Introduction to Python final assignment

Unfamiliar orthography discriminability study

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# Concept

<https://www.nature.com/articles/s41562-017-0186-2#Sec1>

This study shows how an unsupervised deep learning network trained on natural images developed domain-general features as a consequence of training and when exposed to print develop domain-specific features at upstream neurons. They claim that natural visual primitives can be tuned in a domain-specific way to allow for learning of written symbols. In this study, I will test if, for literate humans, a period of short exposure to natural images similar to those used in this study enhances their ability to identify written symbols. Participants will have to indicate whether two symbols rendered in different fonts are the same or different, with DVs being accuracy and reaction time. One group will be exposed to symbols in their native language, while the other will be exposed to symbols in an unfamiliar script.

Design

Training (6:20 minutes) – NATURAL IMAGES CONDITION

200 trials + 50 filler trials

Each trial – 500ms of fixation cross, 1000ms of greyscale natural image, center of screen

Participant must push button when same image presented twice

Output needed: Participant Number, Training Condition, Total Exp Time, Trial Number, Trial Type, Image Filename; RT, ButtonPressed?, Accuracy

Read in Accuracy – if above 80% proceed

Training (6:20 minutes) – SIMPLE IMAGES CONDITION

Same as above but using images that don’t have spatial frequency properties of natural images (cartoons)

Testing (min 6 minutes)

Are two symbols the same?

Randomly pick one of 5 font sizes and one of 4 fonts

If trial is SAME, render same letter in one of the remaining 4 font sizes and 3 fonts

If trial is DIFFERENT, same as above but with a randomly selected other letter

Pick one of 8 possible presentation locations for letter 1, then one of remaining 7 for letter 2

Each trial – 500ms fixation cross, presentation of 2 symbols until response logged

240 trials

120 SAME trials and 120 DIFFERENT trials

Output needed: Participant Number, Training Condition, Total Exp Time, Trial Number, Trial Duration, Symbol1, Symbol2, SymbolMatch?, Symbol1Size, Symbol1Font, Symbol1Position, Symbol2Size, Symbol2Font, Symbol2Position, RT, ButtonPressed?, Accuracy

Stimuli

* Natural Images, randomly cut into small greyscale squares
* Non-Natural images, randomly cut into small greyscale squares
* Lots of Chinese symbols (??) rendered in 5 font sizes and 4 fonts

Analysis

* Descriptives
  + Average accuracy and RT across both trainings
  + Average accuracy and RT per training
  + Average accuracy and RT in test across both groups
  + Average accuracy and RT in test per group
* Inferential
  + Inference on Accuracy and RT as function of training
  + Inference on Accuracy and RT in test as function of training