

Nasty Peers and Smart Sceptics:

The cognitive effects of low-quality discussions in comments sections on social media.

Abstract

In the social media world of fake news, filter bubbles, and online bullying, people have a hard time navigating through, and keeping an objective distance to, what is right and wrong. So far, only a few researchers have examined the effects of social media on users' thinking, showing that people adapt to antisocial behaviour or poor writing in comments sections. There is much more to find out about how interactive contexts affect the participants' judgement and rational thinking. By first establishing a framework for what low-quality content on social media might involve, this paper then aims to examine the effects that this content has on users' thinking.

Through the research company Novus, a quantitative, questionnaire-based experiment was conducted with 667 respondents across Sweden. The experimental groups were exposed to online discussions on social media and later tested on assimilation and contrasting, confirmation bias and cognitive performance. The results showed that an extremely low-quality discussion triggered contrasting effects in the comments section, while the moderately low-quality discussions triggered assimilation effects. Moreover, the extremely low-quality discussion generated altered performance on the two cognitive tasks, while the moderately low-quality discussions did not. Conclusively, the results indicated that (low-quality) discussions on social media can affect users' thinking.

Keywords

Social media, comments section, low-quality online discussions, priming, cognitive ability, assimilation and contrasting, confirmation bias.

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Definitions

Social media is a platform for social interactions and allows users to network, share and create content with each other.

A comments section is the space, belonging to an article or picture, where social media users can interact with each other.

An online discussion is referred to, in this thesis, as a discussion taking place in a comments section on social media.

User generated content (UGC) is referred to, in this thesis, as the content created by users on any social media platform.

Antisocial or uncivil behaviour is the behaviour of online bullying, trolling or harassment.

Echo chambers describe the phenomenon when social media users reinforce their pre-existing beliefs by selectively seeking out information that match those beliefs.

Confirmation bias is the tendency to interpret evidence as a confirmation of one's pre-existing beliefs.

Cognition is referred to the mental procedure of attaining knowledge and comprehension.

Priming is referred to the unconscious influence a stimulus can have on someone's behaviour.

1 Introduction

A decade ago, communication faced a paradigm shift as social media was born. The 24/7 open space for sharing and discussing content has not only changed the way we interact, but also the way we talk to each other about business, politics and social life. Interestingly, in this new space of interaction, a part of the ongoing discussions is held in so called comments sections. Today, these are more or less what constitute the vehicle for discourse. The effects of this new way of interacting and discussing are many, and not always constructive. Comments sections on social media are more frequently consisting of bullying, antisocial behaviour, harassment and trolling (Duggan 2017). In fact, the spread of antisocial comments could almost be seen as a domino effect of nasty behaviour. Research show that people tend to accommodate to, or mimic, offensive language and poor writing in comment sections (Cheng, Bernstein, Danescu-Niculescu-Mizil & Leskovec 2017), leading to hostile comments, and consequently *low-quality discussions*. The concept of quality itself is difficult to define as everyone holds their own specific opinion of what constitutes low-or high quality. However, this thesis aims to build further upon this concept.

For decades, researchers have examined the positive impact of communication on consumers' thinking, and findings support that creative communication can make people more creative (Rosengren, Dahlén & Modig 2013). Negative effects of communication on consumers show a similar pattern; it can make people underperform on cognitive or emotional tasks, such as a math test (Spencer, Steele & Quinn 1999; Schmader 2002). This sparks questions about other potential interrelations between a certain impact and the effect on cognition. If communication can prime consumers to perform better, or even worse, on cognitive tasks, could the same hold for the communication taking place in comments sections? This thesis aims to examine the extended effects that (low-quality) discussions on social media might have on users' cognitive thinking.

1.1 Background

This section aims to give a thorough understanding of the role that comments sections on social media have played in the community discourse, and how they influence users' thinking. Furthermore, the following aims to present why the understanding of user generated content in comments sections on social media is relevant to marketers.

1.1.1 Social media interaction

Social media and its massive progression has transformed the way we communicate with each other (Schoder, Gloor & Metaxas 2013). It is commonly associated with the most popular network sites and platforms such as Facebook, LinkedIn, Twitter, Instagram and YouTube (We Are Social 2018). The market leader, Facebook, is ruling the social media landscape and plays an important role for social interactions, but also for information dissemination. In fact, studies show that people use social media platforms as a major source of information and news (GlobalWebIndex 2017).

Social media allows users to network, share and create content with each other (Kietzmann, Hermkens McCarthy & Silvestre 2011), a concept referred to as *user generated content*, *UGC* (van Dijk 2009). The notion of UGC has important implications for businesses as their branding and marketing efforts on social media are more or less controlled by the consumers (Sashi 2012). By commenting, posting and sharing information, users are in charge of what is said and promoted (Christodoulides, Jevons & Bonhomme 2012). In contrast to traditional marketing efforts where the marketer tries to influence the potential buyer in a one-way conversation, social media enables two-way, or multidimensional, conversations (Kaplan & Haenlein 2010). Hence, in order to be able to navigate strategically in the digital communications landscape, it is essential for marketers to gain knowledge about the role of comments sections and how they influence users' thinking. However, it is not only important for marketers, but for every politician, company or individual that strives to communicate in social media channels.

1.1.2 The role of comments sections

Social media users discuss and share information in the comments sections of political, social or business-related posts (Gustafsson 2012; Lenhart, Purcell, Smith & Zickhur 2010; Kaplan & Haenlein 2010). As such, these spaces have become tools for community discourse (Shearer & Gottfried 2017). One rather negative effect that has been identified in relation to this, is that

online incivility is growing (Duggan 2017), a concept referred to as a *(virtual) offensive interaction* (Antoci, Delfino, Paglieri, Panebianco & Sabatini 2016). In recent years, there has even been a need to invent a new word that explains this repellent online behaviour; *trolling* – “*make a deliberately offensive or provocative online post with the aim of upsetting someone or eliciting an angry response from them*” (Oxford Dictionary 2018). Previously, researchers have held the belief that trolling is positively correlated with uncivil personality traits or anonymity (Buckels, Trapnell & Paulhus 2014), but new studies show that “anyone can become a troll” (Cheng, Bernstein et al. 2017). In fact, exposure to negativity online increases the readers’ uncivil and negative thoughts, leading to hostile comments, and consequently *low-quality discussions* (Rösner, Winter & Krämer 2016).

Now you may wonder, what is exactly a low-quality discussion? The concept of quality itself is difficult to define as everyone holds their own specific opinion of what constitutes low-or high quality (Moje, Collazo, Carrillo, & Marx 2001). Accordingly, there seems to be no universally accepted definition of what a low-quality online discussion is. Even though the concept is lacking a universal definition, a few reference points have been elaborated on (Strong, Lee & Wang, 1997; Diakopoulos & Naaman, 2011). For example, Hsu, Khabiri & Caverlee (2009) have studied how an online community judges the written quality of others. They measured features such as cohesion, comment complexity, readability, subjectivity vs. objectivity etc. Furthermore, a study by the American Institute of Physics (2017) elaborates on the specific criteria that make up a high-quality online discussion; relevancy, politeness, trustworthiness and variety (Ismail, Salim & Huspi 2017). Based upon the aforementioned literature, this thesis aims to further investigate what constitutes a low-quality discussion and thus contribute with a framework on the subject.

1.1.3 Comments sections’ influence on thinking

As previously mentioned, several researchers have found online incivility to be an interesting subject to explore. To conclude their discoveries, one can state that uncivil comments can cause domino effects in the comments sections (Cheng, Bernstein et al. 2017; Rösner, Winter et al. 2016). Additionally, Singer, Ferrera, Kooti, Strohmaier, & Lerman (2016) observed how people’s language and writing skills were reduced over the course of an active online discussion session on the internet forum Reddit.

Other research show that the discourse taking place in comments sections can lead to *extended effects* on users (Schivinski & Dabrowski 2016). For instance, social media comments sections can increase users' confirmation bias, as platforms like Facebook have algorithms that create so called *echo chambers* (Quattrociocchi, Scala & Sunstein 2016). The concept implies that opinions are reinforced rather than challenged (Garrett 2009; Flaxman, Goel & Rao 2016). Another extended effect of social media usage is explained by Rahwan, Krasnoshtan, Shariff & Bonnefon (2014), as they conclude that copying on social media limits users' analytical thinking and cognitive ability.

However, the previously mentioned extended effects have never been tested on actual cognitive performance. By further elaborating on domino effects in comments sections, this thesis also aims to explore the extended effects that (low-quality) discussions on social media might have on users' thinking.

1.2 Problem area and research gap

Comments sections on social media are used as vehicles for community discourse, whether it is political, social or business-related (Gustafsson 2012; Lenhart, Purcell et al. 2010; Kaplan & Haenlein 2010). In fact, a growing amount of people use social media platforms as their major source of information and news (GlobalWebIndex 2017). At the same time, there is a growing tendency of incivility and antisocial behaviour in these online spaces (Lenhart, Ybarra, Zickuhr & Price-Feeney 2016). Inevitably, this has implications on consumers' thinking. For decades, marketers have studied consumers' cognitive and affective response to communication in order to forecast consumers' decisions and learn about their cognition (Lee, Broderick & Chamberlain 2007). However, the cognitive effects of the user generated content that takes place on social media is yet a fairly unexplored subject.

Research on the subject has explored the effects of comments sections on human cognition within the same context, meaning that researchers have observed how people tend to assimilate to, or mimic, offensive language or poor writing in comment sections (Cheng, Bernstein et al. 2017). However, what happens to our cognition, when transferred between discussions in these comments sections and another context? To the extent of our knowledge, no research has yet been done on the *extended effects* (i.e. in an unrelated setting) on cognition as a result of communication in comments sections on social media. Hence, the following study will explore

if users' cognition is transformed when exposed to comments sections on social media, by measuring the results of two unrelated tasks.

1.3 Purpose and research question

Today, advertising is facing a radical change in terms of power, as the power is shifting towards consumers in social media (Kaplan & Haenlein 2010). Due to the aforementioned effects user generated content has on the landscape, it is the consumers that dictate the outcome of advertisers' efforts (Mangold & Faulds 2009). As such, the communication that takes place in comments sections on social media is fundamental to understanding how the digital world affects, or even transforms, users' cognition. Therefore, this study is set out to investigate the extended effects online discussions in comments section may have on users' cognition;

- *Can (low-quality) discussions on social media affect cognitive thinking?*

In order to examine the possible effects of low-quality online discussions more thoroughly, the sub research question is;

- *Can different levels of (low-) quality affect cognitive thinking differently?*

1.4 Delimitations

In this study, several delimitations were made with regard to the communication that takes place on social media. This thesis examines *social and/or political discussions in the comments sections on social media*. Firstly, this study excludes anonymity in the comments sections, although the names in the comments sections have been blurred for this specific study, the comment itself was made from someone non-anonymous. The reason for excluding anonymity is that social media platforms, such as Facebook, do not allow for anonymous users. Also, previous studies have shown that anonymity often correlates with incivility (Santana 2014). By delimiting to non-anonymous discussions, the intention is to examine the effects on cognitive performance when people are non-anonymous. Furthermore, the online discussions were limited to *public comments sections*, as it was important that the comments sections could be available to anyone using social media.

The delimitations made concerning the questionnaire were based on the limited space available. Consequently, this study was not able to include a complete IQ-test and it is important to emphasise that this study does only measure the immediate cognitive performance, not the actual cognitive ability. Hence, the results will refer to a changed state in performance on a specific test, at a specific time. Furthermore, as the experiment was distributed and conducted by the research firm Novus, the respondents were limited to respondents from their online panel. Geographically, the respondents were limited to Sweden and the language of the questionnaire was therefore in Swedish.

1.5 Expected contribution

With respect to that the term of quality is complex (if not quixotic) to define, this thesis aims to contribute with a framework of what low-quality content on social media might involve. Moreover, with the opportunity to execute a real experiment with the research company Novus, this study aims to provide insights on how social media users' cognitive thinking is affected by low-quality discussions in comments sections. Not only has the tremendous growth of social media made it important to understand how users on these platforms act in order to be able to develop efficient marketing strategies, but also for the understanding of society as a whole. For instance, we have noticed that comments sections can play a part in the outcome of important global events. In light of recent events where related public debates were mainly held on social media, such as the American election of 2016 and Brexit (Enli 2017; Khatua & Khatua 2016), we need to make sure that we understand what social media does to us, and our cognition. The fact that social media is a tool for community discourse (Shearer & Gottfried 2017) is a relatively new phenomenon. By providing knowledge on how people's thinking is affected by content in the comment sections of these platforms, this thesis aims to contribute by opening a door to a new research subject within the field of marketing, but also potentially other fields such as psychology and behavioural economics.

However, the impact social media has on cognitive thinking is an extremely complex issue. There is no single answer to the question how we are affected by content on social media, and not much research has been done on the subject. Thus, it is key to specify that this thesis aims to shed light on a, to the extent of our knowledge, completely new research area, rather than covering all possible mechanisms that affect human cognition when exposed to communication on social media.

2 Theoretical framework

In the theoretical framework, previous research and relevant theories are presented. The purpose of the following section is to identify some of the mechanisms that could explain how people's cognitive thinking is influenced by discussions in comments sections on social media. Subsequently, the three hypotheses of this paper are generated from this framework.

2.1 Theoretical background

2.1.1 The domino effect in comments sections

Nowadays, social or political discussions taking place in forum threads or comments sections on social media trend uncivil and are often embodied by antisocial behaviour, such as *trolling* (Rösner, Winter et al. 2016). As aforementioned, traditional theories often promote the belief that uncivil behaviour is linked to uncivil personality traits (Buckels, Trapnell et al. 2014), but more modern theories note that uncivil behaviour is context bound. In fact, new research from Cheng, Bernstein et al. (2017), shows that “anyone can become a troll”, implying that people adapt their comments to the (low-)level of formality or politeness in an online discussion. Instead of simply holding a specific personality trait, anyone taking part of a discussion that starts with a troll comment is more likely to troll him-or herself. The probability of acting antisocially in an online discussion partially depends on mood and context, both of which can be affected by others in any social setting (Barsade 2002; Turner, Oakes, Haslam & McGarty 1994). As previously mentioned, a study by Singer, Ferrera et al. (2016) shows that the amount and duration of social media usage can affect cognitive performance, as they observed how people's language and writing skills were reduced over the course of an active online discussion session on the internet forum Reddit.

2.1.2 Theory of priming effects

Having laid out the foundations of how social media users influence each other's cognitive or empathic skills in a related environment; the communication theory of *priming* broadens our perspective to what mechanisms might affect us in an unrelated environment. The theory of priming is widely and commonly used among marketers, psychologists as well as behavioural economists (Rosengren, Dahlén et al. 2013; Doyen, Klein, Pichon & Cleeremans 2012; Marteau, Ogilvie, Roland, Suhrcke & Kelly 2011). The phenomenon is complex, but at the same time simple. The basic and single condition for priming is that some sort of communication must take place in order for the partaker to be subjected to it (Yi, 1990). The

theory has mostly been used to explain advertising effects on consumers, for example, in terms of product choice or brand attitude (Yi 1990; Chartrand, Huber, Shiv & Tanner 2008). However, scientists have also examined the extended, or *unrelated*, effects of priming, such as the effects on cognitive performance as a result of exposure to particular communication (Spencer, Steele et al. 1999; Schmader 2002; Stein, Blanchard-Fields & Hertzog 2002).

In a study by Rosengren, Dahlén et al. (2013), it is confirmed that advertising creativity has a priming effect on the creativity of the consumers. Their results showed that a creative advertisement benefited the consumers by making them better at creatively solving unrelated tasks. However, not only did it benefit the consumer, but also the advertiser, as it allowed the recipients to derive greater value from the advertisement's context. Another study shows that, after being exposed to portrayals of homosexuality in advertising, people tend to think about others on a higher level. Thus, the consumers were primed to enhance their empathic skills (Åkestam, Rosengren et al. 2017).

Hence, research show that advertising, as well as other forms of communication, can prime consumers to increase creative, cognitive or emotional skills (Rosengren, Dahlén et al. 2013; Yi 1990; Åkestam, Rosengren 2017). Negative effects of communication on consumers show a similar pattern; it can make people underperform on cognitive or emotional tasks, such as on a math test (Spencer, Steele et al. 1999; Schmader 2002). These negative effects are often explained through *stereotype priming*, meaning that communication can reinforce stereotypes and make people act accordingly (Blair & Banaji 1996).

Several studies have been conducted on the topic of stereotype priming (Meisner 2012; Stein, Blanchard-Fields & Hertzog 2002; Chen & Bargh 1997), showing that it can influence people differently based on whether they find themselves to be a part of the stereotyped group or not. To explain the concept further, Stein, Blanchard-Fields et al. (2002) have studied age-stereotype and its effects on memory performance. Results showed that the memory performance was affected negatively for older adults, when exposed to a negative prime (exposure to words, such as; Alzheimer's, dying, confused, senile etc.) Other studies have shown that gender identification has a negative effect on female's math performance (Schmader 2002; Spencer, Steele et al. 1999).

If communication can prime consumers to perform better, or even worse, on cognitive tasks, could the same hold for the communication taking place in comments sections? Since research shows that users tend to copy each other's behaviour in these online spaces that increasingly consist of content such as harassment, bullying and poor writing (Cheng, Bernstein et al. 2017), they could hypothetically be primed to underperform cognitively. However, different levels of (low-)quality in comments sections can potentially affect users in different ways, and luckily, the consequences of priming explain these mechanisms.

2.2 Consequences of priming: assimilation and contrast effects

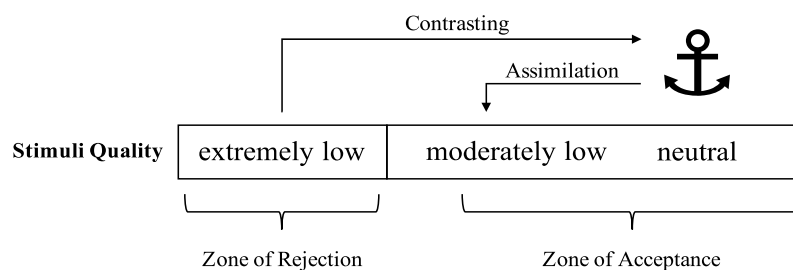
Priming of communication can lead to several consequences, and two of them are assimilation and contrast effects (Herr, Sherman, & Fazio 1983). These effects explain how different levels of quality, intensity or any other parameter, of a communication stimulus can prime recipients in opposing ways (ibid). A pedagogical example inspired by Schwarz & Bless (1992) could clarify these effects. Suppose, for example, that two groups of people "Group A" and "Group B" are asked to state their opinion about a certain politician. Before they express their opinion, they receive some negative information about this politician. How is this new information affecting them? It depends on their initial standpoint on the subject, referred to as their *anchor*. Suppose that "Group A" worships this politician. Hence, the negative information is so far away from the group's perception, or anchor, that they in fact become more confident in their initial standpoint. This effect is called *the contrast effect* as it illustrates the consequence of priming when communication falls into someone's *zone of rejection*. "Group B" also likes this politician, but not as much as "Group A". For "Group B", the negative information is not perceived as *too* far away from their anchor, and consequently they accommodate to the information and shift their opinion towards it. This effect is called *the assimilation effect* as it illustrates the consequence of priming when communication is received in someone's *zone of acceptance*. (Ibid).

More specifically, the assimilation effect is the bias imposed after exposure to a context stimulus, affecting the thoughts and judgements to match those of the received information, whilst the contrast effect occurs when the recipient produces an opposed reaction to the contextual information (Sherif & Hovland 1961). Which of these effects that arise depends on the intensity of the specific stimuli that the subjects are exposed to, as well as their anchor (Herr, Sherman et al. 1983; Sherif & Hovland 1961). Hence, if someone is exposed to a *moderately* intense stimulus, an assimilation effect can occur. Conversely, contrast effects arise when

someone is exposed to an *extremely* intense stimulus. The more specific or extreme the context stimuli are in comparison to one's anchor, the more likely contrast effects are to occur (Herr, Sherman et al. 1983). Looking back at the politician example, the negative information was interpreted as extreme for "Group A", while the information was perceived as moderate for "Group B", leading to opposing effects on their actions.

As previous studies show that trolling in comments sections can make people adapt, or assimilate to, hostile behaviour (Cheng, Bernstein et al. 2017), this study aims to investigate whether discussions of different levels of (low-)quality can prime respondents to assimilate or contrast in the comments section. In this study, online discussions of extremely-low quality will serve as *extreme context stimuli* and online discussions of moderately-low quality will serve as *moderate context stimuli*. Moreover, the purpose of this study is to compare the effects of the different online discussions (context stimuli), rather than investigate how individual subjects change their position in relation to their own anchor after being exposed to a stimulus. Thus, a stimulus of *neutral quality* will be used as a general anchor of the population, hence working as a reference point of the average respondent's initial position.

Figure 1 – zones of rejection and acceptance



As *figure 1* shows, a stimulus (online discussion) of moderately low-quality is expected to fall into the respondents' "zone of acceptance", and thus the respondents are hypothesised to assimilate, i.e. write comments of lower-quality than neutral. Whereas, a discussion of extremely low-quality is expected to fall into the respondents' "zone of rejection" and thus the respondents are hypothesised to contrast. This means that they will write comments of the same quality as the "anchor".

H1a: Subjects to moderately low-quality discussions will produce comments of lower quality than subjects to neutral-quality discussions.

H1b: Subjects to extremely low-quality discussions will produce comments of similar, or better, quality than subjects to neutral-quality discussions.

2.3 Confirmation bias

In these comment sections, have you ever thought about that social media users seem to hold such congruent beliefs? As social media allows user generated content, it also implies that the users leave digital tracks (Girardin, Calabrese, Dal Fiore, Ratti & Blat 2008). A growing concern is that social media platforms create so called *filter bubbles* or *echo chambers*, the result of algorithms that selectively choose what information social media users are exposed to, based on their behaviour online (Bakshy, Messing & Adamic 2015). Consequently, users are segregated from those with completely opposing opinions and instead homogeneous thoughts and opinions are confirmed by each other (Garrett 2009; Flaxman, Goel & Rao 2016).

Research shows these echo chambers can increase users' *confirmation bias* (Del Vicario, Bessi, Zollo, Petroni, Scala, Caldarelli et al. 2016). The concept implies that when people want something to be true, they will gather information in accordance with that belief (Nickerson 1998). Hence, a confirmation bias can be possessed by anyone selecting information based on the beliefs of oneself, also referred to as the *myside bias* (Stanovich, West & Toplak 2013). This bias is attained when pursuing a *selective exposure*, and thanks to Google, people can confirm ideas by simply adjusting the search a few times (Frenda, Nichols & Loftus 2011). Del Vicario, Bessi et al. (2016) states the important role that confirmation bias and user polarisation have played in the dissemination of false information on social media. Furthermore, they argue that the main driver for the spreading of misinformation is selective exposure to content (ibid).

The reason for possessing a confirmation bias is that people tend to only ask questions of which they know the answer will be “yes”. However, people in disagreement with the proposed beliefs are much harder to convince; they will instead ask questions where they can elicit the answer “no” (Wason 1968), in other words disconfirm the proposed argument. In a study by Hoffman, Trawalter, Axt & Oliver (2016), it is stated that people can overcome an unconscious bias by simply learning what is regarded as socially correct, and what is regarded as wrong. However, as this is a process occurring in the unconscious mind, it takes time and learning can only be accomplished by repeated exposure to the specific bias (ibid).

Accordingly, subjects exposed to extremely low-quality discussions are expected to more easily reject the information as incorrect. If they disconfirm the information of the stimulus (as hypothesised) it is possible that they are put in a critical, or questioning, mindset (Nickerson 1998). A questioning mindset is helpful in this case as the only way a confirmation bias task can be solved is to disconfirm the statement that has been proposed (Wason 1968). In contrast, it is hypothesised that respondents of moderately low-quality discussions will find it more difficult to reject the information as being incorrect. Consequently, they are expected to possess a higher confirmation bias.

H2a: Subjects to moderately low-quality discussions will underperform on a confirmation bias test, in relation to the control group.

H2b: Subjects to extremely low-quality discussions will perform similar to, or better than the control group on a confirmation bias test.

2.4 Priming effects on cognitive performance

In the first hypothesis section, certain consequences of priming were presented, namely assimilation and contrasting, and their effects on *related tasks*. In this section, theories of how priming can influence someone on an *unrelated* task will be presented.

As mentioned in previous sections, priming has shown to influence people's performance on unrelated tasks in a range of ways; by making people more creative, decrease performance on a mathematics test or decrease memory performance (Rosengren, Dahlén et al. 2013; Schmader, 2002; Stein, Blanchard-Fields et al. 2002). The unrelated task of interest for this particular study is cognitive performance. Hence, theories aligned with cognition will be presented to create a foundation for the final hypothesis.

The concept of critical thinking is one of the most urgent issues in modern time as we need to learn how to navigate in the social media world of fake news, click bait, and online bullying (Girardin, Calabrese, Dal Fiore, Ratti, & Blat 2008). Not only has critical thinking been proven to be a tool for fighting against filter bubbles (Miller & Bertlett 2012), but also it can enhance cognitive performance (Albergaria-Almedia 2011). With notion to the previous theory sections, it was hypothesised that respondents of extremely low-quality discussions will contrast the information in the online discussion. Research shows that contrasting requires more cognitive

steps for the human mind than it requires when assimilating to information (Martin, Seta & Crelia 1990). When people choose to contrast, they also choose to disregard the given information and instead search for evidence matching their own perceptions of the factual question. To the contrary, when assimilating to information, people are simply absorbing the information and applying it as equivalent to their own opinions (ibid).

With all the above taken into consideration, it is hypothesised that subjects to a moderately low-quality discussion will underperform on a cognitive task, as assimilation requires less cognitive steps and no critical thinking is activated. Furthermore, it is hypothesised that people exposed to extremely low-quality discussions will activate higher cognition effort and consequently perform similar to, or better than, the control group on the cognitive task.

H3a: Subjects to moderately low-quality discussions will underperform on a cognitive test, in relation to the control group.

H3b: Subjects to extremely low-quality discussions will perform similar to, or better than the control group on a cognitive test.

2.5 Summary of hypotheses

Summary of hypotheses	
H1a	Subjects to moderately low-quality discussions will produce comments of lower quality than subjects to neutral-quality discussions.
H1b	Subjects to extremely low-quality discussions will produce comments of similar, or better, quality than subjects to neutral-quality discussions.
H2a	Subjects to moderately low-quality discussions will underperform on a confirmation bias test, in relation to the control group.
H2b	Subjects to extremely low-quality discussions will perform similar to, or better than, the control group on a confirmation bias test.
H3a	Subjects to moderately low-quality discussions will underperform on a cognitive test, in relation to the control group.
H3b	Subjects to extremely low-quality discussions will perform similar to, or better than, the control group on a cognitive test.

3 Methodology

In this part, the reasons for the undertaken scientific approach and research method will be explained. As this study aims to explore a relatively new research subject, several preparatory studies have been conducted, and their results will be presented in this section. The main experiment of this thesis was distributed through the Swedish research company Novus, thus enabling a highly professional process.

3.1 Scientific approach

In the previous section, relevant theories and studies were acknowledged as a basis for the hypotheses of this thesis. These formulated predictions were measured using an experiment, implying that a deductive approach was applied. As statistical testing required data collection, a quantitative method was required. (Bryman & Bell 2015)

With the purpose to examine the respondents' cognitive reactions to low-quality discussions on social media, the experiment compared responses of a control group with each of the experimental groups. The experiment was formed with a total of five respondent groups; one control group and four experimental groups. The respondents were randomly assigned to a group, limiting the risk of self-selection bias (Wooldridge 2016). The four experimental groups were each exposed to a stimulus, to later on answer some questions, while the control group was solely exposed to the questions. The four different stimuli consisted of an online discussion about an article taken from the social media platform Facebook.

3.2 Experiment design

The main study was formed in three parts; an introduction, a stimulus and a questionnaire. The introduction and questionnaire were exactly the same between all four experimental groups. In the introduction, participants of the experiment were welcomed by a text explaining that this particular study was conducted with the purpose to gain knowledge of how people perceive online discussions on social media. Furthermore, the participants were informed that the experiment would consist of an online discussion in a comments section belonging to an article, followed by a range of questions that would vary in style. However, the participants assigned to the control group were solely welcomed to the survey with a text explaining that they were about to answer a couple of questions for a study on online discussions.

After the introduction, respondents assigned to the experimental groups were randomly exposed to one of the four stimuli (an online discussion), before proceeding to the questionnaire. Each stimulus consisted of a news article, gathered from Facebook, and its related comments section. In the experiment, the stimuli were designed to have the appearance of a news feed section on Facebook and was constructed to look as authentic as possible. The comments in the experiment were captured from the original comments sections belonging to the gathered news articles. However, the order of the comments in the experiment was not the same as in the original comments sections and a handful of comments were manipulated in order to leave out personal information.

Lastly, the respondents were exposed to the questionnaire. The questions varied in style and structure and they were either open ended or indicated on a scale to measure beliefs and perceptions. (Bryman & Bell, 2015)

The following sections will provide more details about the structure and content of the main experiment. However, the process of creating the main experiment began with building a framework for what a low-quality discussion might involve, and subsequently to conduct a pre-pre-and pre-survey. These preparatory studies are explicated below.

3.3 Preparatory studies and stimuli development

Bryman & Bell (2015) recommend that experiments should be designed to imitate reality as much as possible in order to make the results accurate. Therefore, it was important that the comments sections chosen for this experiment comported to those people can find on a social media platform. The purpose of the following pre-pre-and pre-study was to set the conditions for creating the main stimuli, with the goal to imitate an authentic social media setting.

3.3.1 Assessment framework for low-quality content on social media

As presented in the background section of this thesis, there seems to be no universal definition of what constitutes low-quality content online. Thus, as a complement to the literature presented in the background section, the aim of this pre-pre-study was to create a framework for low-quality content in comments sections on social media.

3.3.2 Pre-pre-study

Respondents were asked to evaluate 10 characteristics (selected from the previously mentioned literature about online content quality (Ismail, Salim & Huspi 2017)) and assess them as either high-quality content or low-quality content. The result of the following pre-pre-study was taken into account when creating the online discussions as the accuracy of the stimuli was essential in order to produce a natural response in the main study.

Results from pre-pre-study 1: n = 36 responses, mean age 24, 54 % male, 46% female.

Table 1
Framework for low-quality content online

	Low quality	High quality	Both	Neither	No opinion
Harassment	94.44%	0.00%	2.78%	0.00%	2.78%
Off topic arguments	77.78%	2.78%	8.33%	8.33%	2.78%
Spelling errors	75.00%	2.78%	8.33%	8.33%	5.56%
One-sided argumentation	72.22%	2.78%	16.67%	8.33%	0.00%
Politeness	8.33%	77.78%	0.00%	0.00%	13.89%
Different opinions	2.78%	55.56%	19.44%	19.44%	2.78%
Constructivism	2.78%	83.33%	0.00%	5.56%	8.33%
Useful information	2.78%	91.67%	2.78%	2.78%	0.00%
Complex arguments	0.00%	69.44%	11.11%	13.89%	5.56%
Multiple perspective	0.00%	91.67%	2.78%	5.56%	0.00%

The result from this pre-pre-study showed that harassment, off topic arguments, spelling errors and one-sided argumentation characterise low-quality online discussions. The framework was used as a foundation for the choosing of comments sections that would represent the low-quality stimuli.

3.3.3 Stimuli development

Based upon findings in the pre-pre-study, the stimuli (online discussions) were developed. Four different articles were selected, all gathered from Facebook accounts such as news magazines or companies. The four selected articles touched upon different political or social subjects: 1. *the Swedish pension system* 2. *Swedish agriculture* 3. *mobile phones* 4. *a specific Swedish entrepreneur*. From the original comments sections of the articles, ten to fifteen comments were carefully selected according to the quality framework that was designed in the pre-pre-study. In line with the previously mentioned theory of assimilation and contrast effects, the goal was that the different online discussions would reflect different levels of (low-)quality; *moderately*

low and *extremely low* as well as one of *neutral* quality. For obtaining the lower quality levels, moderately low and extremely low, the comments were selected according to match the low-quality characteristics in the established framework. The comments of neutral quality were instead selected to *not* match any of the low-quality characteristics. The purpose of having a stimulus of neutral quality was to control for the effects of reading something before participating in the experiment.

When the four articles and their belonging comments sections were chosen, they were placed together with a short description of the article and an internet link of the source, using Photoshop. The purpose of utilising this tool was to imitate a real-world social media setting. The four experimental stimuli were subsequently assessed and evaluated in the following pre-study, in order to control that the stimuli mirrored the intended levels of quality; neutral, moderately low and extremely low.

3.3.4 Pre-study 1: Assessing stimuli comments sections

In order to ensure that the stimuli created (online discussions) possessed the intended levels of quality, a pre-study was conducted. The participants were asked to classify the online discussions on the basis of their overall quality level. More specifically, they were asked to assess the four different stimuli on a five-point scale of quality level (Bryman & Bell 2015):

1 = extremely low-quality, 2 = moderately low-quality, 3 = neutral quality, 4 = moderately high-quality, 5 = extremely high-quality

Results from pre-study 1: n = 44 responses, mean age 29, 56.10 % male, 43.90% female.

<i>Stimulus 1</i>	Online discussion based on the topic “mobile phones” was assessed as “neutral quality” with a mean value of 3.07.
<i>Stimulus 2</i>	Online discussion based on the topic “the Swedish pension system” was assessed as “moderately low-quality” with a mean value of 2.05.
<i>Stimulus 3</i>	Online discussion based on the topic “a specific Swedish entrepreneur” was assessed as “extremely low-quality” with a mean value of 1.34.
<i>Stimulus 4</i>	Online discussion based on the topic “Swedish agriculture” was assessed as Assessed as “moderately low-quality” with a mean value of 2.19.

(to view the four different stimuli, see the appendix)

As the result proved that the intended levels of quality were mirrored in the respective stimulus, no alterations were made to the online discussions. Consequently, the final drafts of the stimuli were established.

3.3.5 Pre-study 2: Assessing difficulty level of cognitive test

The second preparatory study was conducted to assess the difficulty level of some intelligence related questions. The purpose of the study was to make sure that answers should reflect the normal distribution of intelligence in the Swedish society. Due to the limited space of the questionnaire, a standardised intelligence test could not be performed as they usually have more than 30 questions. Instead, “the world’s shortest IQ-test” was utilised, a cognitive reflection test consisting of three questions (Shane Fredrick 2005). Instead of using open ended answers, as proposed in the study, the main study of this thesis offered three answering alternatives to each question. This was done in order to simplify the data collection.

Results from pre-study 2: n = 53 responses, mean age 31.47% male, 53% female. The results showed a mean of 1.65, indicating the number of correct answers. This was evaluated in relation to the results reported by Shane Fredrick (2005) (the creator of the cognitive reflection test). In his study (with open-ended questions), a mean of 1.24 was reported, indicating that the answering alternatives presented in the experiment of this study assisted the respondents in answering the questions more correctly. However, the answering alternatives did not assist the respondents enough to make them answer all questions in the test correctly. Therefore, the three answering alternatives was preserved for the main study.

3.4 Main study

Once the final drafts of the four different online discussions were established and the difficulty level of the cognitive test was assessed, the main experiment was conducted. The following section describes the structure and content of the main experiment that was divided into four parts; writing a comment, a test of confirmation bias, a cognitive test, and a moderator question.

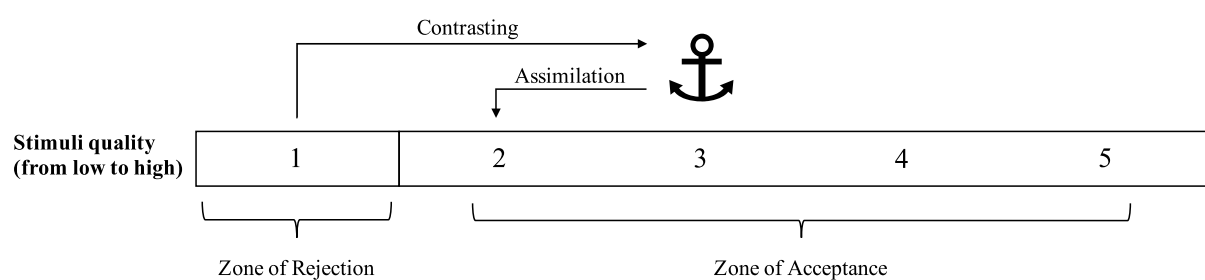
3.4.1 Part 1: Writing a comment

In the main experiment, the four experimental groups that were exposed to an online discussion were asked to leave a comment in the given comments section. As this was an open-ended question, the written comments would subsequently be recoded on a five-point scale of overall

quality (Bryman & Bell 2015): 1 = *extremely low-quality*, 2 = *moderately low-quality*, 3 = *neutral quality*, 4 = *moderately high-quality*, 5 = *extremely high-quality*. If the question was left blank, the comment was recoded as “missing”. In order to produce an objective result, recoding was performed by two externals, entitled “Recoder 1” and “Recoder 2”. The hired recoders were asked to assess the 501 comments in accordance to the low-quality framework that was established in the pre-pre-study. In order to obtain an objective assessment, the correlation of the two different ratings were measured. A correlation above 0.6 was defined as an acceptable level, which generally is seen as a rule of thumb (Shortell 2001). Furthermore, the comments that Recoder 1 and Recoder 2 did not agree upon (comments assigned different levels of quality) were excluded when testing the hypotheses.

In addition, the written comments were categorised according to the theories of assimilation and contrasting. The comments written by respondents exposed to one of the low-quality stimuli were assigned as *assimilating* if the recoders gave a rank of 2 (moderately low quality) or 1 (extremely low quality). Accordingly, their comments were assigned as *contrasting* if the recoders gave a rank of 3 (neutral quality) or higher. The comments written by the respondents exposed to a neutral stimulus were not evaluated on these parameters as the group was used for controlling that the respondents wrote comments of a quality in line with the “anchor” (see figure 1).

Figure 1 – zones of rejection and acceptance



3.4.2 Part 2: A simple test of cognitive performance

Cognitive performance was measured using the cognitive reflection test (CRT) designed by Shane Fredrick (2005). The test measures peoples’ ability to reject an incorrect intuitive answer and instead reflect upon the problem to find the correct answer. The three questions of the cognitive reflection test (CRT) were;

1. *A bat and a ball cost 110 SEK together. The bat costs 100 SEK more than the ball. How much does the ball cost?* (Answering alternatives; 5, 10, 15)
2. *If it takes 5 machines 5 minutes to make 5 widgets, how long would it take 100 machines to make 100 widgets?* (Answering alternatives; 5, 10, 100)
3. *In a lake, there is a patch of lily pads. Every day, the patch doubles in size. If it takes 48 days for the patch to cover the entire lake, how long would it take for the patch to cover half of the lake?* (Answering alternatives; 5, 24, 47)

Cognitive Reflection and Decision Making by Shane Fredrick (2005)

3.4.3 Part 3: Confirmation bias

In this study, the Wason selective task (Wason 1968), also referred to as the four-card-problem, was utilised for testing the confirmation bias of the respondents. The four-card-problem is related to the concept of confirmation bias since the task can only be solved if the subject disconfirms the statement (ibid). Subjects were exposed to four cards, each with a number or letter on it (D, K, 3 and 7). Subsequently, the subjects were asked to read the following statement and question (the statement is formulated by Ambridge (2015); Intel: Kaufman, DeYoung, Reis & Gray (2011));

“Truthful Terry says: ‘Every card that has a D on one side has a 3 on the other.’ What is the fewest number of cards you need to turn over to find out whether Truthful Terry is actually telling the truth? And which ones?”

3.4.4 Moderator question: Critical thinking

A moderator question was conducted in order to measure the respondents’ general view on online discussions in comments sections on social media: *“In general, I am critical to discussions that are held in comments section on social media.”* Answers were indicated on a ten-point bipolar scale, ranging from “Strongly disagree” to “Strongly Agree”. By using a ten-point scale, measurements between the groups are more precise as smaller deviations can be captured (Bryman & Bell 2015).

3.4.5 Experiment launch

For the launch of the main study, a collaboration with the research company Novus was made. The collaboration enabled an unbiased sample distribution, highly representative of the Swedish population. The survey was conducted in April 2018 during a one-week period (between April 6th and April 11th), using Novus' online service that distributed the questionnaire to an online panel. A soft-launch including 25 respondents was run (April 4th) before running the main study, ensuring that the experiment was working properly. The main sample consisted of 667 experiment participants.

3.4.6 Sampling of respondents

The aim of this experiment was to examine how people react to, and are influenced by, comments sections on social media. The *people* in this context refers to the Swedish population and the goal was to collect a representative sample of social media users in Sweden. Intuitively, experiments in a social media setting could be limited to samples of younger age groups. However, statistics from the Internetstiftelsen i Sverige [*Eng: Internet Foundation in Sweden*] (2017) show that the age group 75+ years old has the highest increase of Facebook users. Furthermore, this particular group tends to be the least critical towards sources on social media. On the other hand, a report from Stanford Digital Repository (2016) states that “digital natives” (people brought up during the age of digital technology) are just as likely as anyone else to be duped by false information on social media. Based on the previous information, the inclusion of older age groups was regarded as relevant for this study.

The following background variables of the sample were compared with data on behalf of the total Swedish population (Statistiska Centralbyrån, [*Eng: Statistics Sweden*] 2017), (indicated in brackets). Primarily, gender was equally distributed across the sample with 53.2% (50.2%) men and 46.8% (49.8%) women. In addition, the mean age of the sample was 48.7 (41.2) years old, and regarding age groups the following was received; 18-29 years old: 19.3%, 30-49 years old: 32.33%, 50-64 years old: 26.6%, and 65-79 years old: 21.8%. Other background variables of the sample, such as; education, municipality, household income and occupation, can be found in the appendix.

3.5 Data analysis tools and tests

The main experiment was distributed and conducted by Novus, whilst the preparatory studies were distributed by the authors of this study (using Qualtrics). Subsequently, the collected data was analysed assisted by Stata software, version 15. Microsoft Excel was used in order to collect responses from the recoders, and the data was later imported into Stata for analysis. Since a normal distribution could be supported ($n > 30$), the test used for comparing mean values between the control group and the experimental groups was an *independent sample t-test*. Moreover, a mediation analysis was formed in the additional findings section, using Baron & Kenny's Causal-Steps mediation test (Baron & Kenny, 1986), where significance was tested using the Sobel First-Order Test (Sobel, 1982). Significance level was set to 0.05.

3.6 Reliability & Validity

To ensure a high reliability, a large unbiased sample of 667 respondents was collected in collaboration with Novus. Due to technical limitations, all desired features could not be included in the experiment. For example, the cognitive reflection test by Shane Fredrick (2015) only includes three questions, and standard cognition tests are usually more extensive than such. Adding to the topic of measurements, none of them (due to technical limitations) had the ability to include multi-item questions. For example, critical reasoning was only measured on a single moderator question, which limited the ability to perform Cronbach's Alpha tests on indexes. However, cognitive performance and confirmation bias is usually measured using one simple test, and therefore a justification of these measurements could be established.

To ensure a high validity, the online discussions were created to mimic those found in a social media setting, with material from *real* comments sections. Thus, the reaction triggered should assemble the reaction that would prevail in a real context. It is possible that results are applicable on other social media discussions, such as business-related discussions and advertising. However, the articles chosen for this study either contained a political connection or touched upon a social issue. It is possible that topics of this kind evoke stronger reactions than those generated by business-related issues. Additionally, it has to be taken into consideration that people might have felt compelled to write comments of either better or inferior quality (in this study) than they would have in a *real* social media setting.

4 Results

In the following section, the results from the main experiment are exhibited and each of the three hypotheses are either supported or rejected. As presented in the pre-study, the quality of four different stimuli (online discussions) was assessed. Therefore, in this section, the exposure of respondents to an online discussion of “neutral quality”, is referred to as the *neutral condition*. In addition, the exposure of respondents to online discussions of “moderately low-quality” is referred to as *moderate condition (1)* and *moderate condition (2)*, and the exposure of respondents to an online discussion of “extremely low-quality” is referred to as the *extreme condition*. The results are presented in the same order as the three hypotheses; written comments (assimilation and contrasting), confirmation bias and cognitive performance.

4.1 Assimilation and contrast effects in comments sections

The partakers of the experiment were asked to leave a comment in the online discussion that they had been exposed to, resulting in a total of 501 comments from the four conditioned groups. Below, an extract of comments written by the respondents is presented (a larger sample of the respondents’ comments can be found in the appendix). The following comments were translated from Swedish to English (***) expletive language):

Neutral condition (article about mobile phones)

“When it's cold outside, I usually have my phone in an inner pocket close to the body, so it's not affected by the cold as much.”

“All chemical reactions slow down as the temperature decreases”

Moderate condition (1) (article about the Swedish pension system)

“That’s what happens when you vote for the wrong political party”

“You had 47 years to save money, take some responsibility for *** sake”

Moderate condition (2) (article about Swedish agriculture)

“Sounds like ***, or they have completely lost their minds. Agriculture can be run all over the country, ***?”

“SWEXIT”

Extreme condition (article about a specific Swedish entrepreneur)

“This discussion is inappropriate and distasteful. Please, stick to the subject without any swearing and personal attacks”

“I usually never comment on such threads. However, it seems like there is a very bad atmosphere in here. Can people please be nicer to each other?”

4.1.1 Assessment of comments

“Recoder 1” and “Recoder 2” ranked each of the 501 comments on a five-point scale of overall quality. Their rankings showed a correlation of 0.690 which was regarded as an acceptable level for obtaining an objective assessment ($0.690 > 0.6$) (Shortell 2001). As mentioned in the method section, the comments that were not assigned the same level of quality were excluded from the following hypothesis test, remaining a total of 220 comments. *Table 3* presents the average ranking of the experiment participants’ comments.

Table 1
Distribution of quality assessment on comments

Online discussion	Assessment of respondent’s comments				
	1	2	3	4	5
Neutral condition (<i>n</i> = 51)	5.89%	19.61%	62.75%	7.83%	3.92%
Moderate condition (1) (<i>n</i> = 52)	31.82%	32.45%	27.81%	5.77%	2.15%
Moderate condition (2) (<i>n</i> = 58)	31.03%	32.76%	27.59%	5.17%	3.45%
Extreme condition (<i>n</i> = 56)	7.14%	21.14%	62.50%	7.43%	1.79%

*1 = extremely low quality, 2 = moderately low quality, 3 = neutral quality
4 = moderately high quality, 5 = extremely high quality*

4.1.2 Hypotheses testing

Albeit it is clearly stated in *table 1* that there is a difference in comment quality between the groups, an independent sample *t*-test was performed. Results showed that each of the moderate conditioned groups ($M_{\text{moderate1}} = 2.140$, $p < 0.01$ and $M_{\text{moderate2}} = 2.155$, $p < 0.01$) wrote comments of significantly lower quality than the neutral conditioned group ($M_{\text{neutral}} = 2.843$), whereas the extreme conditioned group ($M_{\text{extreme}} = 2.750$, $p = 0.728$) wrote comments of similar quality to the neutral conditioned group.

Table 2
Independent sample *t*-test showing result of assessment of comments

Online discussion	Mean values of respondent's comment quality		
Moderate condition (1) (<i>n</i> = 52)	2.140	–	–
Moderate condition (2) (<i>n</i> = 58)	–	2.155	–
Extreme condition (<i>n</i> = 56)	–	–	2.750
Neutral condition (<i>n</i> = 51)	2.843	2.843	2.843
Difference in mean values	-0.703**	-0.688**	-0.093
<i>n</i> = 217	103	109	107

* $p < 0.05$, ** $p < 0.01$, one-sided test

The first hypothesis of this thesis entailed that the moderate condition would generate assimilation effects in the comments section, i.e. that the respondents would adapt their comments to the low quality that prevailed in the discussion. The second part of the hypothesis was that respondents of an extreme condition would contrast, i.e. not adapt their comments to the low quality of the discussion.

Supporting H1a, table 2 shows that the two moderate conditions generated comments of significantly lower quality than the neutral condition. Hence, it was supported that the respondents of the moderately low-quality discussions assimilated to the low-quality.

Supporting H1b, table 2 shows that the extreme condition generated similar results in quality of comments to those of the neutral condition. Hence, it was supported that the respondents of the extremely low-quality group contrasted the low-quality.

4.2 Extreme condition lowers confirmation bias

The second hypothesis entailed that respondents of moderately low-quality discussions would possess a higher confirmation bias than the control group, whereas, the respondents exposed to the extremely low-quality discussion would practise a similar, or lower, confirmation bias than the control group. The mean values of the confirmation bias test were calculated with index scoring; (0 points = incorrect answer on the first question, 1 point = correct answer on the first question and incorrect answer on the second question, 2 points = correct answer on the first question and correct answer on the second question).

An independent sample *t*-test was performed in order to measure the differences in mean values between the conditioned groups and the control group. The results showed no significant difference in mean values between the neutral conditioned group ($M_{\text{neutral}} = 0.638$) and the control group ($M_{\text{control}} = 0.673$, $p = 0.745$). Furthermore, the mean values of the moderate conditioned groups ($M_{\text{moderate1}} = 0.752$, $p = 0.680$ and $M_{\text{moderate2}} = 0.669$, $p = 0.487$) were not significantly lower than the mean value of the control group. However, the extreme conditioned group ($M_{\text{extreme}} = 0.992$, $p < 0.01$) scored significantly higher on the confirmation bias test, in relation to the control group.

Table 3
Independent sample *t*-test showing result of confirmation bias test

Online discussion		Mean values of score index		
Neutral condition ($n = 127$)	0.638	–	–	–
Moderate condition (1) ($n = 120$)	–	0.725	–	–
Moderate condition (2) ($n = 127$)	–	–	0.669	–
Extreme condition ($n = 124$)	–	–	–	0.992
Control group ($n = 159$)	0.673	0.673	0.673	0.673
Difference in mean values	-0.035	0.052	-0.004	0.319**
$n = 657$	286	279	286	283

* $p < 0.05$, ** $p < 0.01$, one-sided test

H2a was rejected as *table 3* shows that the moderate conditions did not score significantly lower on a confirmation bias task, in relation to the control group. Thus, it was not supported that respondents exposed to moderate conditions possessed a higher confirmation bias than the control group.

Supporting H2b, as *table 3* shows that the extreme conditioned group scored significantly higher than the control group on a confirmation bias test. Hence, it was supported that respondents exposed to the extreme condition possessed a lower confirmation bias.

4.3 Extreme condition alters cognitive performance

The third hypothesis stated that respondents of the moderate conditions would underperform on a cognitive test, in relation to the control group. Furthermore, respondents of the extreme condition were hypothesised to perform similar to, or better than, the control group. The mean values of the cognitive test were calculated with index scoring; (*0 points = incorrect answer on all questions, 1 point = correct answer on one out of three questions, 2 points = correct answer on two out of three questions, 3 points = correct answer on three out of three questions*).

An independent sample *t*-test was performed in order to measure the differences in mean values between the conditioned groups and the control group. The results showed no significant difference in mean values between the neutral conditioned group ($M_{\text{neutral}} = 1.349$) and the control group ($M_{\text{control}} = 1.373$, $p = 0.855$). Furthermore, the mean values of the moderate conditioned groups ($M_{\text{moderate1}} = 1.525$, $p = 0.878$ and $M_{\text{moderate2}} = 1.477$, $p = 0.792$) were not significantly lower than the mean value of the control group. However, the extreme conditioned group ($M_{\text{extreme}} = 1.629$, $p < 0.05$) scored significantly higher on the cognitive test, in relation to the control group.

Table 4
Independent sample *t*-test showing result of cognitive test

Online discussion	Mean values of score index			
Neutral condition (<i>n</i> = 129)	1.349	–	–	–
Moderate condition (1) (<i>n</i> = 120)	–	1.525	–	–
Moderate condition (2) (<i>n</i> = 128)	–	–	1.477	–
Extreme condition (<i>n</i> = 129)	–	–	–	1.629
Control group (<i>n</i> = 161)	1.373	1.373	1.373	1.373
Difference in mean values	-0.024	0.152	0.104	-0.256 *
<i>n</i> = 667	288	281	289	285

* $p < 0.05$, ** $p < 0.01$, one-sided test

H3a was rejected as *table 4* shows that the moderate conditions did not score significantly lower on the cognitive performance test, in relation to the control group. Thus, it was not supported that respondents exposed to moderate conditions underperformed on the cognitive test.

Supporting H3b, as *table 4* shows that the extreme conditioned group scored significantly higher than the control group on the cognitive performance test. Hence, it was supported that respondents exposed to the extreme condition performed better than the control group.

4.4 Additional findings

4.4.1 Extreme condition alters critical reasoning

Results on the moderator question regarding critical reasoning towards discussions on social media were also analysed. The outcomes supported that subjects of the moderate conditioned groups were not significantly more critical towards discussions on social media than subjects of the control group. However, the group of the extreme condition was significantly more critical towards discussions on social media than the control group.

An independent sample *t*-test was performed in order to measure the differences in mean values between the conditioned groups and the control group. The results showed no significant difference in mean values between the neutral conditioned group ($M_{\text{neutral}} = 7.465$) and the control group ($M_{\text{control}} = 7.267$, $p = 0.220$). Furthermore, the mean values of the moderate conditioned groups ($M_{\text{moderate1}} = 7.525$, $p = 0.195$ and $M_{\text{moderate2}} = 7.695$, $p = 0.054$) were not significantly lower than the mean value of the control group. However, the extreme conditioned group ($M_{\text{extreme}} = 8.105$, $p < 0.01$) were significantly more critical towards online discussions on social media than the control group.

Table 5
Independent sample t-test showing result of critical reasoning

Online discussion		Mean values		
Neutral condition (<i>n</i> = 129)	7.465	–	–	–
Moderate condition (1) (<i>n</i> = 120)	–	7.525	–	–
Moderate condition (2) (<i>n</i> = 128)	–	–	7.695	–
Extreme condition (<i>n</i> = 124)	–	–	–	8.105
Control group (<i>n</i> = 161)	7.267	7.267	7.267	7.267
Difference in mean values	0.198	0.258	0.428	0.838**
<i>n</i> = 662	288	281	289	285

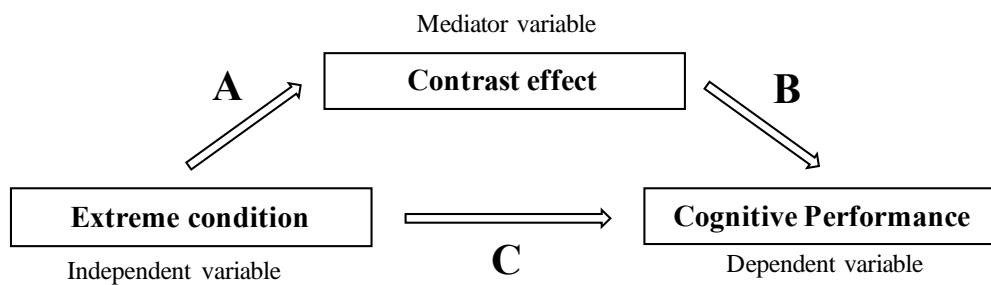
* $p < 0.05$, ** $p < 0.01$, one-sided test

To conclude the first additional finding, the respondents of the extreme condition were significantly more critical towards discussions on social media than the control group.

4.4.2 The contrast effect is a mediator for cognitive performance

It was hypothesised that the respondents of the moderately-low quality discussions would underperform on a cognitive test (in relation to the control group) with the underlying reasoning that assimilation requires less cognitive steps than contrasting. Surprisingly, the results showed that the groups of the moderately low-quality discussions did *not* significantly underperform on a cognitive test. However, the group exposed to the extremely-low quality discussion performed significantly better than the control group on the cognitive task. Consequently, it was considered as relevant and interesting to test if the *contrast effect* could act as a mediating effect of *cognitive performance*, implying that altered cognitive performance would, in fact, be caused by the contrast effect (*see figure 1*).

Figure 1: Mediating the contrast effect



By reason of that only the experimental groups were exposed to a stimulus (an online discussion), and thus asked to leave a comment, the control group was excluded from the following mediation regression. Furthermore, only the groups of low-quality conditions could either assimilate or contrast in the comments section, whereby the group of neutral quality was excluded from the following regression as well. Consequently, the included variables were; low-quality conditioned groups (extreme condition, moderate condition (1) and moderate condition (2)) that were indicated as dummy variables taking on values of 1 if included in the particular group. Furthermore, contrasting was measured as a dummy variable taking on the value of 1 if the particular comment was recoded a value of 3 or higher. Cognitive performance was calculated on an index scale of correct answers from 1 to 3.

The Baron & Kenny's (1986) mediation analysis method was used to test if the mediation effect of contrasting on cognitive performance prevailed. The following procedure was divided in four steps, each testing the different paths of the mediation model (*see figure 1*).

Path C: The extreme condition must significantly predict higher levels of cognitive performance. A simple linear regression was run: Regression 1: $Cognitive\ Performance_i = \beta_0 + \beta_1 Extremecondition_i + u_i$. A significant relationship between *Extreme Condition* and *Cognitive Performance* (*Path C*) could be established. ($\beta_1 = 0.439, p < 0.05$)

Path A: The extreme condition must significantly predict higher levels of contrasting. A simple linear regression was run: Regression 2: $Contrasting_i = \beta_0 + \beta_1 Extremecondition_i + u_i$. A significant relationship between *Extreme Condition* and *Contrast Effect* (*Path A*) could be established. ($\beta_1 = 0.250, p < 0.01$)

Path B: Contrasting must significantly predict higher levels of cognitive performance. A simple linear regression was run: Regression 3: $Cognitive\ Performance_i = \beta_0 + \beta_1 Contrasting_i + u_i$. A significant relationship between *Cognitive Performance* and *Contrast Effect* (*Path B*) could be established. ($\beta_1 = 0.429, p < 0.05$)

Path A-B-C: When measuring the relationship of the *Extreme condition* – *Cognitive Performance* (*Path C*), the extreme condition variable must either become non-significant (full mediation) or have a weaker significance (partial mediation).

A multiple linear regression was run: Regression 4: $Cognitive\ Performance_i = \beta_0 + \beta_1 Extremecondition_i + \beta_2 Contrasting_i + u_i$. The coefficient for the *extreme conditioned*-variable in the fourth regression showed weaker significance (significant at 90% confidence interval) when the contrast effect was included in the model, and thus partial mediation was indicated. $\beta_1 = 0.351, p = 0.052 < 0.10, \beta_2 = 0.350, p = 0.041 < 0.05$

Sobel test

The Sobel test (1982) was run in order to measure the significance of the mediation effect.

The formula calculating the Sobel test statistic is:
$$z = \frac{ab}{\sqrt{(b^2 SE_a^2 + (a^2 SE_b^2)}}$$

For the contrasting-mediation analysis, the constants were:

$$a = 0.251, b = 0.350, SE_a = 0.080, SE_b = 0.170$$

Sobel test statistic: 1.724 $p = 0.0848 < 0.1$

To conclude the second additional finding, test results show that the contrast effect mediates the relationship of extreme condition on cognitive performance. The four conditions of the Baron & Kenny mediation analysis were met ($p < 0.05$). *A summary of the results of the mediation analysis can be found in the appendix.*

4.5 Summary of results

Summary of results		
H1a	Subjects to moderately low-quality discussions will produce comments of lower quality than subjects to neutral-quality discussions.	Supported
H1b	Subjects to extremely low-quality discussions will produce comments of similar, or better, quality than subjects to neutral-quality discussions.	Supported
H2a	Subjects to moderately low-quality discussions will underperform on a confirmation bias test, in relation to the control group.	Rejected
H2b	Subjects to extremely low-quality discussions will perform similar to, or better than, the control group on a confirmation bias test.	Supported
H3a	Subjects to moderately low-quality discussions will underperform on a cognitive test, in relation to the control group.	Rejected
H3b	Subjects to extremely low-quality discussions will perform similar to, or better than, the control group on a cognitive test.	Supported
Additional finding	Subjects exposed to extremely low-quality discussions perceives themselves as more critical to discussions on social media than any other group perceives themselves	
Additional finding	Contrasting is a mediating variable for an extremely low-quality discussion on cognitive performance	

5 Analysis and discussion

The aim of this study was to observe how different levels of (low-)quality discussions on social media affect cognition, by measuring results on three different tasks; writing a comment, a confirmation bias test and a simple cognitive test.

As hypothesised, the results showed that respondents of moderately low-quality discussions produced comments of significantly lower quality than the respondents of the neutral quality discussion, supporting that they assimilated to the low quality. Furthermore, the respondents of the extremely-low quality discussion produced comments of quality similar to the neutral conditioned group, supporting that they contrasted the low quality. However, surprising results were found on the two other tasks (confirmation bias test and cognitive test), as respondents that were exposed to moderately-low quality discussions did *not* underperform on either of them, whereas the group exposed to the extremely-low quality discussion performed remarkably better than the control group on both of the tasks. As the results of the extreme conditioned group were distinct, a test for a mediating effect on the group's cognitive performance could not be discounted.

5.1 Segregation of quality in comments sections

5.1.1 Assimilation in comments sections

The fallouts of the first experiment task, writing a comment, were that people taking part of an online discussion of moderately low-quality adapted (i.e. assimilated) their own comments to the (low-)quality that prevailed in the discussion. These outcomes were similar to the findings presented by Cheng, Bernstein et al. 2017, that “anyone can become a troll” if participating in an online discussion starting with a troll comment. However, Cheng, Bernstein et al. (2017) triggered their respondents into a negative mood before they were exposed to an online discussion, which caused the respondents to more easily write troll comments themselves (i.e. assimilate). In our study, people's mood was not affected before reading the comments, hence, the assimilation effect was assumed to be triggered by the particular quality level of the online discussion. Nevertheless, there is a possibility that the assimilation effect was activated by negative mood in our study as well, but in contrast to the findings by Cheng, Bernstein et al. (2017), negative mood would be a reaction to the online discussion itself.

Moreover, Singer, Ferrera et al. 2016 argue that writing skills are affected when spending much time in an online discussion. This leaves a question lingering; is it the amount of time spent on writing or the constant exposure to gradually inferior quality in comments that affect people's writing skills? Perhaps it could be both, however, the results from our study indicate that the exposure to a moderately low-quality discussion affects overall quality of the comments immediately. Furthermore, the overall quality of the comments written by respondents exposed to moderately low-quality discussions, showed to be in line with the theory of assimilation effects. The concept suggests that a moderate context stimulus make people adapt their actions or behaviour to that particular level of intensity (Herr, Sherman et al. 1983). Our findings support this theory, as the respondents adapted their comments to the particular level of quality that embodied the online discussion; moderately-low. A possible explanation is that discussions on social media tend to be scattered, i.e. that users absorb information fast and do not have time to write long sentences or complex arguments. In some ways, discussions on social media could be seen as fast-forward versions of those in real life. Therefore, it is likely that respondents are used to observe comments like those in the experiment, of moderately-low quality, in a social media setting and thus they assimilated rather than contrasted.

5.1.2 Contrasting in comments sections

In opposite to the outcomes of the previously mentioned groups, our results showed that when respondents were exposed to an extremely low-quality discussion they distanced themselves from the low-level of quality that embodied the online discussion. More specifically, instead of adapting (i.e. assimilating) their comments to the low-quality, some respondents expressed that they did not want to participate in such a low-quality discussion, while others encouraged participants to write comments of higher quality. These findings matched those of the contrast effect, in other words, extreme context stimuli make people question the information and subsequently trigger them to act, or behave, in accordance with their initial position (i.e. anchor) (Herr, Sherman et al. 1983). More specifically, the comments written by respondents of the extremely low-quality discussion were mostly recoded as “neutral quality”, which supports that the respondents did not comply with the low quality but rather stuck to their initial position, which is referred to as their anchor (Schwarz & Bless 1992).

As suggested previously, it is possible that social media users are familiar with observing comments of moderately-low quality in comments sections. However, the results from this study implies that a discussion personified by extremely-low quality content provokes

repudiation. An explanation might be that people rarely read discussions on social media that is completely constituted of hostile or uncivil comments, rather such comments are incorporated with more subtle comments.

5.2 Confirmation bias

5.2.1 Myside bias

The theory section of this thesis conveyed that *confirmation bias*, as its name suggests, is the preconception of confirming information rather than falsifying it (Wason 1968), wherefore the concept is also called *myside bias* (Stanovich et al. 2013). As it was hypothesised that respondents of the moderately low-quality discussions would conform their own comments to the low-quality, it was also expected that these respondents would possess a higher confirmation bias than the control group. However, this hypothesis was not supported. Respondents within the two groups of the moderately low-quality discussions showed no significant difference in mean (on a confirmation bias test) to those who had not been exposed to an online discussion.

The insignificant results are thought-provoking, as there is an ongoing debate about that social media platforms feed peoples' confirmation biases (Bakshy, Messing et al. 2015). As stated in the theory section, the algorithms of these platforms create so called *echo chambers*, implying that our opinions are reinforced rather than challenged (Garrett 2009; Flaxman, Goel et al. 2016). Nevertheless, in contrast to the belief that social media increase confirmation bias, the findings of our study showed that respondents of the moderately-low quality discussions did not become victims of confirmation bias. On the other hand, it is possible that the direct effects of confirmation bias are difficult to detect, and rather confirmation bias could be a long-term effect. To develop that thought, it is likely that anyone connected with social media is somewhat affected by confirmation bias. Similar to what was stated in the study by Del Vicario, Bessi et al. (2016), people who previously have been subjects to selective exposure, or echo chambers, could sustain a confirmation bias. Hence, the results that were compared to the control group could be misleading, as the control group might also be affected by confirmation bias.

5.2.2 Overcoming myside bias

As it was believed that respondents of the extremely low-quality discussion would question and confront the content that prevailed in the particular discussion, it was also expected that these

respondents would be put in a critical mindset and consequently perform likewise to, or better than, the control group on a confirmation bias task. This hypothesis was supported as respondents of this group performed significantly better than the control group. A possible explanation is that the respondents of this group were negatively positioned towards the information they had been provided in the in online discussion as they more easily could identify the low-quality when it was extreme, thus making them harder to convince (Hoffman, Trawalter et al. 2016). As these respondents criticised and questioned the content in the extremely-low quality discussion, it is likely that this triggered a critical mindset, suggesting that they could more easily disconfirm the statement proposed in the confirmation bias question. This analysis corresponds to Nickerson's (1998) statement that critical thinking works as protection against confirmation bias.

5.3 Cognitive performance

5.3.1 No decline in cognitive performance

Lastly, the respondents carried out a cognitive test. Similar to the reasoning behind the first hypothesis of confirmation bias, the respondents of the moderately low-quality discussions were expected to underperform on the test as assimilation requires less cognitive steps than contrasting (Martin, Seta et al. 1990). The results of the cognitive test appeared to be corresponding to those of the confirmation bias test; the respondents of the moderately low-quality discussions did *not* significantly underperform.

Albeit the hypothesis was rejected, the findings are rather satisfactory and comforting. As stated by Duggan (2017), in a social media world of fake news, online bullying and uncivil comments, one might expect that users' cognition is negatively influenced. The results of our study could be interpreted as inconsistent with these findings since respondents of moderately-low quality discussions performed similar to the control group. Nevertheless, one should not downright dismiss that low-quality content on social media has negative effects on thinking, at least not in the long run. It is possible that people exchange certain knowledge within these low-quality discussions, knowledge that does not show its implications on a simple problem-solving task. Moreover, a possible explanation for the surprising results is that social media users might not be accustomed to engaging in cognitive tasks in a social media setting, and thus the respondents might have "reset" their mindset when transferred between the two settings.

5.3.2 Contrasting boosts cognitive performance

Similar to the reasoning behind the hypothesis of confirmation bias, the respondents exposed to extremely low-quality discussions were expected to perform similar to, or better than, the control group as contrasting requires more cognitive steps than assimilation (Martin, Seta et al. 1990). Again, the respondents of the extremely low-quality discussion performed not only significantly better, but remarkably better, than the control group. Therefore, a mediator analysis was completed in order to investigate whether the altered results on the cognitive test were triggered by the contrast effect. De facto, the model proved to be supported.

The results from the mediator analysis might be viewed as the most interesting aspect of this thesis as it supports that contrasting, in fact, alters cognitive performance. As contrasting conveys that the subject choses to disregard the given information, one might argue that contrasting is triggered by critical reasoning. Remarkably, the second additional finding showed that respondents of the extreme condition were significantly more critical towards discussions on social media than the control group, while the other groups were not. In line with research from Albergaria-Almedia (2011), where it is stated that critical thinking alters cognitive performance, the additional finding raises thoughts about the extreme conditioned group's critical attitude. Perhaps, it is possible that critical reasoning contributed to the heightened cognitive performance within this group.

5.4 General discussion and contribution

The results of this thesis are rather comforting. None of the experimental groups underperformed on the cognitive tests after being exposed to low-quality online discussions. Instead, as a consequence to contrasting, the group of the extreme condition outperformed the control group on cognitive performance. Additionally, this group possessed a lower confirmation bias and were more critical towards discussions on social media. As previous research show that communication can prime consumers to perform better, and even worse, on cognitive tasks, the fear was that the latter would hold for the communication taking place in comments sections. However, with this research in hand, one can draw the general conclusion that (low-quality) online discussions do not make users blunt. Rather, something that can be anticipated for the marketing landscape, is that consumers are becoming more critical when enduring extremely low-quality content. Hence, consumers demand higher quality and marketers will have to elicit refined content in order to satisfy, or even convene, with them.

However, one has to note that the online discussions were of different quality, but inevitably also different characteristics as the discussion related to a particular article. Thus, it is possible that the subject itself was particularly controversial or evoked strong feelings. Again, this leaves a key question lingering; was the contrast effect caused by a reaction to extremely-low quality, or by the specific subject of the online discussion? Furthermore, the article belonging to the extremely-low quality discussion related to a person, whilst the articles of the moderately-low quality discussions touched upon political subjects; the Swedish pension system and Swedish agriculture. Is it possible that respondents are more easily provoked by personal attacks than uncivil content referring to factual or political issues? Nevertheless, the online-discussions were assessed different quality levels, and whether that depends on the particular subject or the overall quality of comments, does not make the results inaccurate, but maybe more interesting.

6 Conclusions and implications

6.1 Conclusions

To conclude, the results indicated that low-quality discussions on social media can affect users' thinking. Significant results supported that the cognition of respondents of extremely low-quality discussions was altered when transferred from a social media setting to an unrelated task. However, moderately low-quality discussions were only affecting readers in the same context.

The results from the experiment in this study supported the main research question; *Can (low-quality) discussions on social media affect cognitive thinking?* The answer to this question was yes, when social media users were exposed to a certain level of low-quality discussions, namely extremely-low quality, cognitive performance was altered.

Moreover, results from the experiment also supported the sub-research question; *Can different levels of (low-) quality affect cognitive thinking differently?* Where the answer was yes, when social media users were exposed to an extremely low-quality discussion, cognitive thinking was altered. However, when users were exposed to moderately low-quality discussions, cognitive thinking remained at the same level.

6.2 Implications

A decade ago, social media created a paradigm shift in the way we communicate. These platforms have been integrated into our lives, to such an extent, that some people cannot go a day without checking their Facebook, Twitter or Instagram feed (We Are Social 2018). Today, the user generated content that take place in the comments sections on these platforms is more or less what constitutes the community discourse (Shearer & Gottfried 2017). Studying the phenomenon of user generated content in comments sections, and its implications on users thinking, should therefore be of outmost interest to every marketer or business that aim to advertise on social media.

The results from this thesis support that social media users' cognition is affected when participating in a (low-quality) discussion, making them either assimilate to, or contrast, the low-quality. Inevitably, this has implications on the marketing landscape as marketers need to be aware of what is going on in the comments sections that relates to their brand. When the quality of user generated content in comments sections is below a certain level of perceived quality, users will question the content and overcome their confirmation bias. Consequently, it is possible that this evoked "critical mindset" can have negative spill-over effects on the advertiser, making the users question the marketing content as well. Hence, if a marketer prefers that their consumers solely absorb the content related to their brand, rather than question it, the user generated content should not fall beneath the level of moderately low-quality. However, our study shows that partakers of moderately-low quality discussions can assimilate to the comments and therefore consumers might not reflect upon the advertising content.

Nevertheless, the results of this study can have implications on a wider base than within the field of marketing, in fact the society as a whole. In the beginning of this thesis we asked ourselves; what happens to users' cognition, when transferred between low-quality discussions on social media, and real life? As our results show, users exposed to extremely low-quality content online can be put in a critical mindset and disconfirm the information they receive. In fact, this behaviour might even help them to alter their cognitive performance or lower their confirmation bias. In a digital world of echo chambers, we worry that social media platforms feed our confirmation biases and encourage us to ask questions of which we know the answer will be "yes". But do we need to worry? Maybe, in a context with extremely low-quality content, the answer is "no".

6.3 Critique and limitations

The general limitation of this study relates to the definition of low-quality. Even though a thorough review of previous research on the definition of a low-quality discussion was configured, the finalising steps were completed using the perception of respondents in the pre-study. Beliefs and perceptions of a rather small sample, even though confirmed by another sample at another point in time (pre-study), are rarely seen as an upright definition.

Another limitation threatening the reliability, refers to that the data was collected once, on a short period of time. Thus, one could argue that people have been exposed to the low-quality online discussions prior to this experiment. One could further argue that an experiment of this kind would gain from being executed in another setting, such as a laboratory experiment. Since the tests' answers can be found on the internet, and without a time limitation, one cannot state if the respondent's answers were actual results of their own capacity.

Furthermore, the impact social media has on the human mind is an extremely complex issue. There is no single answer to the question how we are affected by content on social media, and not much research has been done on the subject. Thus, the theoretical framework that have been proposed for this study may in fact only explain a small part of the matter. Also, in order to apply theories like assimilation and contrast effects, the groups were divided into two different levels of quality (intensity); moderate and extreme. Allocating the stimuli into different groups, based upon the perceived level of quality, could have an inference with the results. Specifically, when stimuli were containing different subjects in the discussions, people could have been affected by content rather than level of quality.

In order to address the hypotheses that was suggested by the theoretical framework, one hypothesis (H1b) was not stated statistically correct – as one cannot simply investigate an insignificant result. As with any thesis study of this kind, the space was limited, and a statistically correct way of formulation would have required a hypothesis suggesting a specific level of difference between the mean values. However, by completing a mediation analysis, it was concluded that the variables were in fact connected with each other. Furthermore, the hypotheses could have been more detailed, and results would also have been improved by testing on people rather than groups.

6.4 Future research

Rather surprising results were found in this study on the confirmation bias test and cognitive test, as people that were exposed to moderately-low quality discussions did *not* underperform on either of them, whereas the group exposed to the extremely-low quality discussion performed remarkably better than the control group on both of the tasks. As the results of the extreme conditioned group were distinct, a test for a mediating effect on the group's cognitive performance could not be discounted. However, confirmation bias or critical thinking could further be examined as other possible mediating effects of cognitive performance.

Even though the effects of the moderately-low quality discussions on cognitive performance showed to be insignificant, one should not dismiss that there could be other effects on thinking. As these respondents assimilated in the comments section, i.e. adapted to the low-quality, and previous research show that hostile comments can create a domino effect of antisocial behaviour online (Cheng, Bernstein et al. 2017), we suggest that future research examine the effects on *emotional performance*.

Lastly, as the online discussions related to an article, and thus a specific topic, it is possible that the subjects of the articles triggered the effects on cognitive thinking, rather than the particular level of quality. Furthermore, the article belonging to the extremely-low quality discussion related to a person, whilst the articles of the moderately-low quality discussions touched upon political subjects; the Swedish pension system and Swedish agriculture. Is it possible that personal attacks provoke respondents more than uncivil content referring to factual or political issues? We suggest that researcher explore this further.

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8 Appendix

8.1 Stimuli: Neutral group

The screenshot shows a Facebook news feed interface. At the top is a navigation bar with the Facebook logo, a search bar, and icons for Home, Messenger, and a question mark. Below the navigation bar is a sidebar with menu items: News Feed, Messenger, Marketplace, Explore, Events, Groups, Pages, Saved, Friend lists, On this Day, Pages feed, Photos, Games, Suggest Edits, and See more... At the bottom of the sidebar are links for Create, Ad · Page · Group · Event, and Fundraiser.

The main content area displays two posts. The first post, titled "Därför fungerar inte mobilen i kyla", is from a user named DN.se and has 158 reactions. The text of the post discusses how cold temperatures affect mobile phone batteries. The second post, titled "Därför fungerar inte mobilen i kyla", is also from DN.se and has 24 comments and 39 shares. The text of this post discusses how cold temperatures affect mobile phone batteries.

Below the posts, there are several comments. The first comment, from a user named Kyla, discusses how cold temperatures affect mobile phone batteries. The second comment, from a user named Kyla, discusses how cold temperatures affect mobile phone batteries. The third comment, from a user named Kyla, discusses how cold temperatures affect mobile phone batteries. The fourth comment, from a user named Kyla, discusses how cold temperatures affect mobile phone batteries. The fifth comment, from a user named Kyla, discusses how cold temperatures affect mobile phone batteries. The sixth comment, from a user named Kyla, discusses how cold temperatures affect mobile phone batteries. The seventh comment, from a user named Kyla, discusses how cold temperatures affect mobile phone batteries. The eighth comment, from a user named Kyla, discusses how cold temperatures affect mobile phone batteries. The ninth comment, from a user named Kyla, discusses how cold temperatures affect mobile phone batteries. The tenth comment, from a user named Kyla, discusses how cold temperatures affect mobile phone batteries.

8.2 Stimuli: experimental groups

8.2.1 Moderately low-quality (1)

The screenshot shows a Facebook news feed. At the top, there's a navigation bar with the Facebook logo, a search bar, and icons for home, notifications, and a profile. Below the navigation bar, the news feed is divided into two main sections: a post and its comments.

Post:

Vart Tog Pengarna Vägen?

Så här är det att vara pensionär efter 47 år i arbetslivet: Jag har inte längre råd att: gå till tandläkaren, åka på semester, köpa kläder, gå till frisören, gå ut på restaurang med mina vänner, köpa busskort, köpa julkappar till mina barn och barnbarn, Medicinerna som jag inte heller har råd med köper mina barn till mig.

Vart gick alla skattepengarna jag betalade in under dessa 47 åren? **FATTIG-PENSIONÄR**

Vart tog pensionärernas pengar vägen?

INSÄNDARE Ja, nu har några löntagargrupper genom fackföreningarna erhållit sina nya lönebesked om ökningen på cirka 500-700 kronor per månad. Publicerad 22 maj 2016 08:00

www.jp.se

24 Comments 39 Shares

Like Comment Share

Write a comment...

Top comments

Sverige i dag 1 Like · 1h

Herre Gud, hur ska jag klara mig, ska jobba 4 år till, har ju inte jobbat heltid inom vården, så ser dystert ut för mig

Like · 35m

Löfven: Det har jag ingen ahhhning om. Skall titta på!

Like · 26m

skaffa dej ett apotekskonto då betalar du 208kr per mån

Like · 2m

Man borde få listat sina varenda kronor hur dom är fördelade och på vad...ex 2 kr till...? 100 kr till...? Osv osv

Like · 17h

Comments:

Jag sparade 500 kr i månaden i sparbanken, 35 år.. när jag skulle ta ut pengarna så hade alla pengar gått till olika avgifter..Det hade varit bättre att spara dom hemma,, sparbanken kan visst ta pengar från folk som dom vill ...

Like · 20h

Precis så blev det för mig med, när jag skulle ta ut sparpengari!!

Like · 8h

Dina pengar skickas hem till släkten av bidragsinvällarna som kommer hit - 17 miljarder skickades via bank systemet 2016 av invällare som inte hade job, då skickas det säkert 10 gånger mer via hemliga kanaler - inte dåligt med pengar av folk som sitter i gratis boende och inte gör någonting

Like · 13h

Pensionärer, flytta ut till en av Balkan länderna.Sedan kom ni tillbaka till Sverige vårt ni kommer allt som står i listan utan att betala + alla möjliga bidrag som finns,samtidig som ni behåller era pensioner. Bättre än så kan man inte leva.

Like · 19h

Du skulle blivit politiker. Då hade du fått FALLSKÄRM med någon miljon om året, eller så hadu blivit Generaldirektör vid nåt Statist verk som ingen jävel behöver, men DU hade mått bra, fri bostad, fria flyg otaxireor o fri sem. FAN VAD BRA DU O JAG KUNDE HAFT DET, MEN NU E DE SOMDE E, O DE E INTE ROLIGT !!!

Like · 19h

Varför tror Ni dom gjorde om pensionssystemet? Jo utredaren sa att det skulle bli bättre !Jo bättre för dom som skall betala ut pengarna ! (Billigare)

Like · 22h

Satte mig i bilen och fick höra någon från Chile som tydligen varit med i Mellon och blev intervjuad i något program, och han pratade om hur maktthavarna var korrupta och skodde sig på folket. Jag var övertygad att han pratade om Sverige, men det visade sig att det var i hans hemland Chile...tänk så man kan tänka feli

Like · 6h

8.2.2 Moderately low-quality (2)

Search

News Feed

Messenger

Marketplace

Explore

Events

Groups

Pages

Saved

Friend lists

On this Day

Pages feed

Photos

Games

Suggest Edits

See more...

Create

Ad · Page · Group · Event · Fundraiser

EU vill avveckla svenskt jordbruk

I maj kom en prognos från European Environment Agency - EEA om jordbrukets framtid i EU. Där framkommer det med all tydlighet att jordbruken ska koncentreras till de länder med de bästa förutsättningar. Det innebär att allt jordbruk norr om Skåne kanläggas ner. Det är helt enkelt inte lönsamt.

EU vill avveckla svenskt jordbruk

I maj kom en prognos från European Environment Agency - EEA om jordbrukets framtid i EU. Där framkommer det med...
FORFUTURE.SSE

Like · Comment · Share

Write a comment...

Top comments ▾

framförs inte ett dugg om den svenska lantbrukspolitiken, eftersom partiet är kapat av en maktgalen globalist som sätter sig självt främst.
Like · 23h

Bättre att avveckla EU för hela Nordens framtid. Dessa ministrar sitter där för lönen o för att få bestämma så mycket som möjligt
Hade inte EU funnits hade inte våra länder sätt ut så här. Undrar om Löfven fikar efter en plats i EU
Like · 23h

Beredskaps mässigt så är det fantastiska tankar de höga herrarna/damera framför, att dom ens öppnar mun
Like · 23h

Öppna landskap vad blir det utan bönder????
Like · 6h

EU vill avveckla svenskt jordbruk

I maj kom en prognos från European Environment Agency - EEA om jordbrukets framtid i EU. Där framkommer det med...
FORFUTURE.SSE

Like · Comment · Share

Write a comment...

Top comments ▾

framförs inte ett dugg om den svenska lantbrukspolitiken, eftersom partiet är kapat av en maktgalen globalist som sätter sig självt främst.
Like · 23h

Bättre att avveckla EU för hela Nordens framtid. Dessa ministrar sitter där för lönen o för att få bestämma så mycket som möjligt
Hade inte EU funnits hade inte våra länder sätt ut så här. Undrar om Löfven fikar efter en plats i EU
Like · 23h

Beredskaps mässigt så är det fantastiska tankar de höga herrarna/damera framför, att dom ens öppnar mun
Like · 23h

Öppna landskap vad blir det utan bönder????
Like · 6h

EU vill avveckla svenskt jordbruk

I maj kom en prognos från European Environment Agency - EEA om jordbrukets framtid i EU. Där framkommer det med...
FORFUTURE.SSE

Like · Comment · Share

Write a comment...

Top comments ▾

framförs inte ett dugg om den svenska lantbrukspolitiken, eftersom partiet är kapat av en maktgalen globalist som sätter sig självt främst.
Like · 23h

Bättre att avveckla EU för hela Nordens framtid. Dessa ministrar sitter där för lönen o för att få bestämma så mycket som möjligt
Hade inte EU funnits hade inte våra länder sätt ut så här. Undrar om Löfven fikar efter en plats i EU
Like · 23h

Beredskaps mässigt så är det fantastiska tankar de höga herrarna/damera framför, att dom ens öppnar mun
Like · 23h

Öppna landskap vad blir det utan bönder????
Like · 6h

Home

Like · 18h

Det finns bara en väg att gå, SWEXIT !
Like · 18h

Här ser man ju klart och tydligt att vi måste ut ur EU. Det enda EU gör är att suga ut allt ur vårt land sen när det inte finns några tillgångar kvar skiter dom i oss när ska folk forstå
Like · 6h

Pengarna går bara till bidragstagare och kvar står våra fattiga pensionärer. Gå ur det där förbannade EU! Värdeöst!!
Like · Reply · 28m

Det är ju allmänt känt att Sveriges ekonomi har halverats sedan EU-krisen 2011. seg byråkrati! Måste finnas bättre sätt att försörja de stackars länderna. tex. privat sektor
Like · Reply · 26m

Ser man på EU's historik, ser det inte imponerande ut. Se på Grekland, Spanien med flera medelhavsländer som kraschat...
Like · Reply · 6m

Det som händer i Turkiet nu, när en diktator får för sig att styra EU. Om EU stryper samarbetet med Turkiet hotar han att öppna gränsen och släppa igenom miljontals flyktingar. Vad liknar det???
Då hoppas jag verkligen att EU stänger gränsen på sin sida. Och ska Sverige vara beroende av något sådant??? NEJ NEJ och åter NEJ!!!
Vi ska ut ur EU så fort det bara går.....!
Like · Reply · 6m

en av de största anledningarna till att lämna EU - utan tvekan - att få tillbaka vårt självbestämmande och suveränitet. Tycker Sverige ska vara en fri, självständig nation utan kontroll av överstatliga makter.
Like · Reply · 1m

8.2.3 Extremely low-quality

The image is a screenshot of a Facebook interface. At the top, the navigation bar includes the Facebook logo, a search bar, and icons for Home, Messenger, and a profile picture. Below the navigation bar, the main content area displays a post from 'EXPRESSEN.SE' titled 'Leif-Ivans hemliga maktplan: "Affärer med president Trump"'. The post text reads: 'FLORIDA. Entreprenören Leif-Ivan är tillbaka i Florida. Med dyrare båt, fler lyxbilar – och ett nytt stort karriärs mål. "Jag vill göra affärer med president Trump och vet att det snart händer", berättar han i en stor intervju.' The post has 24 comments and 39 shares. Below the post, there is a section for 'Top comments' with several replies. The replies are humorous and satirical, including: 'Sverige var bra när han fick hjärtinfarkt!!!!', 'Jävla skojare å skitgubbe å Äkel fy fan', 'Han är ett riktigt äckel.', 'fetknoppen skulle ga med i viktvakterna', and 'Och här kom jantelagen och missundsamheten.' The bottom of the screen shows the Facebook navigation menu with icons for News Feed, Messenger, Marketplace, Explore, Events, Groups, Pages, Saved, Friend lists, On this Day, Pages feed, Photos, Games, Suggest Edits, and a 'See more...' option. The 'Create' button is also visible, with options for Page, Group, Event, and Fundraiser.

Search

News Feed

Messenger

Marketplace

Explore

Events

Groups

Pages

Saved

Friend lists

On this Day

Pages feed

Photos

Games

Suggest Edits

See more...

Create

Ad · Page · Group · Event · Fundraiser

TA FRAM CIREKLSÅGEN!!!

Like · Reply · 1m

Han är ett stort skämt och skryter hur han skulle få ordning på Sveriges ekonomi. Han kan ju för fan inte sköta sin egen. Han hade bliffrar i Luleå och där sket han i att betala skatt och iuarnde kunder, hade skulder på flera miljoner. MEN han hade skrivit allt han äger på frugan förutom ett gammalt släp. Det är FRUGAN som sköter ekonomin och allt i företaget, fast utåtsett ser det ut som att Leif-Ivan är det smarta och dragit in pengarna MEN detta är inte sant.

Like · Reply · 4d · Edited

Måste vara människor utan hjärna som tittar på denna dynga.

Like · Reply · 1d

ska du säga, ser fan ut som om du tappades i golvet när du va liten. sluta hacka ner på andra gubblävel, han har inte gjort något ont mot dig

Like · Reply · 1m

hur kan det här ens vara intressant Expressen?! blir så jävla arg o upprörd! Ni vill bara hjärntvätta oss och få in pengar på läsare!!

Like · Reply · 1m

AJ SOM FANI!! Fick en intressepil i ögat.

Like · Reply · 1w

Den där halvfjollan måste det väl finnas hur mycket skvaller som helst om ?

Like · Reply · 1m

Leif-Ivans hemliga maktplan: "Affärer med president Trump"

EXPRESSEN.SE

24 Comments 39 Shares

Like Comment Share

Write a comment...

Top comments

Sverige var bra när han fick hjärtinfarkt!!!!

Like · Reply · 5d

Jävla skojare å skitgubbe å Äkel fy fan

Like · Reply · 5d

Han är ett riktigt äckel.

Like · Reply · 5d

fetknoppen skulle ga med i viktvakterna

Like · Reply · 2d

Och här kom jantelagen och missundsamheten.

Like · Reply · 5d

8.3 Main study: questionnaire

(Swedish)

Hej och välkommen till en ny undersökning från Novus.

Den här undersökningen genomför Novus tillsammans med forskare vid Handelshögskolan i Stockholm. Vi är intresserade av att få mer kunskap om hur man upplever olika internetdiskussioner på sociala medier. OBS! Du behöver inte ha några särskilda förkunskaper för att kunna besvara denna undersökning.

Du kommer nu att få läsa en diskussion som förs i ett kommentarsfält till en artikel. Kommentarererna är anonyma och namnen har suddats ut för att inte utelämna någon. Läs diskussionen på samma sätt som du normalt brukar läsa denna typ av texter. Efter att du läst diskussionen, kommer du att få besvara några frågor som har lite olika karaktär.

Det är viktigt att du läser alla kommentarer i kommentarsfältet

Dina svar är anonyma. Tack för din medverkan!

(Stimulus images displayed)

Lämna en kommentar i textrutan nedan. Skriv som om du skulle göra ett inlägg i kommentarsfältet.

Skriv din kommentar till inlägget:

Lyckades du läsa hela Facebook-tråden?

- ☐ Ja
- ☐ Nej

En fotboll och en fotbollspump kostar tillsammans 110 kr. Fotbollen kostar 100 kr mer än pumpen. Hur mycket kostar pumpen?

- ☐ 5
- ☐ 10
- ☐ 15

Om det tar 5 maskiner 5 minuter att tillverka 5 fotbollar, hur lång tid tar det för 100 maskiner att tillverka 100 fotbollar?

- ☐ 5
- ☐ 10
- ☐ 100

I en sjö finns det ett täcke med näckrosor. Varje dag blir näckrostäcket dubbelt så stort. Om det tar 48 dagar för hela sjön att bli täckt av näckrosor, hur lång tid tar det för näckrosorna att täcka halva sjön?

- ☐ 5
- ☐ 24
- ☐ 47



Titta på de fyra korten här ovan. Vi vet med säkerhet att varje kort har en bokstav på ena sidan och en siffra på den andra. Sanningsenliga Sandra säger: ”Varje kort med ett D på ena sidan, har en 3a på den andra.”

Vilket är det minsta antalet kort du behöver vända på för att ta reda på om Sanningsenliga Sandra faktiskt berättar sanningen?

- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4

Och vilket/ vilka kort är det?

D	K	3	7
---	---	---	---

Jag är i allmänhet kritiskt inställd till diskussioner i kommentarsfält på sociala medier:

1	2	3	4	5	6	7	8	9	10

Tack för din medverkan!
Tryck nästa för att avsluta!

8.4 Extract of written comments

(Swedish)

Neutral condition (article about mobile phones)

“Läste inte artikeln. Lämnade DN några källhänvisningar?”

“Min telefon har klarat både sommar och vinter. Jag känner inte igen problemet. Vem är experten och vilka märken har hen testat?”

”Bra tips med powerbank. Kan vara värt att ta med under resor och turer ute i kylan.”

”Kyla gör att batteriet tappar i spänning. Ju friskare batteriet är desto mindre spänning tappar det vid kyla. Ett gammalt batteri kan gå från hundra till noll när det utsätts för kyla.”

”Håll mobilen varm nära kroppen och ta bara fram när den används. Vid låga samtal använd handsfree.”

Moderate condition (1) (article about the Swedish pension system)

“Typiskt Sverige”

“Är det verkligen så illa? Gör en budget”

“Använd preventivmedel. Det föds en politiker varje dag!”

”Low lifes”

”TrEUDje rikets herremän vill ha mer”

”Hur vet ni att detta är sant? Hur vet ni att hen inte hittar på allt det här för att påverka er Sverige-bild till det negativa?”

Moderate condition (2) (article about Swedish agriculture)

“Vinnaren av SM i Noll Faktakoll är...”

”Känns som maktens herrar sitter lite för långt från verkligheten.”

”Låt bönderna leva”

”Skrota EU”

”jordbruket ska vara kvar bönder har rätt att leva ge dom stöd sänk lönerna för dom som missbrukar sin ställning och lever på skattebetalarna det gör inte bönderna”

Extreme condition (article about a specific Swedish entrepreneur)

“Jag anser inte att ovanstående är värt att svara på. Ligger på en för låg nivå.”

“Seriöst. Det är en grej att tycka olika, det är en helt annan sak att önska live tur någon. Och rikta er ilska, på ett balanserat sätt, mot de beslutsfattare som möjliggjort hans upplägg dvs. politikerna snarare än mot honom”

”Men vari ligger nivån i denna diskussion? Ingen som är konstruktiv?”

”Jag hade inte kommenterat i det kommentarsfältet överhuvudtaget... Det bidrar inte till någonting.”

“Jag skulle ej beröra mig med detta kommentarfält, anmäla till lämplig moderator vore det enda lämpliga”

8.5 Summary of mediation analysis

Table 1
Mediation analysis test showing results of
the contrast effect as a mediator of cognitive performance

Step	β_1	β_2	Condition satisfied?
1	0.439* (0.176)	—	Yes
2	0.260* (0.08)	—	Yes
3	0.394* (0.166)	—	Yes
4	0.359* (0.180)	0.310 (0.171)	Yes

* $p < 0.05$, ** $p < 0.01$ (SE)

8.6 Background variables

Table 1: gender

	Men	Women	Total
Control group	86	75	161
Experimental group 1 (neutral)	69	59	129
Experimental group 2	66	58	120
Experimental group 3	61	59	124
Experimental group 4	70	59	128
	352	310	662

Table 2: age groups

Age	Frequency	Percent
18 – 29 years	128	19.34%
30 – 49 years	214	32.33%
50 – 64 years	176	26.59%
65 – 79 years	144	21.75%
	662	100.00%

Table 3: neighbourhood

Municipality	Frequency	Percent
Large cities	224	33.84%
Medium-sized cities	190	28.70%
Countryside	248	37.46%
	662	100.00%

Table 4: municipality

Age	Frequency	Percent
Stockholm	133	20.09%
Eastern middle-Sweden	118	17.82%
Småland and islands	64	9.67%
Southern Sweden	90	13.60%
Western Sweden	129	19.49%
Northern middle-Sweden	66	9.97%
Northern Sweden	32	4.83%
Upper-Northern Sweden	30	4.53%
	662	100.00%

Table 5: highest level of completed education

Education	Frequency	Percent
Primary school	37	5.59%
Upper secondary school	280	42.30%
University	344	51.96%
Have not completed	1	0.15%
	662	100.00%

Table 6: household income

Age	Frequency	Percent
< 200,000 SEK/year	64	9.67%
200,000 - 299,000 SEK/year	72	10.88%
300,000 - 399,000 SEK/year	83	12.54%
400,000 - 499,000 SEK/year	79	11.93%
500,000 - 599,000 SEK/year	50	7.55%
600,000 - 699,000 SEK/year	76	11.48%
700,000 - 799,000 SEK/year	62	9.37%
800,000 - 899,000 SEK/year	37	5.59%
> 900,000 SEK/year	71	10.73%
Don't want to tell	33	4.98%
Don't know	35	5.29%
	662	100.00%