When randomness opens new possibilities: Acknowledging the stimulus sampling variability in Experimental Psychology

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Introduction

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Stimuli are fixed, respondents are random

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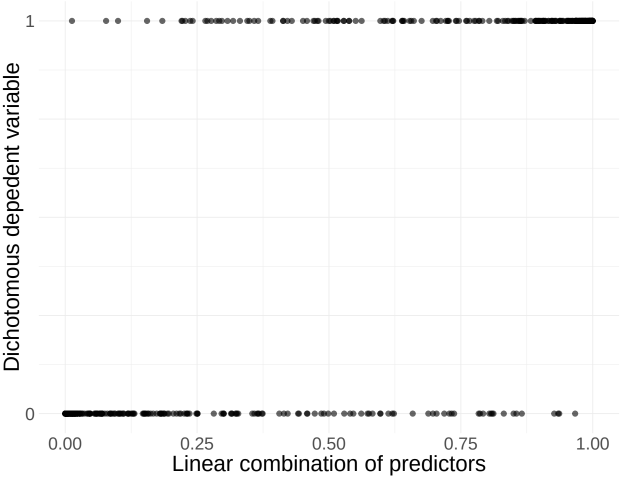
What if

Generalized linear model for dichotomous responses



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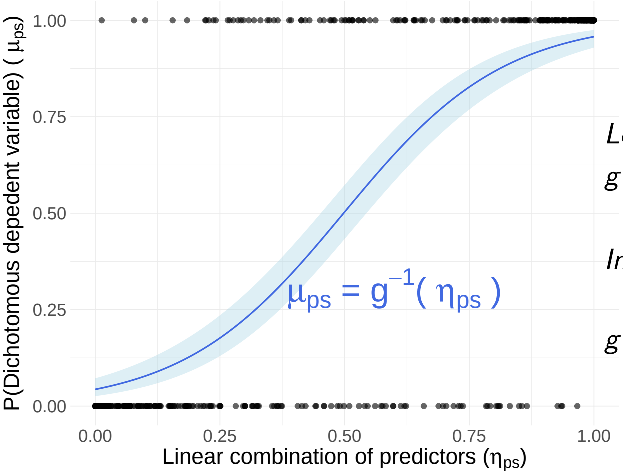

Logit link function g

$$g(\eta_{ps}) = log\left(\frac{\mu_{ps}}{1-\mu_{ps}}\right)$$

Inverse g^{-1}

$$g^{-1} = \frac{exp(\eta_{ps})}{1+exp(\eta_{ps})}$$

Random effects and random factors

Linear component in a (G)LM:

$$\eta = \beta X, \tag{1}$$

where β indicates the coefficients of the fixed intercept and slope(s), and X is the model-matrix.

Linear components in a (Generalized) Linear Mixed-Effects Model (GLMM):

$$\eta = \beta X \, Zd, \tag{2}$$

where Z is the matrix and d is the vector of the random effects (not parameters!)

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The Rasch model

$$P(x_{ps} = 1|\theta_p, b_s) = \frac{\exp(\theta_p - b_s)}{1 + \exp(\theta_p - b_s)}$$

where:

θ_p: ability of respondent p (i.e., latent trait level of respondent p)
b_s: difficulty of stimulus s (i.e., "challenging" power of stimulus s)

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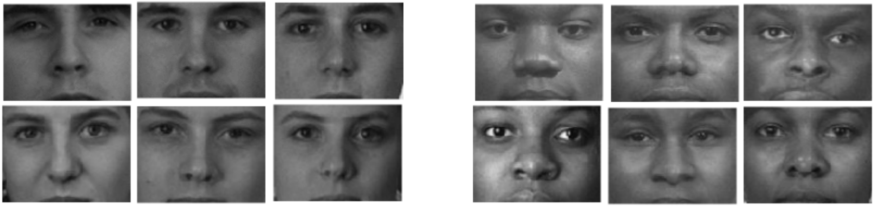
Stimuli:

12 Object stimuli



16 Attributes (Good, laughter, pleasure, glory, peace, happy, joy, love and and Evil, bad, horrible, terrible, nasty, pain, failure, hate)

Participants: 62 (F $= 48.39\%$, Age $= 24.92 \pm 2.11$ years)

Conditions:

WGBB: White-Good/Black-Bad, 60 trials

BGWB: Black-Good/White-Bad, 60 trials

Condition–specific easiness

High contribution stimuli | **Low contribution stimuli**