Give me Gestalt! - XPLab 2019

Preregistration Report

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We aim to replicate the "Give me Gestalt! Preference for Cubist artworks revealing high detectability of objects" experiment by Muth et al (2012).

Background

Cubism is a highly influential visual art style from the 20th century. The three most famous and most influential painters for this particular style are Picasso, Braque and Gris.
In Cubist artworks, objects are analysed, fragmented and reassembled into an abstracted form. Therefore, Cubist paintings are very open to interpretation.
They are full of everyday objects, but because of the fragmentation, immediate object recognition is difficult.
With this study we aim to show that the subjects' enjoyability of the pictures is linked to the ability of detecting objects, also called Gestalt, in the paintings.

A leading theory behind rating enjoyability and detecting objects is to derive pleasure from searching for and finding recognisable everyday objects. For example, neurologists Ramachandran and Hirstein argue that perceptual grouping processes are in general linked with the neural structures known as the reward system.[1]

[1] V.S.Ramachandran and W.Hirstein, "The science of art. A neurological theory of aesthetic experience," *Journal of Consciousness Studies* 6, No.6-7 (1999) pp.15-51

Research question

H1: Individuals without expertise in cubism appreciate the paintings more, if they are able to detect objects in them more easily.

Design of the Experiment

General remarks about the Design

In contrast to the original experiment, our replication of the experiment will be web-based. We will be using the architecture babe which is based on JavaScript and HTML while the statistical analysis will be performed with R.
In the original experiment 120 photographs of paintings by Pablo Picasso, George Braque and Juan Gris were used. To shorten the duration of the experiment we will limit the stimuli to 30 images. The stimuli set will respectively contain 5 monochrome and 5 coloured paintings for each painter.

Sampling Plan

Our plan is to at least recruit 20 participants and even more if we are able to find more subjects. They will be recruited among Cognitive Science students at the University Osnabrueck which are enrolled in the course “Experimental Psychology Lab” and among friends and family. Participants will be recruited via email with a link that provides access to the online experiment. The participants will be no experts in cubist art and will have corrected-to-normal vision as well as normal colour vision.

Procedure

Before the experiment begins, we want to make sure that participants meet the required distance to their laptop. The distance should be 55cm. The participants can easily measure this by just putting their hand on their monitor and staying an arm length away.
The experiment consists of two blocks. In both blocks the paintings are shown in a randomised order. Participants are shown written instructions about the task. In the first block the participants are asked to rate the paintings on how much they like them. The participants rate on a 7 point Likert scale from 1 (“not at all”) to 7 (“very much”). During the second block, participants are asked to rate how well they are able to detect objects in the paintings. The participants rate on a 7 point Likert scale from 1 (“very hard”) to 7 (“very easy”). After the two blocks, the corrected-to-normal vision of the participants is tested by a Snellen chart and by a short version of the Ishihara color vision test.

Measured variables

- liking of the objects: measured by a 7-point Likert-scale from 1 (“not at all”) to 7 (“very much”)
- detectability of objects: measured by a 7-point Likert-scale from 1 (“very hard”) to 7 (“very easy”)

Materials

We will use photographs provided by Claudia Muth, the author of the study we are replicating. The pictures were part of the stimuli set used in Muth et al (2012). The photographs have been adapted to 450 pixels width and 600 pixels height. If the proportion was not 4.5:6 the pictures were cropped accordingly. A list of the stimuli can be found below.

- Muth, C., Pepperell, R., Carbon, C. (2012), “Give me Gestalt! Preference for Cubist artworks revealing high detectability of objects” Leonardo, 46

The image of the hand is provided by Clipart.

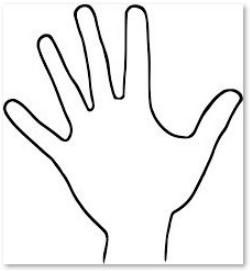
- https://www.clipart.email/download/177177.html

For the Ishihara Test we used an image provided by Augenarzt & Augenchirug Marek.

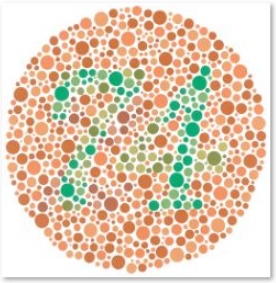
- https://augenmedizin.at/wp-content/uploads/2014/11/Ischihara-5-300x300.jpg

For the Snellen Chart we crop an image provided by OptiVision2020.

- http://www.optivision2020.com/image-files/snellen-chart.jpg



Hand.png



ishihara.png

snellen_eye_chart.png

Stimuli

Total: 30 Stimuli

		Colour Scheme	
		Coloured	Monochrome
Painter	Pablo Picasso	5x	5x
	George Braque	5x	5x
	Juan Gris	5x	5x

List of used Paintings

No	Painter	Painting	Year
1	Braque	The old castle at La Roche-Guyon	1909
2	Braque	Still life with mandola, metronome (vase and books)	1909
3	Braque	Woman holding a mandolin	1910
4	Braque	The Rio Tinto factories at L'Estaque	1910
5	Braque	Still life with a bottle	1910
6	Picasso	Still life with liqueur bottle	1909
7	Picasso	The rack (with glass, pipe and letter)	1912
8	Picasso	Bowl of fruit	1910
9	Picasso	Standing nude woman	1910
10	Picasso	Man rowing (with oars)	1910
11	Braque	Factory roofs at L'Estaque	1908
12	Braque	The chateau at La Roche-Guyon	1909
13	Braque	The mandolin (and bottle)	1910
14	Braque	Bottle and glass (on a table)	1911
15	Braque	Still life with harp and violin (glass and ink blotter)	1912
16	Picasso	Man with guitar	1913
17	Picasso	Glass with straws	1911
18	Picasso	Man with clarinet	1911
19	Picasso	Woman with triangular head	1910
20	Picasso	The female student	1911
21	Gris	The pot of geraniums	1915
22	Gris	Still life on a chair	1914
23	Gris	Still Life with Fruit Dish and Mandolin	1919
24	Gris	Water bottle, bottle and fruit dish	1915
25	Gris	The checked tablecloth	1915

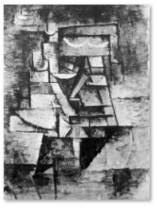
26	Gris	Still life with playing cards	1916
27	Gris	The violin	1916
28	Gris	The checkerboard	1915
29	Gris	Still life with poem	1915
30	Gris	The lamp	1916

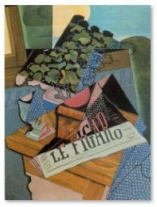

16.jpg


17.jpg


18.jpg


19.jpg


20.jpg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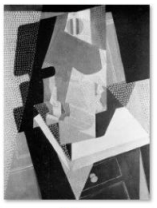
30.jpg


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Analysis Plan

Exclusion criteria

The first exclusion criterion is colour blindness because in order to recognise objects in the paintings, it is necessary to have unimpaired colour vision. To test the participants' colour vision, we make use of the Ishihara test. The Ishihara test is a colour perception test developed by Dr. Shinobu Ishihara at the University of Tokyo in 1917. It consists of multiple so called Ishihara plates. Due to constraints on the length of the experiment which needs to stay in a reasonable time frame for participants, in our case only plate 7, is included. This plate mainly tests if subjects have red-green colour blindness which is one of the most common colour vision deficiencies. If the participant is unable to recognize the number 74 shown in plate 7, the data will be excluded in the analysis. Viewers with dichromacy (two types of cone cells functioning) or anomalous trichromacy (one of the cones is altered in its spectral sensitivity) may read it as "21" and viewers with monochromacy (one type of cone cells functioning) may see nothing.

After completing the Ishihara test our participants have to take the Snellen eye chart test in order to check for impaired vision regarding short distances. The Snellen eye chart was developed by Herman Snellen in 1862. The test consists of a template with eleven lines of block letters. The first row contains only one letter which is very large while subsequent rows have increasing numbers of letters that decrease in size. Usually, the person stands 6 meters away from the template and reads the rows out loud. The smallest row that can be read out loud, indicates the visual acuity. In our experiment, the eye chart is used in a modified way to test whether the participants' short sight is sufficient. It is only relevant to us if people have good vision concerning short distances, since they are sitting approximately 55cm away from the desktop. The eye chart template has been modified to fit our purposes. Instead of keeping eleven rows, we only use the rows 6-11 (the smallest ones). Participants are excluded if the last row they can clearly see is the row 9. During the test, participants can keep on glasses or contact lenses.

Our final exclusion criterion is whether the participants are already familiar with or even experts in the cubist art style. We simply ask them whether they are or not. If the participant answers this question with "yes", the data is excluded. The method of self-reporting used here is appropriate because there is no reason for the participants to not answer this question honestly. The participant will surely know best if he or she has knowledge about the topic.

Confirmatory hypothesis testing

The hypothesis H1 will be tested by using a Pearson correlation coefficient as done in the original experiment. In more explicit terms the verification of H1 would mean that a painting with a high value for detecting objects will have a high value concerning the liking of the painting.
We will report the value of r and the p-value indicating whether the correlation is significant or not. The results will also be depicted in a regression graph: on the x-axis, the detectability of objects will be shown and on the y-axis, it will be shown how much subjects liked the

painting. One point in the graph shows the values for a single painting. We will further report the amount of explained variance r^2.

First draft of code using the statistics software R

To look at the first draft of our statistical analysis code using R, please take a look at our R notebook:

R Notebook

Code

This is an R Markdown Notebook. When you execute code within the notebook, the results appear beneath the code.

Try executing this chunk by clicking the *Run* button within the chunk or by placing your cursor inside it and pressing *Cmd+Shift+Enter*.

Hide

```
data <- read_csv("/Users/Mirijam/Documents/BachelorCognitiveScience/4.Semester/XPLab/Final_Project/GiveMeGestalt_Exp/test_results.csv")
```

#load libraries

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```
library(tidyverse)
library(ggpubr)
```

#exclude: color blind participants, bad vision, experts in cubism

#data formatting

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```
data_temp <- as_tibble(data) %>% mutate(response = as.integer(response))
data_temp

x <- filter(data_temp, trial_name == 'rating_scale_like') %>%
  select(c('response', 'picture_nr'))%>%
  group_by(picture_nr) %>%
  summarise(response = mean(response))
x
y <- filter(data_temp, trial_name == 'rating_scale_object') %>%
  select(c('response', 'picture_nr')) %>%
  group_by(picture_nr) %>%
  summarise(response = mean(response))
y

data_formatted <- merge(x,y, by = 'picture_nr')
```

#test variables for normal distribution (assumption of the Pearson correlation)

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```
shapiro.test(data_formatted$response.x)
shapiro.test(data_formatted$response.y)
```

#correlation test and regression graph:

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```
ggscatter(data_formatted, x = "response.x", y = "response.y",
          add = "reg.line", conf.int = TRUE,
          cor.coef = TRUE, cor.method = "pearson",
          xlab = "Detectability", ylab = "Liking")

res <- cor.test(data_formatted$response.x, data_formatted$response.y,
                    method = "pearson")
res

#extract the p.value
res$p.value

#extract the correlation coefficient
res$estimate

#the amount of variance explained
res$estimate^2
```