

RESEARCH REPORT

Cybervisuals or the meaning of memes: multimodal perception, emotion- and meaning-attribution to digital imagery.

Marion G. Müller, Christof Barth & Katharina Christ (Media Studies, Universität Trier)

Corresponding author: muellermg@uni-trier.de

ABSTRACT

As media scholars, we are mainly interested in measuring reception and effects of media content, and not necessarily exclusively intrapersonal processes. Hence, this eyetracking-experiment differs from ‘typical’ psychological experiments that e.g., use visual stimuli to trigger intrapersonal reactions. This experiment also measures the reaction to the stimuli, and the valence- and emotion-eliciting factors of the stimuli per se. Thus, this study aims at understanding media stimuli and their evaluation by participants.

This within-participants experiment ($N = 30$, 22F, 8M) aimed at conducting an eyetracking-study, using TobiiPro3-Lab, with self-report questionnaire in order to scrutinize perception, evaluation and meaning-attribution to Internet memes, a popular online form of multimodal (text-visual) commentary on current topics. The interaction hypothesis tested whether the manipulation of valence through text (on the 21 meme stimuli, not on the control stimuli) lead to a ‘switch’ in meaning, i.e., whether the same memes’ valence attributions could be manipulated by changing the accompanying text from positive to negative (H1, H2). Additionally, H3 and H4 tested whether valence affected viewing time or not. The experiment was conducted in German, with mainly students ($M_{age} = 23.87$, $MD_{age} = 24.00$, $SD_{age} = 3.99$) enrolled at a German-language university. The experiment was conducted after obtaining clearance from the *Ethikkommission der Universität Trier*, during December 2019 and January 2020. 27 visual stimuli were shown in color, in randomized order, for a maximum of 10 s each. 21 of the stimuli were popular Internet memes, 6 stimuli were control images from the *International Affective Picture System (IAPS)*. Five hypotheses were guiding the study, four of which could be tested. H5 was affected by last minute changes in the final study design, leading to non-interpretable data results. The major results were that hypotheses 3 and 4 could be confirmed, and that participants tended to spend, on average, 0.33 seconds longer in viewing a negative meme stimulus ($N_{negative\ stimuli} = 10$, $M_{negative\ stimuli} = 65.77\ s$; $MD_{negative\ stimuli} = 60.65\ s$; $SD_{negative\ stimuli} = 26.40\ s$) than they did in viewing a positive meme stimulus ($N_{positive\ stimuli} = 9$, $M_{positive\ stimuli} = 56.25\ s$; $MD_{positive\ stimuli} = 50.22\ s$; $SD_{positive\ stimuli} = 20.58\ s$). Another result relates to H1 and H2, and the attribution of valence to stimuli. While the majority of negative stimuli (7/10; see table 1) also received negative attributions by participants, the inverse could not be confirmed: Only 4 out of 9 positive stimuli, received a positive rating from participants (see table 2). In sum, the experiment provides evidence for the importance of self-attributed valence to responses to user-generated-content. Negative stimuli seem to lead to longer attention times than positive stimuli.

POST-EXPERIMENTAL ASSESSMENT

After the experiment, certain shortcomings of the procedure (see DISCUSSION section) and the research design became apparent, like the two-tailed-hypothesis 5. Last minute changes in the study procedure, changing the sequence of presenting stimuli and tasks, led to the loss of synchronicity between eye movement/scanpath measurement and immediate emotional evaluation. This connection of what participants see and how they react emotionally could not be reconstructed post-experimentally. Hence, we had to exclude H5 from our data analysis. Originally, this experiment had been conceived to test cause-and-effect of visual stimuli on valence and emotional evaluation.

Additionally, while meme stimuli had been tested in a pilot experiment, the association of the visual meme background (i.e. Grumpy Cat, Pepe the Frog) with positive or negative valence was not pre-tested. One ancillary result was that differences between experimenter-assigned and participant-self-assigned valence could be observed which obfuscated results.

Originally, we aimed for “equal distribution of gender”. However, almost three times as many female participants (22F) enrolled than male participants (8M). Yet, gender was not a tested variable, and it is safe to assume that gender did not confound our study results.

Additionally, data analysis, and thus writing of this report, was seriously delayed by the outbreak of the COVID-19 pandemic.

METHOD

A within-participant experiment in a single condition was conducted, showing a total of 27 visual stimuli (21 Internet memes, 6 control stimuli from IAPS-database), asking participants whether the 21 Internet meme had a positive, negative or neutral meaning (valence) and what the meaning-association for each meme was (meaning-attribution).

RESULTS

Hypothesis 1 was confirmed.

H1: A majority of participants will attribute negative valence and meaning to negatively captioned visuals. The results show that 7 out of 10 negatively valenced memes received also a negative attribution (see table 1).

Hypothesis 2 was not confirmed.

H2: A majority of participants will attribute positive valence and meaning to positively captioned visuals.

Only 4 out of 9 positively valenced stimuli received a positive valence attribution (see table 2).

H3 and H4 are inter-connected, one testing positively valenced stimuli, the other negatively tested stimuli. Both H3 and H4 are tentatively confirmed, H3 less strong than H4.

H3: Negatively valenced digital imagery is explored more thoroughly and viewed for a longer time before being evaluated.

H4: Positively valenced digital imagery is explored more superficially and viewed for a shorter time before being evaluated.

H3 resulted in an average viewing time for **experimental negative valence attribution of 6.57 s per stimulus** across all 30 participants ($N_{negative\ stimuli} = 10$, $M_{negative\ stimuli} = 65.77\ s$; $MD_{negative\ stimuli} = 60.65\ s$; $SD_{negative\ stimuli} = 26.40\ s$).

H4 resulted in an average viewing time for **experimental positive valence attribution of 6.25 s per stimulus** across all 30 participants ($N_{positive\ stimuli} = 9$, $M_{positive\ stimuli} = 56.25\ s$; $MD_{positive\ stimuli} = 50.22\ s$; $SD_{positive\ stimuli} = 20.58\ s$).

The predicted **longer viewing time for negatively valenced stimuli of on average .33 s** narrowly confirms H3. The predicted **shorter viewing time for positively valenced stimuli of an average .33 s** narrowly confirms H4.

An unexpected result of our study is that the experimental stimuli which were selected and pilot-tested according to the assumption that they are widely known. Except for two memes (meme pair 6 and meme pair 8; see tables 3 and 4) all eight other experimental memes were hardly known (see table 3). The least known meme in the sample are meme pair 2, meme pair 4 and meme pair 5 (see tables 3 and 4).

DISCUSSION

The experiment yielded some results for H1-H4, and some surprising findings like the relevance of self-attributed valence for viewing times of memes. Indirectly, the study also indicates that the diversity of the stimulus-base (Internet memes) is much higher than expected and prior knowledge of the selected memes is much lower than expected.

A major shortcoming of this experiment is that only a single hypothesis was actually relating to eyetracking (H5), and due to last minute changes and undetected effects on this hypothesis, H5 could not be analyzed due to the delay between watching stimuli and measuring emotional reactions to this stimulus. Hence, the intended partial replication of Yarbus (1967) – a task-dependency leading to very different viewing paths, depending on the respective task – could not be measured.

Another shortcoming was to have not planned this experiment as a between-participants design with a higher number of participants to increase the power of analysis. The experiment itself was conducted shortly before the outbreak of the pandemic. When results came in, all experimenters were in the first lockdown, and thus unable to communicate in the usual manner. Other tasks intervened and hence, a large delay in submitting this results report occurred.

TABLES

Table 1. Attribution of valence to negative stimuli.

	frequencies		
	M	MD	SD
negative stimulus 1	.30	1.0	.88
negative stimulus 2	-.80	-1.0	.48
negative stimulus 3	.23	.00	.68
negative stimulus 4	-.40	.00	.56
negative stimulus 5	-.13	.00	.43
negative stimulus 6	-.23	.00	.77
negative stimulus 7	-.97	-1.0	.18
negative stimulus 8	.47	1.0	.78
negative stimulus 9	-.60	-1.0	.72
negative stimulus 10	-.50	-1.0	.78

Note. N = 30 participants. The variables were codes with the values -1 = negative, 0 = neutral, 1 = positive.

Table 2. Attribution of valence to positive stimuli.

	frequencies		
	M	MD	SD
positive stimulus 2	-.70	-1.0	.60
positive stimulus 3	.87	1.0	.35
positive stimulus 4	-.13	.00	.51
positive stimulus 5	.07	.00	.45
positive stimulus 6	-.27	.00	.79
positive stimulus 7	-.43	-.50	.63
positive stimulus 8	.57	1.0	.68
positive stimulus 9	.03	.00	.67
positive stimulus 10	-.23	-.50	.86





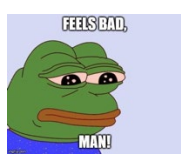
Note. N = 30 participants. The variables were codes with the values -1 = negative, 0 = neutral, 1 = positive.

Table 3. Knowledge of the shown Internet memes.

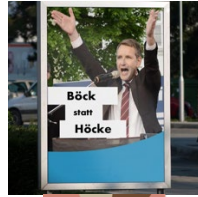
	frequencies		
	M	MD	SD
meme pair 1	-.73	-1.0	.69
meme pair 2	-.93	-1.0	.38
meme pair 3	.00	.00	1.0
meme pair 4	-.93	-1.0	.38
meme pair 5	-.93	-1.0	.37
meme pair 6	.50	1.0	.88
meme pair 7	-.60	-1.0	.81
meme pair 8	.60	1.0	.81
meme pair 9	-.80	-1.0	.61
meme pair 10	-.73	-1.0	.69

Note. N = 30 participants. The variables were codes with the values -values -1 = not known and 1 = known.

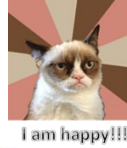
Table 4. Thumbnails of the shown Internet memes.

	positive stimulus	negative stimulus
meme pair 1	/	
meme pair 2		
meme pair 3		
meme pair 4		
meme pair 5		
meme pair 6		

meme pair 7



meme pair 8



meme pair 9



meme pair 10



Note. All meme stimuli were taken from publicly accessible websites, namely Facebook, 9gag, Instagram et al. in 2019. They were selected for both, popularity and diversity of visual appearance.