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

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Abstract

Recently, viral internet memes have become a hot topic in mass media research (e.g., Shifman, 2013, 2014; Gal et al., 2016; Marcus & Singer, 2017; Ross & Rivers, 2017; Nissenbaum & Shifman 2017, 2018; Babic & Volarevic, 2018; Lobinger et al., 2019). The scope of research ranges from entertaining to political memes on a global scale, mostly assessing the types and contents of memetic communication. This paper proposes a mixed-method approach combining an eyetracking experiment, and a self-report questionnaire with the intention of improving the understanding of perception, evaluation and meaning-attribution processes of internet memes. These new forms of communication and expression in a multimodal, yet predominatly visual online format have long left the merely interpersonal communication realm. Viral memes constitute a societally and politically relevant global communication format that is still understudied in terms of the meanings generated and attributed to them. Theoretically, this between-participants experiment builds on the Visual Communication Process Model (VCPM-Model) developed by Müller et al. (2012), focusing on the major visual communication processes from perception to meaning-attribution to emotional evaluation. Valence, emotion- and meaning-attribution are the key variables that are being tested in this experiment. Building on results from previous research on press photography, one key question is how valence, emotion and meaning are influenced by text and/or by visual elements of the meme stimuli.
In an eyetracking experiment using TobiiPro soft- and hardware, 30 participants are viewing 20 text-visual experimental stimuli all downloaded from publicly accessible online sites in a randomized condition. Each stimulus has been manipulated to provide both a positive and a negative version by using a generic image software to modify the textual elements of each meme. Postive and negative versions are randomized, and equally distributed among the participants. Participants evaluate three aspects of visual communication: Whether the meme has a positive, negative or neutral meaning (valence), what kind of emotion is depicted, which emotional reaction is elicited by the stimulus (emotion-attribution) and what is the meaning association for each meme (meaning-attribution). While valence and emotion are being tested in the eyetracking experiment, meaning-attribution is being tested through the post-experimental survey.

Introduction

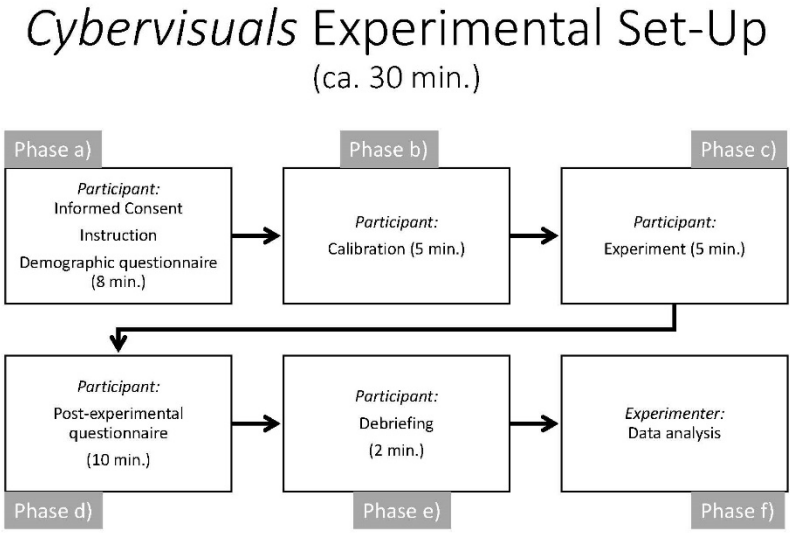
The main forum of societal and political discourse is moving online. This is not simply a transformation of discourse location, but also a transformation of media formats, modalities and meaning-structures (Ritzer & Jurgenson, 2010). However, there are only few studies that are scrutinizing the patterns of visual perception and meaning-attribution of legacy media formats like press photography (Müller et al., 2012). To the best of our knowledge, this is the first study to examine the visual perception and meaning-attribution patterns of online memes. This study aims at making a first contribution to analyzing the specific patterns of perceiving and making sense of internet memes. Viral memes are a bi-modal construct consisting of both, visual and textual elements. In her pivotal book, Limor Shifman (2014) defined memes by contrast to viral online content: “The main difference between Internet memes and virals thus relates to variability: whereas the viral comprises a single cultural unit (such as a video, photo or joke) that propagates in many copies, an Internet meme is always a collection of texts” (Shifman, 2014, p. 56). This study is being based on a different definition and theoretical framework of Internet memes which are not seen as a collection of texts, but which are scrutinized as bi-modal (text-visual) form of expression and communication online. The particular properties of internet memes are first, their dual-modal nature with a highly manipulative potential, and their prosumer-generated character that features a fast-to-create usability facilitated by algorithmic tools online. Many memes are being composed on specific meme-generator websites (e.g., imgflip, makeameme, imgur). Creating a meme is a simple matter, and is part of a pervasive prosumption culture (Ritzer & Jurgenson, 2010).This is not a trivial question, particularly when it comes to politically extreme memes like the Alt-Right icon Pepe the frog (Lobinger et al., 2019). Memes are powerful symbols that can serve as a crystallization forum for like-minded users. Understanding how these discourses – not only the extreme ones – are structured, and how individual meanings are constructed is highly relevant for understanding meaning and emotion in online discourse.

The main goal of this paper is to research the intertwined processes and patterns of visual perception, emotion- and meaning-attribution of online memes. These three elements of the visual communication process cannot be separated, because they are inextricably related (Müller et al., 2012). As the pioneer of eyetracking research, Alfred Yarbus (1967) already demonstrated in his pivotal experiment, a certain “task-dependency” of eye movements can be assumed. How individuals explore a stimulus visually is shaped by high-level factors of knowledge, context and memory, but also by the type of task or instruction they are given (Yarbus, 1967; Tatler et al., 2010). Thus, the actual “seeing” of the picture, the scanpath and dwell-time (see Holmqvist et al., 2015) of the participant, are influenced by the instruction and question she or he received before starting the experiment. While this study cannot provide new evidence on the process between visual exploration and actual meaning attribution – this would need different neuropsychological methods and devices – the study aims at giving evidence for certain tasks, scanpaths, valence-, emotion- and meaning-attributions by participants to the seen meme-stimuli. Some of the stimuli are humorous, some come from a political context. All were selected from generally accessible websites, using Google image search and Know your meme sites as prime sources. Some of the stimuli are country specific, relating to a particular politician or discourse that people residing in Germany are familiar with. The experiment is conducted in German with all participants being fluent in German. Other stimuli are coming from a US-American, Korean or British context. Internet memes are multimodal, globally distributed, text-visual constructs with a high impact (large numbers of viewers/views) that

typically show variations or modifications on the text level, but not on the visual level. An internet meme created with a meme generator typically uses a previous meme and modifies only the text, before being saved, uploaded and shared online (Lobinger & Schreiber, 2017).

Previous perception research (Kobayashi, 1986) found a "picture superiority effect" over words and sentences when it comes to memory testing. In this experiment, it is not tested, whether such a better memory effect for visuals is also relating to internet memes. Rather, this study builds on a previous study (Müller et al., 2012) that tested the relevance of text and visual information for meaning-attribution with the example of an ambivalent press photograph. The result of the experiment was that the majority of participants went along with the valence provided in the text caption. The text manipulation of positive and negative captions proved to be successful. The identical photograph was associated with opposite valences driven by the changed text captions. This part of the experiment is being replicated in the current experiment albeit with different types of stimuli. Additionally, the attributed meanings of the experimental stimuli are tested in the post-experimental survey (see Illustration 1).

Illustration 1



Research questions

The experiment tests participants' evaluations and meaning-attributions of internet memes as examples for digital imagery in general. The overarching question is, **whether and how the (manipulated) text influences valence and meaning-attributions in participants** (H1-4). To that end, each visual stimulus comes in two variations – a negative, and a positive text message accompanying the same visual motif. Participants have to attribute valence, emotion and meaning to each of the 20 visuals (internet memes). Negatively and positively valenced stimuli are randomized in each of the 30 participant conditions. The major question is whether negatively captioned memes are visually explored differently from positively captioned memes, and how much time is attributed to reading the text (AOI) as opposed to exploring the pictures

(AOI). Also, the sequence of visual exploration of digital images as opposed to the non-textual control stimuli is of relevance. Is text more relevant for meaning-attribution than visuals in text-visual constructs? What are the patterns of visual exploration in digital imagery? And lastly, how are emotions elicited by digital imagery? Additionally, meaning-attribution (H5), and varying scanpaths with respect to two conditions (valence, emotion) will be tested.

Hypotheses

H1: A majority of participants will attribute negative valence and meaning to negatively captioned visuals.
H2: A majority of participants will attribute positive valence and meaning to positively captioned visuals.
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.
H5: Differences in scanpath occur between the two different tasks (valence, emotion).

Methods

The experiment is a within-participants design with a single condition that is tested with a target group of 30 participants about equally distributed across two genders (M/F). A participant wishing to indicate the third gender will be able to do so. This will not lead to an exclusion from the experiment, since gender self-attribution is not part of the experimental framework. The age group should only include adults (18+). A young participant population is targeted, due to its affinity to using online media. While age, like gender, as a variable will be reported, it is not tested as a variable in the experiment, and thus, is not relevant in terms of a potentially confounding variable. Due to the sensitivity of the equipment used, participants wearing certain types of glasses (e.g., bifocals) should be excluded from the sample. This should already be advertised in the recruitment announcement. Media usage patterns will be tested as part of the post-experimental survey (see Illustration 1, Phase d). Each participant will see 20 experimental stimuli plus 6 control stimuli, each for a maximum of 10 seconds. During the experiment participants will evaluate valence as well as depicted and felt emotion relating to the visual stimuli.

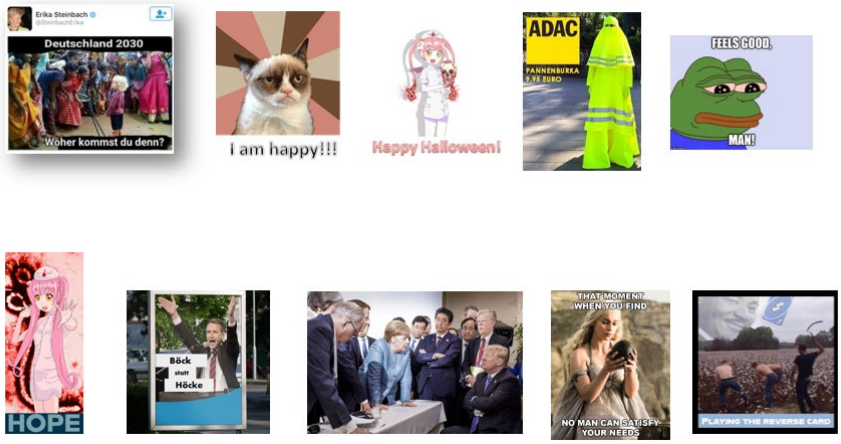
The ethical review committee of the Universität Trier (Ethikkommission der Universität Trier) has given its full consent to conducting the experiment on October 14, 2019 (approval letter on file). Participants will be offered € 5 per person and experimental session as an incentive to participate in the experiment.

The targeted sample size is 30 participants tested in the same condition. Recruitment will take place via official announcement of the ZPiD on Universität Trier website, and in printed advertisements posted at different university buildings and newsletters for students. Stimuli were selected using Google Image search as well as Know Your Meme websites. Selection criteria were virality, potential political impact, and a certain ambivalence as to the meme's meaning

so that it can be modified by text. The result were 10 memes (see Illustration 2) constituting the experimental stimuli set. The texts of the original meme stimuli were modified to provide a positive and a negative version of each meme. Thus, a total of 20 experimental stimuli will be tested. Participants will be shown each stimulus until the participant presses a key. The sequence of shown stimuli will be randomized. Negative and positive stimuli will be randomized for each participant. After each stimulus participants will be asked to evaluate the positive, negative or neutral valence of the stimulus. The experiment started in November 2019 and will end in February 2020.

Illustration 2

Sets of the same stimulus neutral – negative – positive:
10 motifs x 2 conditions = 20 visual stimuli



In an eyetracking experiment using Tobii Pro soft- and hardware, 30 participants are viewing 20 text-visual experimental stimuli all downloaded from publicly accessible online sites in a randomized condition. Each stimulus has been manipulated to provide both a positive and a negative version by using a generic image software to modify the textual elements of each meme. Postive and negative versions are randomized and equally distributed among the participants. Participants evaluate (1) whether the meme has a positive, negative or neutral meaning (valence), (2) the emotion depicted and felt (emotion), and (3) what the meaning association for each meme is (meaning-attribution). The last part is conducted in the post-experimental survey (see Illustration 1, Phase d).
After the experimental stimuli, 6 control stimuli will be shown (IAPS images No. 1050, 1441, 2035, 2411, 2458, 2594). The control stimuli serve as control condition for the not yet tested experimental stimuli. All 6 stimuli will be shown immediately after the experimental stimuli. The control stimuli come from the International Affective Picture System (IAPS, Lang et al., 2008), and have been selected for positive, neutral and negative valence.

To test H5 from a different perspective, the final task in the experiment will be to decide in a hypothetical scenario situation, whether each image should be deleted or not if found on social

media. This question relates to the meaning of the image in so far as highly negative connoted visuals can be identified from the reception perspective of participants.

Material

For data collection a TobiiPro Spektrum eyetracker apparatus (Illustration 4) will be used for the experimental part. The experimental part is embedded in two questionnaires – a demographic questionnaire at the beginning (see Illustration 1, Phase a), and a post-experimental questionnaire at the end (Phase d) asking participants for their meaning-attributions of the seen visual stimuli. For the visual stimuli-creation generic *Microsoft Office Powerpoint for Windows10*, and *Adobe Photoshop* were used. For data analysis, the eyetracker-specific Tobii-software will be used in combination with *Microsot Office Excel for Windows10*.

Illustration 4

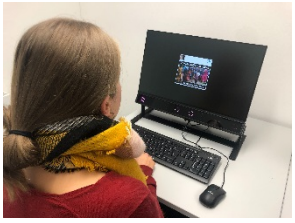


Image: Katharina Christ

Data collection

This between-participants experiment will test approximately 30 participants, each for about 30 minutes total. All participants view the same set of 26 stimuli in a randomized order.The experimental stimuli will be preceeded by two test stimuli in order to familiarize themselves with the evaluation procedure. Owing to the TobiiPro setup, participants will reply to the three experimental questions detailed below with their answers (self-report) being noted by the staff (thinking out loud condition).

The experiment will be conducted in German.The following instructions are translated from German.The test conditions for all participant are:

1st instruction:
„Please evaluate the following image whether it is positive, negative or neutral (by clicking on the respective button). Please indicate your subjective first impression“
***2nd instruction*:**
„Please end the following sentence so that it best describes the depicted item. Select among the following categories: annoying, pleasant, ridiculous, boring, funny, indescript, sad, surprising, scandalous, despicable, frightening“.
3rd instruction (screen without picture)
How does the image affect you?“ (What emotion are you experiencing immediately after viewing the image). Please use the following list and decide for one of the terms to complete the

following sentence. The depicted visual: amuses me, makes me, makes me happy, bores me, makes me sad, frightens me, makes me, the visual does not touch me, I don't understand the visual, I cannot assess".

Timeline

04 - 09/2019	Visual stimuli preparation
07/2019	Application for ethics vote
09/2019	Test of experimental setup
10/2019	questionnaire design
11/2019 - 02/2020	Recruitment of participants; Experimental data collection
02 - 03/2020	Data analysis
04 - 06/2020	Peer-reviewed journal manuscript

In the experiment, the independent variable (IV) are the visual stimuli, while the three dependent variables (DVs) measured are valence, emotion and meanings attributed to the stimuli. The hypotheses relate to the measurement of the DVs during the experiment.

Procedure

Measures scrutinized are threefold: 1. Eyetracking patterns (scan-path and dwell time), 2. Valence and emotion attribution to stimuli, 3. Meaning-attribution to stimuli. The procedure starts with the arrival of the participant in the lab (Illustration 1, Phase a), followed by an introduction to the experiment, the signing of the informed consent form, and the demographic questionnaire (age, gender, educational background and media usage patterns, familiarity with internet memes), (Phase a). The experiment begins with the calibration of the eyetracker, followed by one trial stimulus to test the process (Phase b). Then all 20 randomized experimental stimuli will be shown and evaluated, followed by 6 control stimuli which will also be evaluated for valence and emotion-attribution (Phase c). After the eyetracking experiment the participant will switch to filling in the post-experimental questionnaire (self-report), reproducing the experimental stimuli and asking for familiarity/memory of the seen stimuli as well as for meaning-attributions (Phase d).

Analyses

Data analysis will take place in Phase f (see Illustration 1). Three IVs are being tested both, in the eyetracking experiment (valence, emotion-attribution), and in the post-experimental questionnaire (meaning-attribution).

The analytical softwares used are the Eyetracking-software *TobiiPro Lab,* and statistical software packages. There are three different types of data results to be analyzed: First, the eyetracking data (Phase c), then the two questionnaire data (Phase a) and (Phase d). Missing data and imputations will be identified during the data analysis process. They will then be excluded from the final data integration. Outliers will be identified in all three data analysis processes outlined above, but will be part of the final data integration. Since the DV are the (manipulated) visual stimuli, the DVs are in a visual and not in a numerical form, and thus not subject to statistical analysis. IVs are threefold: First, scanpaths and dwell-times. Both will be

assessed and computed independently from one another. Scanpaths indicate the eye movement trajectory and are spatial and directional data. While dwell-times are also spatial, they are timed data that indicate how long a participant looked at a particular area of interest (AOI). Both, scanpath and dwell-time are indicators of attention allocation in visual stimuli. Additionally, valence and emotion data will be analyzed in parallel to the scanpath/dwell time. Here IV-data relate to both, eyetracking measures and verbal attributions. Second, the demographic data from the first questionnaire (Phase a) provide data on age, gender and media usage behavior. Thirdly, answers from the post-experiment questionnaire on the meanings of these will be computed.

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