Shared and idiosyncratic variance conditions, Spring 2023 (#127992)

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Author(s)
Daniel N. Albohn (The University of Chicago, Booth School of Business) - daniel.albohn@chicagobooth.edu
Joel Martinez (Harvard University) - joeledmartinez@gmail.com
Alex Todorov (University of Chicago Booth School of Business) - alexander.todorov@chicagobooth.edu

1) Have any data been collected for this study already?
No, no data have been collected for this study yet.

2) What's the main question being asked or hypothesis being tested in this study?
This research will consist of four studies designed to examine conditions that might influence the shared and idiosyncratic variance contributions to face judgments. Study 1 will examine whether the type of impression judgment matters when estimating the shared relative to idiosyncratic variance contributions. We predict that low-level, physical judgements of faces (e.g., age, masculinity, femininity) will show greater shared relative to individual contributions compared to higher-level impressions, which are likely to be more subjective (e.g., trustworthiness, attractiveness). Study 2 will be designed to test the influence that type of response has on judgments. We predict that when response options are restricted to a dichotomous choice, shared contributions will increase relative to when judgments are made using responses with more options, such as a typical 7-point Likert-type scale. In Study 3 we will examine how the type of stimulus set influences shared and individual contributions to face judgments. We predict that when stimuli naturally vary it will increase shared contributions compared to when they are highly standardized.

An additional fourth study will explore what factors might help explain or predict the shared and individual contributions to judgments. In particular, we examine whether participant-level features such as self-reported race, gender, and age can explain individual preference of observed judgments in addition to whether stimulus-level features such as emotion resemblance, skin tone, and sexual dimorphism might explain both the shared and perceiver contributions of face judgments. While we predict that models related to shared variance (and stimulus-level features) will have the most explanatory power, we also predict that both stimulus-level features and participant demographics will be able to predict a meaningful amount of idiosyncratic variance (i.e., over 10%; see, Kenny et al., 1992, JPSP).

3) Describe the key dependent variable(s) specifying how they will be measured.
In Studies 1-3 the partitioned variance will act as the pseudo-dependent variable. Pseudo because these are descriptive studies where we plan to examine the proportion of shared relative to idiosyncratic variance for each trait judgment both within and between each study.

Variance will be partitioned in each study following established procedures using linear mixed-effects regression with random intercepts (Martinez et al., 2020).

In Study 4 the random effect coefficients associated with each variance group of interest (stimulus, participant, and stimulus X participant) will act as the dependent variable. These coefficients will be derived from the variance partitioning procedure (Martinez et al., 2020). We will submit the random effect coefficients to 200 bootstrapped simulations in order to stabilize the coefficient values and obtain 95% CIs.

Because of the way that linear mixed-effects models are estimated, the random effect coefficients are analogous to the portion of the response that is above and beyond (or below) what is attributable to other variance components (plus the grand intercept). In other words, the random effect coefficients represent the portion of response that is unique to that variance component.

4) How many and which conditions will participants be assigned to?
There will be three studies that require participants each with four conditions (attractive, feminine, masculine, trustworthy) for a total of 12 total conditions.

5) Specify exactly which analyses you will conduct to examine the main question/hypothesis.
We will partition the variance for each trait into shared variance contributions (stimulus-level) and idiosyncratic variance contributions (both participant-level variance and participant-by-stimulus-level variance) following procedures outlined by Martinez et al. (2020, Behavioral Research Methods). Specifically, we will construct a series of linear mixed-effects regressions with random intercepts for each trait of interest for each study. From these models we can then compute the amount (proportion/percentage) of variance in responses explained by both stimulus- and perceiver-level effects. These variance components will then be descriptively analyzed both within and between experiments (e.g., means, distributions, ICCs), similar to that of a mini meta-analysis. We will also compute "beholder indices" that describe the relative proportion of stimulus-to-perceiver variance following procedures outlined by Hönekopp (2006, JEP: Human Perception and Performance).

For Study 4, we plan on using machine learning models to predict the bootstrapped random effect coefficients of each grouping factor of interest (i.e., stimulus, participant, and participant by stimulus) from stimulus- and participant-level features of Studies 1 and 3 (Study 2 is excluded because responses

are made on a binary scale). We will focus on the following stimulus-level features: facial emotion resemblance (derived from an updated version of a custom-made algorithm; Albohn & Adams, 2020, Frontiers), face actor demographics (average perceived race and gender derived from machine learning algorithms), skin luminosity, and apparent masculinity/femininity (derived from a custom-made algorithm; Peterson et al., 2022, PNAS). Likewise, we will use the following participant-level features for our model predictors: participant demographics (self-reported race, gender, and age),

We will compare the predictive power of a simple linear model prediction to that of more advanced machine learning algorithms, such as XGBoost, Perceptron, or stacked ensembles (i.e., SuperLearner).

6) Describe exactly how outliers will be defined and handled, and your precise rule(s) for excluding observations.
Participants will be excluded from analyses only if they fail to complete 100% of the trials (i.e., both impression judgments and demographics) or fail a comprehension check question at the beginning of the experiment (typing a sentence exactly as it appears). If less than ⅛ of the participants fail to complete demographic information we will still include all participants in the final analysis, despite missing demographic information.

7) How many observations will be collected or what will determine sample size? No need to justify decision, but be precise about exactly how the number will be determined.
We will collect approximately 50 participants per trait judgment across all studies for a total sample size of approximately 600 (4 trait judgments*3 studies*50 participants). Because participants will be randomly assigned to a condition, the likelihood that the conditions are evenly balanced is low.

8) Anything else you would like to pre-register? (e.g., secondary analyses, variables collected for exploratory purposes, unusual analyses planned?)
Studies 1 and 2 will use 120 neutral face stimuli from the Chicago Face Database (Ma et al., 2015, Behavioral Research Methods). The demographics of these images will be: 30 Black (15 male; 15 female), 30 White (15 male; 15 female), 30 Asian (15 male; 15 female) and 30 Latinx faces (15 male; 15 female).

Study 3 will use 120 neutral face stimuli scraped from the Internet and matched (as best as possible) to the stimuli in Studies 1 and 2 on race, gender, and age.