 | Same+ | We retain constructs from Norton et al.’s (2007) original study but also measure perceived similarity to target. | This allows us to conceptually replicate the findings from Study 3 by Norton et al. (2007). |
|  Study 4 | Same |  |  |
| IV operationalization | **Same** |  |  |
| DV operationalization | **Same** |  |  |
|  Studies 1a and 1b | Same |  |  |
|  Study 2 | Same |  |  |
|  Study 4 | Same+ | We retain measures by Norton et al. (2007) but also include continuous measures of perceived liking and similarity at traits 1, 5 and 10. | This increases sensitivity of the measures of liking and similarity and allows us to explore their change over time as more traits are known.  |
| Population (e.g., age) | **Similar** |  |  |
|  Study 1a | Different | Original article study recruited participants via online dating website.The replication used an online US undergraduate student sample recruited via Prolific.  | Conducting an online study ensures we have sufficient power at a reasonable cost. |
|  Study 1b | Similar | Original article study recruited MIT undergraduates. The replication used an online US undergraduate student sample recruited via Prolific. |
|  Study 2 | Similar | Original article study recruited individuals from MIT campus. The replication used an online US undergraduate student sample recruited via Prolific. |
|  Study 4 | Similar | Original article study recruited MIT and Yale students. The replication used an online US undergraduate student sample recruited via Prolific. |
| IV stimuli | **Same** |  |  |
| DV stimuli | **Same** |  |  |
|  Studies 1a and 1b | Same |  |  |
|  Study 2 | Same+ | We retain DV stimuli from Norton et al. (2007) but also include a measure of perceived similarity to the target | Allows us to conceptually replicate Study 3.  |
|  Study 4 | Same+ | We retain DV stimuli from Norton et al. (2007) but also include continuous measures of perceived liking and similarity at trait 1, 5 and 10.  | Allows us to explore the influence of dissimilarity cascades on degree of liking as more information is known.  |
| Procedural details | **Similar** | The 4 studies were combined in the replication.  | Conducting a single study ensures we have sufficient power at a reasonable cost. |
|  Studies 1a and 1b | Similar | See above | See above |
|  Study 2 | Similar | See above | See above |
|  Study 4 | Similar | We include a continuous measure of perceived similarity and a continuous measure of degree of liking at traits 1, 5 and 10. As such, we treat Study 4 as a conceptual replication. | Inclusion of these questions increases sensitivity to the perceived similarity and degree of liking measures above those used in the original study. Measuring these at three time points allows us to examine their change as more information about the target is known.  |
| Physical settings | **Different** |  |  |
|  Study 1a | Same |  |  |
|  Study 1b | Different | Original article recruited participants by approaching them in the campus student center.Replication is an online survey. | Conducting a single online study ensures we have sufficient power at a reasonable cost. |
|  Study 2 | Different | Original article recruited participants by approaching them on MIT campus or as part of class exercise.Replication is an online survey. | Conducting a single online study ensures we have sufficient power at a reasonable cost. |
|  Study 4 | Different | Original article recruited participants as part of class exercise or as part of a web-based survey for a series of unrelated experiments.Replication is an online survey.  | Conducting a single online study ensures we have sufficient power at a reasonable cost. |
| Contextual variables | Different | Different time and context. |  |
| **Replication classification** | Close replication |  |  |

# Results

[IMPORTANT: Method and results were written using a randomized dataset produced by Qualtrics to simulate what these sections will look like after data collection. These will be updated following the data collection. For the purpose of the simulation, we wrote these sections in past tense, but no pre-registration or data collection took place yet.]

## Replication: H1a and H1b

We first conducted a chi-square test to test H1a. Failing to support the hypothesis, the result indicated that people did not significantly prefer a person who they know more about over one who they know less about, χ(1) = 0.0007, *p* = .98. We found the same for each comparison (1 vs. 2 traits, 2 vs. 4 traits, 3 vs. 6 traits, 4 vs. 8 traits and 5 vs 10. traits), χs < .93, *ps*> .34. Based on LeBel et al. 's (2019) criteria, we did not replicate the original result reported in Study 1a (see Table 1).

To test H1b, we conducted a chi-square test and examined whether participants believe that more information leads to more liking. We failed to find support for more people believing they would like a person more when they know more about them (*n* = 670) than people believing they would like a person more when they know less about them (*n* = 713), χ(1) = 1.34, *p* = .25. Thus, we did not find support for H1b. We thus did not successfully replicate the results reported in Study 1b (see Table 1).

## Replication: Hypotheses 2s

To test H2-1, we computed the correlation between the number of pieces of information about a person and the degree of liking. We failed to support H2-1, *r* = .01, 95% CI [-.05, .06], *p* = .80. We thus failed to replicate the original findings (see Table 1). Next, to aid H2-1, we conducted a 1 x 4 (the number of presented traits: 4 vs. 6 vs. 8 vs. 10) between-subjects ANOVA on liking, *F*(3, 1379) = 1.27, *p* = .29, eta squared = .003. Following the preregistration, we ran post-hoc pairwise comparisons with the holm method. Failing to support H2-2, we did not find that people liked a person with less known traits more than that with more known traits, *ps* > .39.

## Replication: Hypothesis 3

We built a partial mediation model in which the number of the presented pieces of information about a target had an indirect effect on liking of the target via perceived similarity. We failed to find support for the pathway between number of presented traits and similarity, *B* = 0.01, 95% CI [-0.06, 0.07], *p* = .85 and the pathway between similarity and liking, *B* = -0.01, 95% CI [-0.06, 0.04], *p* = .72. Thus, we did not find support for H3 and did not replicate the original mediation effect, *B* < -.001, 95% CI [-0.001, 0.001], *p* = .87.

## Replication: Hypothesis 4-1

We first categorized participants into two groups based on whether they found the first presented trait about a target person describes themselves or not (similar vs. dissimilar groups). To test H4-1, we then conducted a Welch’s t-test to examine whether people in the dissimilar condition (i.e., those who found the first presented trait *not* describing themselves) overall perceived the target person more dissimilar to themselves than those in the similar condition (i.e., those who found the first presented trait describing themselves). Not supporting H4-1, the perceived similarity between the two conditions did not differ (see Figure 1), *t*(1380.96) = -0.95, *p* = .34, *d* = -0.05, 95% CI [-0.15, 0.06]. As such, the original findings were not replicated (see Table 1).

###### Figure 1*Perceived Similarity by Conditions: Raincloud Plot*



*Note*: Diamonds and their error bars indicate means and 95% confidence intervals.

## Extension: H5-H7

We computed the correlations between curiosity, the number of pieces of information, and liking. We failed to find support for a correlation between curiosity and the number of pieces of information, not supporting H5, *r* = -.005, 95% CI [-.06, .05], *p* > .99. We also failed to find support for a correlation between curiosity and liking, not consistent with H6, *r* < .001, 95% CI [-.05, .05], *p* > .99. Given that we did not find support for the extension hypotheses, we did not test the mediation effect of curiosity and thus did not test H7.

## Extension: H8-H9

Following our pre-registration, we dummy-coded the number of the presented traits (5 vs. 1, 10 vs. 5) and tested whether perceived similarity and liking declined as participants received more information about the target. To this end, we built a linear mixed model in which perceived similarity and liking were each regressed on the two dummy coded variables (fixed effects) and we let the intercept vary for each participant. We summarized descriptive statistics in Figures 2A and 2B. Not supporting H8-9, the dummy-coded variables did not predict perceived similarity or liking, *ps* > 11. This suggests that contrary to the findings by Norton et al. 2007), the number of traits known about an individual does not influence liking towards them, challenging the *less is more effect*.

###### Figure 2*Perceived Similarity and Liking: Raincloud Plot*



*Note*: Diamonds and their error bars indicate means and 95% confidence intervals. Figures 2A and 2B have perceived similarity and liking of the target on their y-axis, respectively.

# Discussion

[Please note that the discussion is only to be completed in Stage 2 following data collection]

## Implications, limitations, and directions for future research

[Planned discussion in Stage 2: Discuss the unified data collection and possible order effects]

[Planned discussion in Stage 2: Our focus on Studies 1-4 and implications for follow-up research addressing real life settings, such as a replication of Study 5.]

# Conclusion

[Conclusion will be completed in Stage 2 following data collection]

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1. We use the word acquaintance to refer to someone whom an individual has previously encountered, but remains largely unfamiliar; for example, sight-based recognition from an initial interaction. [↑](#footnote-ref-2)
2. We chose not to include Study 5 by Norton et al. (2007) in our replication. Study 5 explored whether findings from Studies 1-4 would be replicated in real-life settings, using individuals from a real-world dating platform who had either recently been on a first date, or were going on a first date in the near future. Findings replicated effects reported in Studies 1-4. We felt that we should first focus on Studies 1-4 and once we are able to establish the replicability and robustness of those findings, inspire the more costly and ambitious follow-up of Study 5 in real-life setting. [↑](#footnote-ref-3)
3. Although the power for this study to detect each hypothesized effect is at least 80%, the power of this study to detect all of these effects simultaneously may be lower. [↑](#footnote-ref-4)
4. In some instances, Prolific recruits participants beyond the specified sample size. This is due to the platform sometimes incorrectly classifying valid completed responses as ‘timed out’ or ‘returned’. We will not exclude any complete valid responses from our dataset, and will include any additional completed responses obtained from Prolific. [↑](#footnote-ref-5)