

## **Expressing Emotions in User Comments –**

Examining how Emotional User Comments on Facebook News Posts Influence Readers' Attention and Memory in Varied Capacity Conditions

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### **Abstract**

This research project tackles the questions of how emotional user comments (comments, which present the position of an author towards an article or an issue in an emotional tone) of different emotional arousal (emotional/not emotional), valence (positive/negative) and discrete negative emotions (anger/fear) influence comment readers attention and memory. Following selective attention theories, it is assumed that emotional compared to not emotional comments lead to more attention, and that information are remembered more vivid. Further, taking negativity bias and cognitive functional model into account, negative compared to positive emotions and anger compared to fear lead to more attention and more effective information storage in memory. This correlation is finally assumed to be moderated by the mode of information processing. Relying on the heuristic systematic model, cognitive resources are supposed to be limited. This forces comment readers to apply *heuristic processing mode* when receiving comments, which strengthens the assumed correlations between emotion variations and attention/memory. To test the hypotheses, a laboratory experiment using eye-tracking measurement will be conducted together with recognition tests. If the hypotheses can be proven true, emotions in user comments can be used as a gateway for information transmission and shape topic perception, opinion formation and user reactions.

## Introduction

In the previous years, user comments received a lot of attention as research object in media and communication science, as well as in related disciplines such as psychology, sociology or business (see Ziegele, Springer, Jost, & Wright, 2017 for an overview). With a wide range of methodologies, studies showed user comments on different platforms to be influencing towards readers in terms of news perception (Graf, Erba, & Harn, 2016; Prochazka, Weber, & Schweiger, 2016; Winter & Krämer, 2016), i.e. journalistic quality of a news items (Thorson, Vraga, & Ekdale, 2010) or evaluation of content and actors (Sikorski & Hänel, 2016; Waddell & Bailey, 2017), as well as in terms of experienced emotions (Ferrara & Yang, 2015), opinion formation, participation and decision-making (Schweiger, 2017; Ziegele, 2016). The impact of user comments have been investigated in terms of a number of variables. Reasoning in comments (Prochazka et al., 2016), argument quality (Sung & Lee, 2015), valence of arguments in regard to a news content (Hsueh, Yogeewaran, & Malinen, 2015; Kramer et al., 2017; Sikorski, 2016), degree of incivility (Kalch & Naab, 2017; Prochazka et al., 2016) or interaction between users in comments (Hwang, Kim, & Kim, 2018) have been proven to influence readers perception in different ways.

In their form of communication, user comments are called to be unique and of „hybrid nature“ (Reich, 2011). The term “hybrid nature” points to the fact even though comments are published in mass media, they are *interpersonal*. Comments are “entangling interpersonal and mass media processes more closely than ever before” (Neubaum & Krämer, 2017).

Interpersonal communication is known to stronger influence peoples’ opinions and perception than mass media (Beck, 2010). In a complex media environment of overloading information – such as social media – user comments appear to be favored content compared to news articles themselves when trying to make judgments (Ziegele, Quiring, Esau, & Friess, 2018). They offer orientation (Waddell & Bailey, 2017). Interestingly, Vraga, Bode, Smithson, and Troller-

Renfree (2019) show in an eye tracking study, that attention to social, news, and political posts in social media is not associated with interest in those topics. In media research, interest is commonly used to explain media perception. The authors suggest posts in social media content to be seen more incidentally than consciously.

One way to show a (political) position towards an article or an issue in a user comment in a particular unconsciously triggering manner, might be to be *emotional*. Emotions are known to be highly salient. Research on information processing explains that it is faster and easier to process salient content such as emotions than not emotional content (Yiend, 2010). According to theories of selective attention, emotional stimuli is prioritized already in early sensory processing (Reeck & Egner, 2015). It is more likely to hold attention to emotions, to drive processing and to be able to recognize emotional information later on (Yiend, 2010).

By the words and statements used in a comment, readers can be able to deduce if a writer is angry about something, or fearful, as well as happy or hopeful. What kind of information are considered to be relevant in social media environments to spend attention to is important when studying effects of user comments on higher cognitive processes. All elements within a news posts that are not encoded, will be lost. How information is used for e.g. topic perception or opinion formation depends on attention in the first place, but also on encoding and storage as following processing steps. The aim of this study is therefore to gain insight into how people with limited cognitive resources are triggered by emotional information, and how attention to such information leads to adequate encoding and storing of information. We use eye tracking to explore whether attention to certain user comments varies across different emotional tone, and whether this attention influences information storage in memory by using recognition tests. With this knowledge, we hope to understand the role of emotions in user comments as a gateway for information transmission shaping topic perception, opinion formation and reader reactions.

## **Emotional User Comments on Facebook News**

The comment function on news websites is a common way for users to publish their personal opinions in the public. Comments are “considered (one of) the most popular form(s) of public online participation” (Ziegele et al., 2017). User comments often are discussed in terms of democratic potential in public discussions (Fromme et al., 2016); Ruiz et al., 2011). However, multiple studies show user comments to be uncivil, personal and emotional and do not fulfill a desired democratic function (Baek, Wojcieszak, & Delli Carpini, 2012; Coe, Kenski, & Rains, 2014). The atmosphere in comment sections is described as counter-public sphere (Springer, 2014).

Based on the studies cited in the introduction, comments have a strong influencing power and thus, what people post on the internet is holding some risks. Opinions can be spread to a wide range of readers, without rational arguments or by lacking in facts. This can have dangerous effects for a working democratic society by (next to others) building anti-deliberative public spheres characterized by incivility, homophily, and polemics (Anderson, Brossard, Scheufele, Xenos, & Ladwig, 2013) or supporting increased negative emotions toward opposing opinions, more closed-mindedness and more expression of disagreement (Hwang et al., 2018). Therefore, is it already a common working practice of news providers to moderate user discussions. Among inappropriate posts, a “set of behaviors that threaten democracy, deny people their personal freedoms, and stereotype social groups” using “name-calling, aspersion, pejorative speak, vulgarity, and further behaviors of not adhering to an etiquette” (Papacharissi, 2004: 267) are main reasons for moderation (Ksiazek, 2017).

Research results about the incivility of user comments differ between news platforms like news websites, providers or social media platforms. On Facebook, Rowe (2015) showed that discussions are of lower deliberative quality than on a news website itself. Also Ben-David and Soffer (2018) found comments to be more emotional on Facebook than on original

news websites. Next to its popularity, this low rationality of comments might be a reason, why Facebook appears to be a well-established platform in comment research (Brückner & Schweiger, 2017; Sülflow, Schäfer, & Winter, 2019; Winter, Brückner, & Krämer, 2015; Ziegele et al., 2018). But further, Facebook is increasingly used as source for news information (Newman, Fletcher, Kalogeropoulos, Levy, & Nielson, 2018). According to the Reuters Institute Digital News Report 2017, 54 percent use Facebook products weekly for news. Therefore, Facebook is a familiar platform for news consumption.

Using Facebook as an extreme case, this study should complement the research field of affecting user comments by investigating on *emotions*. We assume emotion in comments to be relevant for user when experiencing news. This assumption stems from the idea, that emotions are triggers and rather lead to heuristic than systematic processing. Heuristics allows processing in a less costly manner and appear to be a commonly used in complex online environments, such as social media. In the following, this will be explained in more detail.

### **Theoretical Contributions on Emotions**

In communication science, the effects of emotions in media receptions are widely explored. Emotions can be research object either as mental state of the receiver of information, or as the emotional intensity of an information perceived. As mental states, emotions are of certain quality and intensity. They are object-directed, multi-dimensional and of a short time duration. Persons who are in an emotional state usually have a characteristic experience, certain physiological changes and show behavioral actions (Meyer, Reisenzein, & Schützwohl). The emotional intensity is referred to as emotional tone of content. Following Bolls, Lang, and Potter (2001), content can either be emotional because of its topic addressed is fundamentally emotional or its verbal, non-verbal, and paraverbal language used. Both concepts are proven to influence information processing. For the present study, emotions are

investigated as emotional tone. More particular, the user comment is taken as experienced emotional toned expression of the writers experienced emotional state.

### **Negative Emotions**

However, not all emotions are equal. There is ample empirical evidence for an asymmetry in the way it is attended to emotions with different *valence*. Valence describes emotions as either positive or negative. This variation of emotions is explained in dimensional models. Dimensional approaches are powerful to study emotions in a statistical way and explain differences of effects on a simple level. One particular dimensional approach, the circumplex model of affect by Russell (1980), understands emotions on two bipolar dimensions, describing varying degrees of valence and arousal (low, high).

In terms of the influence of emotional tone, contracting studies and theories comparing *emotional valence* describe either positive or negative information to be of higher priority in selective attention (so called positivity or negativity bias). Thereby, the negativity bias is a wider accepted approach. It is a psychological principle to which *negative* is more causally efficacious than *positive* (Corns, 2018). Attending to negative more than to neutral and positive information is said to be the result of a tendency to attend to negative/threatening situations (Baumeister, Bratslavsky, Finkenauer, & Vohs, 2001; Rozin & Royzman, 2001). Negative stimuli are hypothesized to carry greater informational value than positive stimuli, and to thus require greater attention and cognitive processing. Supporting, research shows that individuals spend more time looking at negative than at positive stimuli, perceive negative stimuli to be more complex, and form more complex cognitive representations of negative stimuli (Vaish, Grossmann, & Woodward, 2008).

Researching on emotions, a differentiation of only valence and arousal might for some cases be insufficient. In particular in terms of negative emotion, distinct emotions such as anger and fear, which both scale high arousal as with negative valence, are considered as

equal within most representations of the circumplex model. A dominant set of theories, which reflects emotions more independent in its behavioral, psychological, and physiological manifestations, explains emotions as discrete states. Izard (1993) is one main exponent of discrete emotions. He names interest, joy, surprise, sorrow, anger, disgust, contempt, fear, shame and guilt to be basic discrete emotions, shaping further kinds. Focusing again on negative emotions, this concept is helpful to study how negative emotions are processed differently and lead to different reactions. Nabi (1999) explains in his cognitive-functional model of the effects of discrete negative emotions (CFM), how people appear to be more willing so to process approach emotions (such as anger) than avoidance emotions (e.g. fear).

Even though research suggests that attention and processing of information might differ for emotional variations, little is known about how people attend to emotional variations in user comments, and how attention, in turn, influences information encoding, storage, memory and knowledge enhancement. The scientific interest in knowledge generated on user comments stems from the idea, that on this knowledge, people make up their minds about journalistic articles and issues.

### **Affective Information Processing of (Negative) Emotional User Comments**

Although scientist interest in information processing of emotions rapidly is growing, it is still theoretically scarce (Yiend, 2010). Research on effects of emotional stimuli mostly stems from empirical psychophysiological or behavioral studies (Reeck & Egner, 2015; Vuilleumier, 2005). These studies present valid findings of bodily effects but often lack in theoretical explanations. Reeck and Egner (2015) offer an overview of neurophysiological effects of emotional stimuli engaging attention and in turn, how this modulates affective processing. The term affective information processing is thereby used to describe differences in processing of emotional and not emotional content.

In neurophysiological contexts, emotions are mainly referred to as relevant, salient information (Yiend, 2010). Because cognitive resources are limited, such that individuals cannot fully process all aspects of their environment at the same time, attention allocates processing resources to stimuli that are most relevant to an individual's goals. "As emotional stimuli have inherent value and biological or personal relevance to an individual, by their very nature, they have a unique relationship with attention" (Reeck & Egner, 2015). Following Kensinger and Corkin (2003), this attention toward emotional stimuli results in an enhanced likelihood of processing emotional information in memory. The processing of emotional information is described as a relatively automatic, which is stated to "facilitate the holding online of emotional information as compared with nonemotional information" (Kensinger & Corkin, 2003). Building on the literature, we assume emotional user comments to enhance performance on memory tasks via effects on selected attention, and further, that the relatively automatic processing mode of emotional content supports this effect.

### **Emotion and Selected Attention.**

Attraction is the starting point of each process of reception (Bucher & Schumacher, 2006). In attraction, attention has a selective function by including certain stimuli and excluding others from further processing. Because people do not have unlimited cognitive capacity to process messages, they rarely process all aspects of messages, instead selecting only salient features to encode, store, and retrieve (Lang, 2000). This selective process is referred to as selective attention. Selective attention processes "allow an individual to select and focus on particular input for further processing while simultaneously suppressing irrelevant or distracting information" (Stevens & Bavelier, 2012). Selected attention fulfills the means to reduce the complexity of the media outlet to which one is exposed (Bucher & Schumacher, 2006). Christianson (1992) stated that certain characteristics of the emotional event "are perceived and retained in an automatic fashion and perhaps by preattentive processing".



Preattentive processing is assumed to be “fast, nonconscious, independent of context, independent of processing resources, and able to carry out parallel processing of different inputs” (p. 301). In preattentive selection of information, highly salient information such as emotions are prevailed (Yiend, 2010). Highly salient refers to characteristics, which make information more relevant for individual’s goals of receivers. Following these thoughts, our first hypothesis is:

*H1: Emotional user comments receive more attention than comments without emotional tone.*

Based on the large amount of literature existing in the field of emotion effects on attention, we can make more precise prediction. Gervais (2014) showed emotionally strident incivility user comments appear to be especially effective in inducing reactions to incivility. This effect can be explained by negativity bias, stating that negative emotional information receives higher priority in selected attention than positive emotional information (Yiend, 2010). Therefore, we hypothesize:

*H2: Negative emotional user comments receive more attention than positive emotional user comments.*

In user comments, the feeling of anger is connected to incivility, while fear is not violating others. Anger is a negative emotion elicited by perceived demeaning offenses and fear stems from perceptions of imminent physical danger. Fear stems from perceptions of imminent physical danger (Lazarus, 1991). With the cognitive functional model (CFM), Nabi (1999) gives evidence that anger and fear lead to different selected attention. Anger is an approach emotion, fear an avoidance emotion. The model posits that people are willing to process approach emotion more than avoidance emotion. We hypothesize therefore:

*H3: Anger-framed user comments (approach emotion) receive more attention than fear-framed user comments (avoidance emotion).*

### **Emotion and Memory.**

Information that can survive after attention is stored in the brain and can become knowledge. Knowledge is important for building opinions or perceptions. If information does not get lost after attention, it is stored in memory. Memory is often stated to be the basic source for knowledge (Tucker, 2018).

Attention is a first indicator for further information processing and storage in memory. Studies show that the more attention is paid, the more efficiently information is processed and the longer it persists in working memory (Ferré, 2002). Research supports this observation in different studies for the distinctions of emotional tone drawn above: It is argued that emotional information is processed in a more efficient way than neutral information. “This is exemplified by an increased activation of the amygdala, an area of the brain associated with the processing of threatening and emotional stimuli and fear as well as in the encoding and retrieval of memories of emotional stimuli” (Phelps & LeDoux, 2005). Further, humans are supposed to be more likely to encode attributes indicative of a threatening emotion. “The ability to remember a threatening event allows people to utilize that memory in order to recognize the warning signs, when a future event has the potential to become dangerous” (Mickley & Kensinger, 2008).

Waddel and Bailey (2017) showed also for Tweets that individuals are more likely to attend to, recall, and be persuaded by negative rather than positive statements. The researcher compared the influence of positive and negative Tweets on a funny video shown in an experimental setting to see, if the comments of a few viewers on social media affect viewers’ perceptions of audience sentiment or their own program enjoyment. Results show that negative comments undermined perceived bandwagon support for the program and reduced enjoyment, regardless of contextual or trait moderators. Similar thereto, Unkel and Kümpel (2019), found that “negatively valenced user comments had a stronger effect on individuals’

quality perceptions than positive ones". These findings go along with the assumptions of negativity bias.

Taking Nabi's (1999) CFM again, the model shows evidence for only negative emotions to differentially influence the depth and direction of message processing. In the initial test of the CFM, Nabi (2002) examined the effects of anger and fear toward attitudes about domestic terrorism legislation. As predicted, anger promoted deeper information processing of the news story than fear.

Based on the assumption that attention leads to more effective storage in memory in general and on existing studies suggesting for emotional differentiations to influence information storage in the same direction as attention, we hypothesize:

*H4: Along with attentional processes, the storage of information in memory is more sufficient when information is transmitted in (1) an emotional compared to a not emotional, (2) a negative compared to a positive and (3) an angry compared to a fearful emotional user comment.*

### **Emotions and Automated Processing.**

The research cited above can account with neurophysiological body reactions for the general finding that high-intensity (negative) emotional information is often prioritized selected in attention as well as for storage in memory. To explain, *why* affective information processing occurs (Yiend, 2010), the model of heuristic and systematic processing (HSM) by Chaiken (1980) offers further understanding of underlying cognitive processes. The model describes two concurrent modalities of human information processing. The *heuristic processing* mode is characterized by the application of simple decision rules when receiving information while the *systematic processing* involves expending greater mental effort in the pursuit of a relatively analytic and comprehensive treatment of relevant information (Griffin, Neuwirth, Giese, & Dunwoody, 2002). Heuristic and systematic processing operate

independently and occur simultaneously. They are triggered by different information keys and process motivations. Heuristic processing makes fewer demands on cognitive resources (Kao, 2011). It is triggered by features of available information that enable the use of *cognitive heuristics*. Cognitive heuristics are mental shortcuts, used in order to form judgments about complex issues in a quickly and efficient manner when only limited resources are available. Oppositely, recipients tend to apply systematic processing when resources are available to process the message exceed what the message effectively requires (Kao, 2011).

However, as argued earlier, user comments appear in a complex online environment, where available cognitive resources are assumed to be rather low. Emotional information in this context is described as easily available information, which is processed faster compared to neutral information and already in a preattentive phase, thus, before cognitive information. People automatically attend to emotional cues and triggers before cognitive stimuli can be attended to, because no cognitive resources are left after emotional information processing.

Comparing negative and positive content, the preference of processing negative before positive emotional is explained to be more beneficial when quickly recognizing threatening situations. For discrete negative emotion only, an explanation why respondents tend to process anger first before fear is a motivation one: people are *willing* to approach and process messages that might offer goal-relevant information (e.g., retributive information if angry).

The information processing modality is seen as moderating factor of the proposed effects of emotional user comments on receiver's attention and memory storage. The effects of (negative) emotional comments should increase, when reader rely certain conditions, which support heuristic processing mode. People are forced to use heuristic processing, when their cognitive capacities are reduced. This reduction is assumed to occur in a digital environment by an overload of information on one hand, and reduced time for effective processing on the other. Especially for mobile digital media, research shows that time spend on reading articles

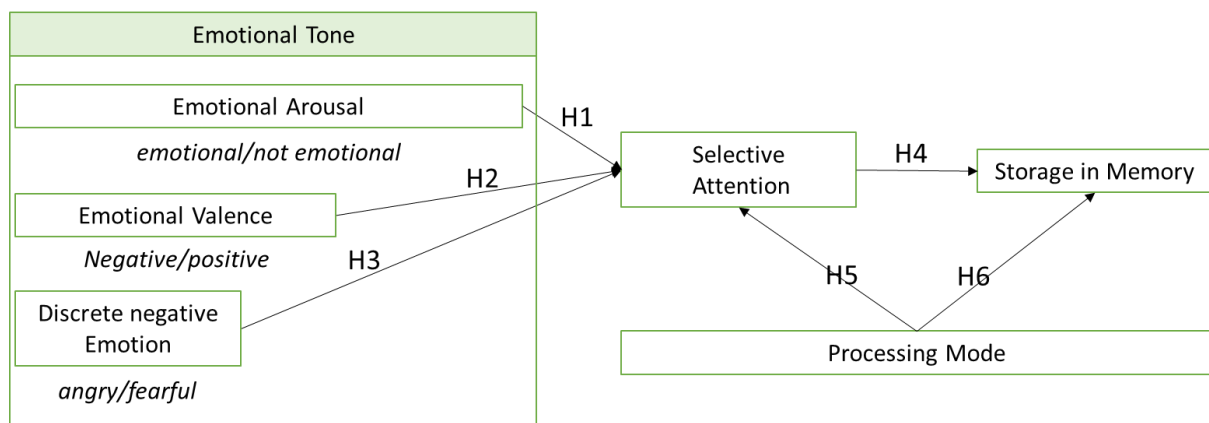
sufficiently is reduced. We propose that people rely on (negative) emotional comments in their selection and storage processes even stronger, when cognitive capacities are reduced:

*H5: (Negative) emotional comments receive relatively more attention than (positive) comments without emotion when additional visual distractors are involved.*

*H6: Information transmitted in an (negative) emotional comments will relatively persist better in memory than information presented in a (positive) not emotional comment when additional visual distractors are involved.*

To sum up, with a focus on negative emotions, we assume different variations of emotional tone to influence users' selective attention and memory storage. Further, we assume this correlation to be moderated by the information processing mode (see Figure 1).

Figure 1: Conceptual Research Model.



## Method

To test our hypotheses, a laboratory experiment using eye tracking and questioning will be conducted. In the laboratory study, participants will be exposed to three treatments. The treatments are Facebook news posts containing each four user comments. While, the first treatment is not part of the experiment, but serves to allow participants to become used to the laboratory situation, the second Facebook posts contains the manipulation of the comments' emotional arousal (emotional/not emotional) and emotional valence (positive/negative). The

third post contains the manipulation of negative discrete emotions (angry/fear). The same treatment will be exposed to every subject to allow within-subject comparisons. The processing mode (heuristic/systematic) will be observed as only between-subject factor in two groups. To provoke either heuristic or systematic processing, the cognitive capacities will be reduced in one group by putting them under time-pressure. The comparison group has unlimited viewing time.

### **Sample**

A sample of about 70 to 100 students will participate in the study. Participants will be recruited via an online website of the University of Amsterdam ([www.lab.uva.nl](http://www.lab.uva.nl)). They will be informed that the study will take about one hour.

### **Procedure**

The participants are invited to come to a laboratory. First, they will be welcomed, and handed a pre-questionnaire containing questions of demographics (age, gender, education), personal characteristics, which are proposed to influence reactions (personality traits, current emotional state) and Facebook news use (general Facebook use, experience with Facebook user comments). After being asked to fill out an informed consent document<sup>1</sup>, the participants will be seated in front of an eye-tracking monitor and be told about the recording of their eye movements during individual calibration. The experiment starts with a task shown on the monitor. It will instruct the participants to carefully read and scrutinize the following information as they would have to answer questions about it afterwards. Participants were randomly assigned to systematic or heuristic condition. To provoke heuristic processing, the participants will be told that they only have 30 seconds<sup>2</sup> of time to read all information. In the

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<sup>1</sup> The ethical committee review board of the Amsterdam School of Communication Research (reference number xx) approved the study protocol, and all participants provided written informed consent.

<sup>2</sup> The time is a first assessment. It will be adjusted according to the results of the pretest.

systematic condition group, no time limit will be given. The participants are allowed to view the news posts for as long as they want to. The participants will following be exposed to the three Facebook news posts. Afterwards, the participants will complete a distraction task to reduce order effects (Reeves & Geiger, 2014).<sup>3</sup> Finally, the participants will be asked to fill out a posttest questionnaire containing (1) a self-report measure of information processing, (2) a recognition test, (3) measurement of control variables, and (4) manipulation checks, before being thanked and debriefed. Participants received monetary compensation or course credits for their participation.

### **Measurement**

*Dependent variables.* The dependent variables of this study are **attention** and **memory**. Attention is measured as visual attention. As measurement for visual attention, eye tracking should be applied. According to the eye mind assumption, by recording the movements of the eye, an external observer can have access to the current contents of conscious processing (Orquin, Ashby, & Clarke, 2016). “Eye-tracking captures the gazing behavior that recipients apply to visually perceive their environment” (Sülflow et al., 2019). Fixations refer to resting gaze on a stimulus and correspond with the level of attention to information. The *total fixation time* of a person is the sum of all fixations. Fixations can be counted within defined *areas of interest* (AOI), which are selected regions of a displayed stimulus. The single user comments and the Facebook posts will be coded as five different AOIs., so that they can be compared. The apparatus will be used is a SMI RED eye tracker. The data for this study will be analyzed using SMI BeGaze software. To explore the effect of emotional tone on attention to comments, ANOVAs should be conducted, whereby time gazing on user comments with and without emotional arousal (H1), with negative and positive tone (H2) and with anger-framed and fear-framed tone (H3) can be compared.

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<sup>3</sup> Nadja will think about if she needs something.

*Memory* is measured as recognition memory. Recognition refers to the association of an event with one previously experienced, and involves a process of comparison of information with memory. *Recognition memory* is used to refer to both a memory measurement and a memory process that occurs in this measure of memory (Tajika, 2001). It provides a measure of encoding efficiency (Lee & Potter, 2018). Recognition is known to be a largely unconscious process. To recognize content is easier than to recall it.

In this study, the participants will be exposed to four multiple-choice questions for each treatment 2 and 3, similar to Kruikemeier, Lecheler, and Boyer (2018) and los Santos and Nabi (2019). This procedure is a forced-choice test. In a forced-choice test, the subject is shown several items at a time. One of the items is a target item the subject is asked to pick out from a set of items (Tajika, 2001). In this study, the items are answers to knowledge questions pertaining to information previously shown in the comments. In a recognition memory test, it is assumed that subjects judge items on their level of familiarity which varies in memory strength. When an item can be retrieved more readily than the other items, the item is at so called *full strength* (for example recognition questions, see Appendix 4). The memory strength of a test item is thought of as the degree of its familiarity in memory. To measure memory strength, the response to each question will be scored as either a 1 (hit) or 0 (miss). The participants should also receive the option to click “I do not know” (0). Each participant’s memory strength or recognition mean scores can be computed and compared across emotional loadings. ANOVAs will be conducted to explore the effect of emotional tone on recognition. The total recognition score of a person is the sum of correct answers for each test. To proof the hypotheses, ANOVAS can be calculated comparing recognition scores on user comments with and without emotional arousal, with negative and positive valence and with anger-framed and fear-framed tone (H4).



*Moderation variable.* The mode of information processing is involved as moderation variable into the research model. It should be measured two ways, which are an experimental intervention of the cognitive processing (Rand, 2016) and self-report. An intervention of the cognitive processing is applied by a decrease of the cognitive capacity in one group. Time can be regarded as a type of external cognitive resource. Reducing the amount of time in that subjects have to perform a task shortens the window of opportunity for cognitive processing (Rand, 2016). Thus, when individuals have sufficient time to process information, they are more likely to process information systematically (Kao, 2011). If the time allowed for processing information is constrained, individuals are expected to apply heuristic processing. For evaluation, again ANOVAS can be calculated comparing the groups attention (fixation time) and working memory (recognition score). The difference between the time individuals spend gazing on user comments with than without emotional arousal and with negative than positive emotional valence is assumed to be greater in the time-pressure scenario than in the unlimited time scenario (H5). Further, the difference between the information individuals can recognize from user comments with than without emotional arousal and with negative than positive emotional valence is proposed to be greater in the time-pressure scenario than in the unlimited time scenario (H6).

Self-report of information processing will be involved as second mode measurement. According to Schemer, Matthes, and Wirth (2008), “communication researchers have laid the groundwork for an externally valid assessment of information processing (...) based on self-report measures” to “shed light on different information processing strategies audience members rely on”. Self-report can be either measured using one-dimensional measures to predict learning (e.g. Eveland & Dunwoody, 2002), or two-dimensional measures to predict judgments or attitudes (e.g. Johnson, 2005). Eveland and Dunwoody (2002) will be applied to the current study using one-dimensional measures. They suggest that a single-factor model is

sufficient when research focuses on the knowledge acquisition. The reason is that the amount of mental effort is the most important explanation for why audience members learn from the media. This mental effort is assumed to be adequately measured with a one-dimensional bipolar scale ranging from low to high mental effort (for the items, see Appendix 1).

*Control Variables.* Besides sex, age and education, several control variables will be included in the study. The participants' news consumption behavior online will be assessed by asking how often participants use Facebook, and in particular read news on Facebook (measured on a scale ranging from 1 (not at all) to 10 (several times a day)); by asking if they liked the newspaper *The Independence* on Facebook and how often they read it online (same scale) as well as how often they read and write user comments (same scale). *Familiarity* of and *Disposition* towards the news issues will be further controlled, as they have been shown to influence comment perception (Anderson et al., 2013). Familiarity will be controlled by asking for topic knowledge, involvement and interest of the treatments (measured on a scale ranging from 1 (very low) to 5 (very high)). Disposition will be assessed by indexing a 5-point item "Overall, I support [depends on stimulus]," from 1 (not agree at all) to 5 (agree very much). Lastly, personality and current emotional state as psychological influencers on attention and memory should be controlled.

### **Stimulus Material**

The stimulus resembles the typical layout of a Facebook post (see Appendix 2 for a typical stimulus example). The posts will be presented singularly and successively on a screen. Original articles will be taken from the news provider *The Independent*. Reports about incidents of regional interest from the section "Home News" are chosen. The reports were chosen so that they do not involve known or famous people and to be easy to understand and not emotional arousing (this needs to be proved in manipulation check). It is assumed that the participants (UvA students) are not familiar with the incidents and have low involvement and

knowledge about the issues. The topics of the stimuli are namely [...] and [...].<sup>4</sup> The article will be transformed into a Facebook post with a short description of 550 to 650 (about seven lines). All posts are having the same picture, showing the word “NEWS” on a typical background for *The Independent* in dark red/black color. The news post will be in English language to further increase external validity.

All articles go along with each four comments in a fix order. The comments are artificially developed as reactions to the Facebook news posts. The procedure of stimulus manipulation was oriented to Kalch and Naab (2017), Sung and Lee (2015) and Kramer et al. (2017) who systematically varied characteristics of comments as independent factors. All comments are of same length (140 to 160 symbols; three lines) and are written by a gender-neutral, typical English named author with a not arousing profile picture (e.g. showing a landscape, flowers or blurred images). Each comment is liked and replied comparable frequent. Every comment contains *one main information* about the story of the incident for the measurement of story detail recognition (los Santos & Nabi, 2019). The information is chosen to be comparable in terms of *the difficulty to recognize* and so that the participants could not can know it before (e.g. background knowledge).

The varying emotional tone of the comments are the dependent variables. Harris and Paradice (2007) serve as theoretical base for the emotion manipulation. The authors make a first differentiation between affective and cognitive information. Affective information or emotion are communicated through various types of message cues, namely verbal and nonverbal cues. Cognitive information is “conveyed through the message content only”. In this study, neutral comments are free of emotion cues while emotional comments are manipulated with verbal and nonverbal cues. Verbal cues are emotion words and linguistic markers. Emotion words are “direct means of communicating emotions in written language”,

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<sup>4</sup> The topics will be selected on basis of the results of the manipulation check pretest.

e. g. I'm angry or I feel depressed. Linguistic markers are referred as phrases that do “not contain emotion words, but do attempt to communicate emotions between message senders and receivers”, which is either lexical or syntactic. Lexical encoding of emotions can be in a form of intensifiers (so, very, really), modals (would, might, will), hedges (maybe, possibly), or affective predicates (love, despise, delight, cry, laugh). Syntactic encoding includes emotional attitudes in a subordinate clause. Finally, nonverbal cues are paralinguistic cues “refer to message characteristics in text-based CMC used to convey meanings normally achieved via tone of voice, body gestures, and other behaviors in face-to-face communication”. Examples are vocal spelling, lexical surrogates, spatial arrays, manipulation of grammatical markers. For the stimulus material, for each emotional tone (positive, negative, angry, fearful), specific cues were used. See Appendix 3 for examples of comments being loaded with different (non)verbal emotion markers.

### **Pretest Stimulus Material**

A pretest study will be conducted to test and select the stimuli for the experiment. In an online questionnaire which will be promoted via an online website of the University of Amsterdam ([www.lab.uva.nl](http://www.lab.uva.nl)), participants will have to rate in total 50 comments in terms of their emotional tone. The comments will be developed as reactions to five Facebook news posts. On a scale from 1 to 7, the participants rate the emotional arousal (not emotional at all to very emotional), as well as either the valence of the emotional tone (very negative to very positive) or the degree of the discrete emotional tones anger (angry to fearful) on bipolar axes. Taken the results of the pretest, those Facebook posts will be chosen of which the comments score most precise the emotion they are assumed to present. The news post and articles for the habituation of the experimental situation (treatment 0) should be chosen randomly from the remaining articles.

### **Manipulation Check**

The manipulation check will be part of the pre/post questionnaire. It aims to test the accuracy of the stimuli, both of the Facebook News Post (familiarity of news provider and topic, comprehensibility of issue and language, emotional arousal of issue) and user comments (experienced emotional tone, authenticity of the comments).

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