LUNDS UNIVERSITET

Department of Psychology
Bachelor Thesis

The Effects of Confirmation Bias on Memory: An Experimental Study

Alva Barden & Sophia Havluciyan

Bachelor Thesis VT 24

PSYK 11

Supervisor: Roger Johansson
Examinator: Ilkka Salo

Abstract

This study investigated the effects of confirmation bias on episodic memory. This was achieved through an experiment assessing people's attitudes towards drugs and their recall of pro, neutral, and anti-drug news headlines. Our hypothesis was that participants would be better at remembering headlines that were in support of their beliefs and worse at remembering those that were against. 109 people participated in this study. First, the participants were instructed to fill out a drug attitude test. Then, they read 12 news flashes, consisting of a headline and a short paragraph of text. The news flashes were evenly distributed across 3 conditions: pro-drugs, neutral, and anti-drugs. After that, a memory test was given to the participants where they were shown 24 headlines and asked if they had seen them previously in the experiment or not. The results revealed that recognition memory was best for anti-drug headlines compared to pro-drug and neutral headlines. However, when factoring in attitude scores the results were insignificant. When looking closer into the attitude scores of the sample, a majority of the participants were strongly biased against drugs. Given that participants also had better recognition memory for anti-drug headlines, the results are in line with our hypothesis. However, more research within the area must be conducted to draw this conclusion.

Keywords: Confirmation Bias, Drug Attitude Scale, Episodic Memory, Recognition Memory

Acknowledgements

We would like to thank our supervisor, Roger Johansson, for his patience and support throughout this entire process. This thesis would not have been possible without you. Additionally, we express our appreciation to all those who participated in our experiment, contributing to the success of this study. Finally, we would like to acknowledge and thank each other for our collaborative efforts.

The Effects of Confirmation Bias on Memory: An Experimental Quantitative Study

In today's digital era, people have constant access to a wide variety of information from different sources. This unlimited access to information can be beneficial, as it may allow individuals to form opinions based on factual evidence rather than from parents or social circles. However, many TV channels, newspapers, and social media platforms have biases and often report news that support their agenda, which is not always factual (Pennycook & Cannon, 2018). The formation of attitudes and opinions depend on the information that is consumed and also what details are remembered.

A phenomenon known as the illusory truth effect suggests that repeated exposure to information increases the likelihood of remembering it. Even if information is obviously incorrect, it is more likely to be remembered as true after exposure to the content (Udry & Barber, 2024). Given the overload of media outlets today, the impact of the illusory truth effect on individuals holds great relevance (Udry & Barber, 2024). Studies have shown that people who are repeatedly exposed to information with certain biases are more likely to access that information from memory (Udry & Barber, 2024). Therefore, it has been suggested that repeated exposure, for example in media, is what shapes individuals' worldviews and biases (Baltezarević, Baltezarević & Ravić, 2023).

Confirmation bias comes into play when people start to develop their own worldviews. This phenomenon suggests that people gather evidence from sources that support their own beliefs and agendas, which has created even more polarization both in politics and in general (Baltezarević et al., 2023). It could be argued that gathering news from opposing sources may reduce polarization, but what if how we consume news is less important than how well we remember it? How does this come into play when we form our worldview? These questions establish a foundation for the present study, which targets the interaction between beliefs and fundamental aspects of human memory. More specifically, it examines how news flashes that align with or oppose one's beliefs influence subsequent recognition of those news flashes.

Findings from this study are relevant to society as they can add an additional dimension of knowledge to how people strengthen their agendas and explain why we inhibit contradictory information. Knowledge within this area could help the understanding of society's increasing polarization and therefore contribute to research in preventing it.

Background

Confirmation bias

The term confirmation bias refers to a phenomenon in which people choose to consume information that is aligned with their opinions. Confirmation bias becomes significant when different sources of information send biased messages and one must form an opinion or take a stance on an event or issue (Frost, Casey, Griffin, Raymundo, Farrell, & Carrigan, 2015). This phenomena is based on the fact that all individuals interpret information in different ways. People make sense of the world using pre-existing ideas and knowledge from memory and link how well the new information corresponds to those ideas (Baltezarević et al., 2023). This leads to the formation of attitudes and beliefs that influence how people view the world. Individuals search for new information that corresponds with their beliefs and memories, which further reinforces their attitudes and/or beliefs. There are currently many definitions and applications for the concept of confirmation bias. The most common definition is the following: information search and memory recall that is based on an individual's preferred beliefs and is congruent with their attitudes (Vedejová & Čavojová, 2021).

These areas of research have been extensively studied in the past. Studies have shown that confirmation bias is a phenomenon that most individuals experience throughout their lives (Baltezarević et al., 2023). Once an individual has formed an opinion, they subconsciously search for evidence in their everyday life to justify it. Multiple studies presented children and young adults with evidence that was inconsistent with the theory they favored (Kuhn, 1989b). In one of these studies, adolescents were presented with multiple tennis balls that were labeled as "good serve" or "bad serve" and had to argue what made them good or bad. However, all qualities and characteristics of the balls were identical in both groups, indicating that the participants who perceived them formed false judgments of the tennis balls (Kuhn, 1989b). The study showed that when participants were asked to recall their arguments and the evidence presented on the tennis balls, they recalled the evidence as more in line with their arguments than it actually was (Kuhn, 1989b). Studies have also shown that people tend to overestimate positive confirmatory evidence and underestimate negative disconfirmatory evidence (Pyszczynski and Greenberg, 1987).

Furthermore, Kelley (1950) showed that when presented with data, people attend to the information that they are searching for. In Kelley's study, participants were given a

description of a professor's social qualities before a lecture. After attending a lecture with that professor, they were asked to describe the professor's characteristics. Results showed that the qualities they had been primed with before the lecture were also most prominent in their memory after the lecture. This demonstrates that students had been actively searching for the qualities they were expecting to observe, and when those characteristics appeared they became more prominent in their memory.

Research on confirmation bias has also been studied in relation to current events. One example is the presidential election in the United States in 2008 (Knobloch-Westerwick & Kleinman, 2012). In this study, an experiment was conducted to see if confirmation bias affects the political information Americans absorb. The study found that if people thought their preferred party might lose the election, they were more likely to pay attention to information that might change their mind, even if it did not match their beliefs. However, people who regularly read news online did not experience this effect to the same extent. Results also showed that those who did not read online news and expected their party to win tended to only pay attention to information in line with their views (Knobloch-Westerwick & Kleinman, 2011). A more recent study analyzed the effects of confirmation bias on opinions about the COVID-19 vaccine (Li & Jager, 2023). This study revealed that confirmation bias contributes to the polarization of opinions by influencing how people select information, ultimately leading to increased satisfaction within different groups. These studies show that research within the area of confirmation bias has become more nuanced and has been applied to current events in society.

Confirmation bias ultimately has a strong connection to our worldview and our memory. There is existing research suggesting that memory tends to conform to an individual's schema, which are frameworks that help people categorize and interpret information (Lampinen, Copeland & Neuschatz, 2001). This may play a role in confirmation bias and how it affects memory. This connection between memory, worldviews and confirmation bias can only be understood with knowledge on the processes that are involved in formation and retrieval of memories.

Episodic memory

Memory allows individuals to understand and make sense of new experiences. Explicit memories are memories that we are aware of and tell to others, for example

experiences or past knowledge. Tulving divides explicit memory into the processes episodic and semantic memory (1972). The present study is primarily concerned with episodic memory, which allows us to mentally revisit events that happened in the past. For example, remembering holidays or important experiences such as traveling or doing something for the first time (Tulving, 2002b). These constructions contain specific information about events or episodes that are connected to a place and time in our lives, sometimes referred to as "mental time travel" (Kronrod, Gordeliy & Lee, 2022; Tulving, 2002b). Semantic memories are different from episodic memories as they are not spatio-temporal meaning they are not connected to a specific place or point in time. They are our memory's "mental thesaurus" for pieces of knowledge such as facts, vocabulary and dates (Greenberg & Verfaellie, 2010). For example, a semantic memory can be "I have been to Paris," whereas an episodic memory contains contextual and sensory information, such as what you ate, what you were wearing, and the smell and sounds of the place (Tulving, 2002b). Tulving describes that episodic memories are arranged in categories linked to their spatio-temporal context (1972). Some episodic memories can become semantic memories. When a memory is recollected multiple times, it can become more general knowledge and placed into a semantic schema (Greenberg & Verfaellie, 2010). When information is stored in different schemas, which is the brain's way of storing and organizing semantic memory, it can be recalled with other information in the same category (Greenberg & Verfaellie, 2010).

Episodic memories are first encoded in the brain. When an episodic memory is encoded, information from all sensory aspects of the memory is processed by respective areas in the cortex and sent to the hippocampus for consolidation. The cortical reinstatement theory suggests that different cortical regions process aspects of the experience and further project that to the hippocampus which is involved in feature binding and memory storage. When a memory is retrieved, the hippocampus activates the memory which triggers the same pattern of activation of the different cortical regions from when the experience first occurred; a process called pattern completion (Nadel & Moscovitch, 1997). Memory retrieval is often dependent on the accessibility of retrieval cues. These cues are a part of the physiological and cognitive aid to help our brain to encode information. The most effective retrieval cues are the ones that overlap with the information that is already encoded. The effectiveness of a cue is dependent on a number of different aspects, however, one of the most prominent ones is its distinctiveness. That we are able to discriminate it from other cues and that the cues are

strongly associated with target information (Wheeler & Gabbert, 2017). Retrieval cues are words, visual images or phrases that are connected to information to aid retrieval of it. These cues can help recollect the information that was linked to them. A study was done by Tulving and Pearlstone in 1966 where participants were asked to write down words that they were previously presented with. The words were drawn from categories like birds, furniture and professions. One group of participants had to recall the words without a cue, whereas the other group was given the cues "birds, furniture, and professions" while recalling words. The group that was given the categories performed better at remembering the words.

The process of encoding and retrieving memories is operated by the medial temporal lobe. This has been explored mostly in lesion studies showing that patients with damage to the medial temporal lobe have difficulties recollecting past experiences and in addition to that have struggled with imagining the future (Suddendorf et al., 2009). For example, the case of the musician Clive Wearing, who was infected with a virus that damaged his hippocampus and resulted in amnesia. He is able to remember semantic knowledge such as facts, vocabulary, and was able to play the piano and conduct a choir, but cannot remember events that have just occurred or recent conversations (Suddendorf et al., 2009).

Recognition Memory

Recognition memory is the ability to identify information as being previously seen (Stern & Hasselmo, 2009). It allows us to identify faces, names, locations, and sounds as previously encountered information within a fraction of a second. There are two main elements to recognition memory: recollection and familiarity. Recollection concerns memory of the context whereas familiarity is remembering that information has been presented before; actually remembering details of information versus being familiar with it.

Previous Research on Memory and Attitudes

There are multiple factors that have been studied and shown to affect memories. Illusory truth effect is a phenomenon that suggests that repeated exposure to information can result in an increased perception of truth for the claim. Even if the claim is false, contradicts prior knowledge, is implausible and/or is initially dismissed, repeated exposure to the claim can make one believe it to be true (Udry & Barber, 2024). A seminal study by Hasher, Goldstein and Toppino (1977) showed that when exposing participants to facts and repeating some of them, the individuals rated the repeated facts as more truthful than the ones that were

not repeated. This result has been replicated using opinions or news headlines instead of facts (Arkes, Hackett & Boehm, 1989; Pennycook & Cannon, 2018).

Confidence can also be impacted by confirmation bias which in turn influences memory (Nickerson, 1998). By selectively processing information to align with preexisting beliefs, individuals may overlook valuable insights, fail to consider alternative perspectives, and reinforce their own biases (Nickerson, 1998). Nickerson further discusses that individuals may be more confident in positive information that aligns with their beliefs, and less confident in information that is negative and opposes their beliefs (1998). One study suggests that participants have greater confidence when a stimulus or a cue presented seems familiar (Chua, Hannula & Ranganath, 2012). The author reasons that if something about the stimulus feels familiar it is remembered better than if it was actually seen before.

Moreover, an experiment investigated if participants remembered more when a text confirmed their worldview than when it was phrased to conflict their worldview (Alper & Korchins, 1952). Their sample was university students and their report discussed the effects of gender stereotyping. They instructed the students to read material written in stereotyping language that described women as cowardly, dumb, and inferior to men, whereas the control group read neutral texts about women. After the initial exposure phase, they tested how well men and women remembered the material and found that men remembered more of the negative text than the women did. However, in the control group, the men and women recalled the same amount. These results suggest that the men had more sexist views and experienced confirmation bias given that they remembered the texts that supported their opinion (Goodstadt et al., 1978).

Additional research aimed to discover a relationship between memory and confirmation bias (Frost et al., 2015). This was conducted through the development and execution of two experiments. In the first experiment, participants were asked about their opinions on gun control and then presented 12 different abstracts. In the second experiment they were presented with posts from social media that were either associated with their friends or with strangers. The abstracts consisted of a title and four sentences summarizing the magazine or journal article. The social media posts included a summary of a person's attitude regarding gun control. There were six abstracts/posts that were pro-gun control and six that were anti-gun control. During the second experiment, the social media posts were also labeled

as being written by a friend or not, although the posts were actually created by the authors. In the next phase of the experiment, the participants had to indicate if they wanted to read a page associated with each abstract/social media post. Lastly, the participants' memory was tested. They were shown 24 titles from abstracts or posts, some were presented previously in the experiment and some of them were new. The order of the presentation was random. Then they had to indicate if they had seen the title previously during the experiment or not. The results showed that the participants remembered more of the titles that supported their view, which indicates a strong correlation between confirmation bias and memory (Frost et al., 2015).

Aim and Present Study

The study conducted by Frost and colleagues (2015) explored the relationship between confirmation bias and memory and discovered that participants had a greater recollection of information that supported their beliefs. The present study builds on Frost and colleagues' research, with the aim to investigate whether there is a relationship between bias and memory. A potential relationship is investigated by assessing participants' attitudes towards drugs and testing if those beliefs impact their recognition memory for articles that contain positive, negative and neutral approaches towards illegal drugs.

As the study by Frost et al. (2015) could not determine whether their findings were due to memory improvement for information supporting their view or memory decline for information opposing it, the present study adds a neutral condition to the presented headlines. This will provide the ability to distinguish between the improvement or decline of recognition of headlines supporting or opposing one's convictions. Moreover, the current study introduces a novel and controversial context: attitudes towards drugs. This topic is broadly relevant across different societies and typically evokes polarizing opinions and views, which are critical for the present study.

The aim of the present study was to examine how well people remembered headlines that supported their beliefs about drugs versus headlines that opposed their beliefs. To achieve this we identified whether the participants' attitudes were more positive or negative towards drugs and tested their recognition memory for three types of news flash headlines: pro-drug, neutral, and anti-drug. We hypothesized that (1) recognition memory for headlines supporting participant's beliefs would be better compared to headlines that were neutral or opposed their beliefs, and that (2) recognition memory for headlines opposing participant's beliefs would be worse compared to headlines that were neutral or that supported their beliefs.

Additionally, we explored whether there were any differences in participants' confidence in their responses across the three conditions (pro-drug, neutral, and anti-drug). While this is an exploratory aspect, we do not have a specific hypothesis concerning it.

Method

Participants

The experiment had 109 participants, 70 Swedish speakers and 39 English speakers, that were recruited via a convenience sample. Demographic restrictions were not included in this study to maximize the number of participants and to ensure anonymity. The decision to not collect more personal information from each participant was made with the intention of creating a safe space and in turn increase the number of participants and receive honest answers. The topic of drugs can be sensitive and provoke a dishonest response or discourage people from participating. Therefore no further demographic questions were asked, to not provoke any feelings of discomfort.

Moreover, two experiments were created, one in English and one in Swedish. This aspect will be discussed in further detail below.

Ethics

Participants were required to provide informed consent before the study commenced, according to the Law (2003:460) on Ethics of Research Involving humans and the regulations provided by the Swedish Ethical Review Authority (2024). This process involved digitally consenting that they have read the above instructions about their right to withdraw from the study at any point and the potential utilization of their data in publications. Our study guaranteed that participants would not undergo any adverse emotional or physical effects. Our survey also stated that it would not require or gather any personal information, the experiment was completely anonymous. The data would be securely stored in an encrypted location accessible only to authorized research personnel and would be used exclusively in line with participants' consent (Appendix A).

Material

Drug Attitude Scale

Our experiment aimed to study participants' attitudes towards drugs and therefore we used items from the “Drug Attitude Scale (DAS)” (Goodstadt, Cook, Magid & Gruson, 1978). This attitude scale has previously been tested in a minimum of five studies where all results

correlated which supports the fact that this measurement is valid and reliable (Goodstadt et al., 1978).

Adjustments. The Drug Attitude Scale has 60 attitude-items with 10 subscales each concerning different drugs. From the original test we used 30 questions where statements about each type of drug were evenly distributed throughout the questionnaire to receive a wider range of attitudes towards drugs (Appendix B). Some items from the original test were removed in order to simplify the questionnaire and provide answers only regarding attitudes towards illegal drugs. These items concerned alcohol and tobacco. Further, items concerning heroin, barbiturate and general drug use were also removed to make the test less extensive.

Moreover, all questions were translated to Swedish to increase understanding of the questionnaire for the Swedish speaking participants. The English questions were sometimes modified to simplify the understanding for the native English speaking respondents. Some questions were also added in the form of reverse coding to increase reliability. Our reliability for both the English and Swedish experiments results together was high (Cronbach's a = 0.938). For both experiments, the reliability was also high with a Cronbach's alpha of 0.935 for the Swedish test and 0.924 for the English test. Before the attitude test there was a section of definitions of each drug to increase the comprehension of each statement (Appendix C). Further, some statements clarified what drugs the statement was referring to to ease interpretation of the questions. Every statement followed with a Likert scale from 1-5 where participants rated on a scale from "Strongly disagree" (Instämmer inte alls) to "Strongly agree" (Instämmer helt) their attitude towards the item in question. The same scale was used in the original test as well.

Memory Test

In the first phase of the memory test, the participants read 12 news flashes with associated headlines concerning drugs. After that encoding phase, there was a distraction task and lastly there was a recognition phase. In the recognition phase the participants were shown headlines and asked if they had read that exact headline previously in the experiment or not. In total there were 24 headlines, 12 from the previous encoding phase and 12 new ones (Appendix D). Further, the participants had to estimate how confident they were in their answer on a scale ranging from 'sure', 'maybe' to 'not sure'.

News flashes. The news flashes were generated by the Open AI Chat GPT 3.5 (https://chat.openai.com) that had been prompted to make newsflashes with headlines

concerning the drugs from the adjusted Drug Attitude Scale. Four of the texts were prompted to have a positive approach towards drugs, four were negative and four were neutral. All the generated news flashes were prompted to be the same length and re-generated until the language and content were similar but not identical. Moreover, to test the participants memory of the titles previously shown 12 new headlines were generated with Open AI Chat GPT 3.5. The AI was prompted with the previous title and told to regenerate it with new words and change the attitude of the title, meaning that the four pro-drug titles became anti-drugs and vice versa. Each new headline was rephrased but included the same content as the old respective headline. For the neutral headlines Chat GPT 3.5 (https://chat.openai.com) was asked to regenerate and rephrase the old titles (Appendix D).

Procedure and Design

This experiment was conducted using an online questionnaire created in the Sunet Survey tool ("Lunds Universitet IdP Login", n.d.). One survey was created in Swedish and one survey was created in English in order to generate accurate results. We created two surveys in different languages to maximize the amount of respondents and widen our sample. The experiment comprised four phases: an attitude test, an initial exposure phase, a distraction task, and a test phase. Before beginning the experiment, the participants read through general information on how long the experiment would take and that it requires concentration. The participants were asked to complete the experiment in a quiet setting. They were also informed that no personal information would be recorded and that they had the right to end the experiment at any time (Appendix A). After consenting to this information, they were able to begin the experiment. During the first phase of the experiment, the drug attitude test (Appendix B) was presented where 30 statements were provided and the participant rated their attitude on a scale from 1 to 5. Each statement had either a positive or negative view on drugs, for example, "It is never okay to use amphetamine (speed) or cocaine." The statements were randomized in order for the order and grouping of the questions to have no influence on participants' responses. During the second part of the experiment, the initial exposure phase, the participants were presented with 12 news flashes (Appendix D). Each news flash consisted of a headline and three to five sentences and were presented one at a time on the screen. After this phase, a distraction task was presented where participants were instructed to solve 2 short math problems and one short puzzle in order to switch mental focus away from the 12 news flashes previously read. Then, a surprise memory test was given where the

participant was shown 24 news headlines (Appendix D) one at a time and told to mark if they had read them previously in the experiment or not. They were instructed to mark "yes" or "no" as well as "not sure" "maybe sure" or "sure" after reading each headline. After they completed this, they were told the real purpose of the experiment and the experiment was complete.

Analysis

The data from both the attitude test and memory test were downloaded and processed in excel and then analyzed in the statistical program Jamovi. In excel some of the scores from the attitude test had to be reversed so that pro-drug attitudes would pair with high scores, while anti-drug attitudes would paired with low scores. When the data was on the same scale we could start working on it. Using the attitude scores, a three-way median split divided the participants into a pro-drug, against-drug or neutral group.

In order to analyze confidence in relation to type of headline and attitude in Jamovi, the amount of "sure" responses (that each participant selected after being asked "Estimate how confident you are in your answer") was counted in excel. Then, a score was given for each participant which could be analyzed in Jamovi.

Hits, Miss, False Alarms, and Correct Rejection. The data was sorted into hits, misses, false alarms and correct rejections. A hit is when a participant has correctly remembered and selected that they have seen an old headline, and a miss is when they select an old headline as a new one. False alarms occur when a participant has incorrectly selected that they have seen a new headline before. Lastly, a correct rejection is when a participant has correctly selected a new headline as a new.

Discrimination Index P_r. The discrimination index P_r equals the amount of hits minus the amount of false alarms (Snodgrass & Corwin, 1988). In other words, the amount of correctly recognized old titles minus the amount of falsely recognized new headlines. This index is used to compare how well participants recognize old headlines while taking into account their ability to distinguish a headline as new. This is central when evaluating recognition memory, which is the ability to determine whether participants can differentiate between old and new headlines.

Using this data, Repeated Measure Analysis of Variances (ANOVA) and Post-Hoc tests were conducted to measure if there was a difference for hits, P_r, and false alarms between the 3 attitude groups. Three Repeated Measure ANOVAs were done for hits, three for P_r and

three for false alarms. All ANOVAs contained the independent variable Type of Headline (Neutral, Pro, Against), and additionally, all of the between subjects Repeated Measure ANOVAs contained the independent variable Attitude Group (Neutral, Pro, Against).

Confidence Rating. A confidence aspect was included in the memory test. This was analyzed by counting the amount of sure responses for each participant in excel and comparing them in Jamovi. The independent variable used for the Repeated Measure ANOVA was Type of Headline, and additionally, the independent variable Attitude Group was analyzed in the between-subjects Repeated Measure ANOVAs. A between-subjects Repeated Measure ANOVA analyzed if there was a difference in level of confidence between each attitude group.

Results

Descriptives of Participants' Attitude Scores

The first step in the data analysis was to compile the descriptives from the Drug Attitude Scale (Table 1). Since the attitude test included 30 questions, the lowest possible score indicating a negative attitude towards drugs was 30, the highest score indicating a positive attitude towards drugs was 150 and an exact neutral score towards drugs was 90. The mean was 76.073 and the standard deviation was 22.702, showing that the data is skewed (.642) (Table 1). This becomes clear when looking at the attitude score histogram (Figure 1). In total there were 109 participants and when dividing them into against, neutral and pro groups (Against = 30-89 points, Neutral = 90 points, Pro = 91-150 points) it becomes clear that the group is skewed towards anti-drugs. There were 79 participants with a score lower than 90, 28 with a score higher than 90 and two with exactly 90 points on the attitude scale. In other words the group has a clear anti-bias (72,5%) in contrast to the pro-drug and neutral bias (25,7%, 1,8%).

However, to measure the relationship between attitude and recognition memory, three groups were created. The groups were created through a three-way median split in order to make equal groups of participants that were either pro, against or neutral towards drugs. These groups were given the epithet "Against" with attitude scores ranging from 40-66, "Neutral" with scores ranging from 67-85 and "Pro" with an attitude score from 86-150. This split was done to create statistical robustness. However, as the descriptive data shows, there is a clear bias for anti-drug attitudes.

Furthermore, when analyzing the difference between the test conducted in Swedish and the one in English, group differences are revealed. There were more participants in the Swedish experiment (70, 64%) than in the English (39, 36%). Moreover, Figure 2 shows that the English speaking participants were more pro-drugs and the Swedish speaking participants were more anti-drugs and neutral (Figure 2).

Table 1

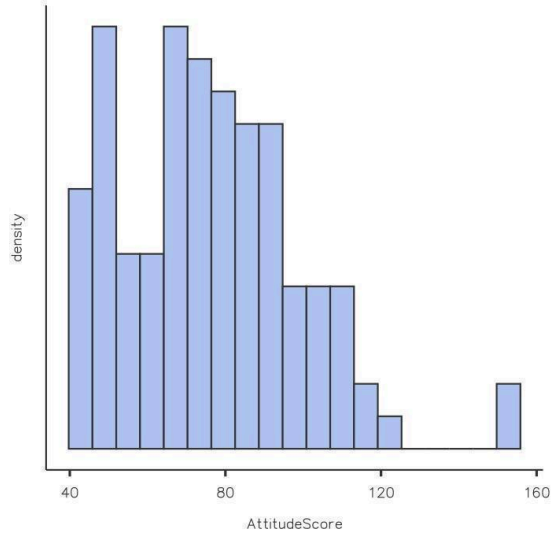
Descriptives

	Attitude Scores
Number of Participants	109
Mean	76.073
Median	74
Standard Deviation	22.702
Minimum	40
Maximum	150
Skewness	.644
Kurtosis	.613

Note. This table shows descriptive statistics from the obtained data from the drug attitude test.

Figure 1

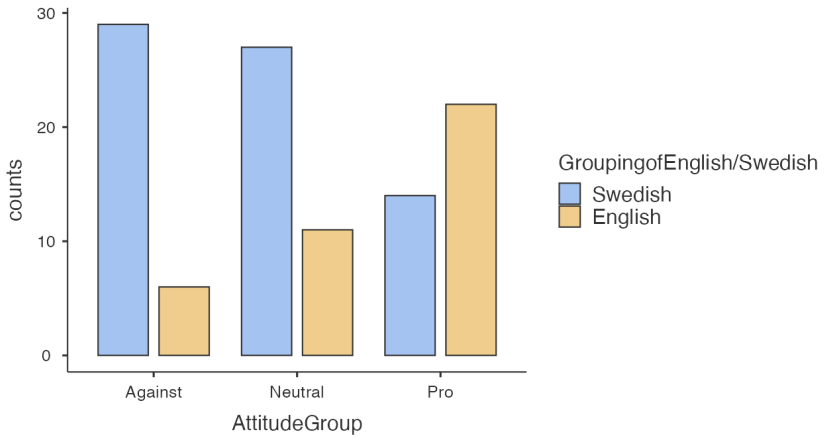
A Histogram Showing the Distribution of Attitude Score.



Note. Figure 1 depicts the attitude data from the drug attitude test. On the x-axis it is how pro-drugs they scored on the attitude test and y-axis the number of people. The higher bars indicate a higher number of people with that score.

Figure 2

A Histogram Showing the Distribution of Attitude Score Between the English and Swedish Attitude test.



Note. Figure 2 depicts the attitude data from the drug attitude test with the groupings of Swedish and English participants in the three attitude groups (Against, Neutral, Pro). The blue bars are the Swedish participants and the yellow bars are English ones.

Recognition Memory

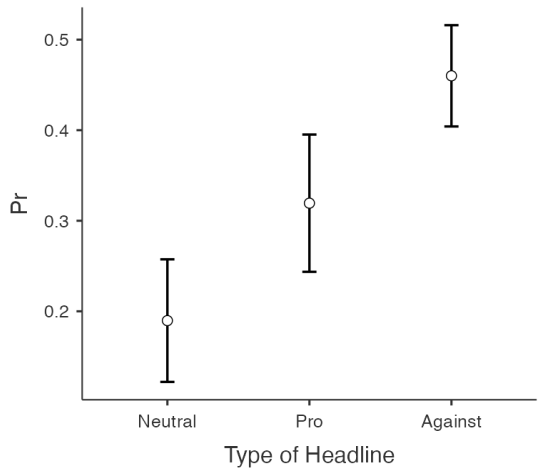
Pr

A Mixed Model ANOVA was conducted with the Type of Headline (Neutral, Pro, Against) as a within-subject independent variable, Attitude Group (Neutral, Pro, Against) as a between-subject independent variable and P_r as the dependent variable. It revealed a main effect of Type of Headline ($F(2, 212) = 19.106$, $p < .001$, $\eta^2 = .091$). A Bonferroni Post-Hoc test showed that people performed best at remembering the types of headlines that were biased against drugs and worst at remembering the type of headlines that were neutral towards drugs ($t = -1.167$, $p < .001$). When comparing the results of pro-drug headlines and anti-drug headlines, the Post-Hoc test showed a smaller difference in results between them than between against and neutral, however there was still a significant result ($t = -3.398$, $p_{bonferroni} = .003$). Lastly, the smallest effect was between the neutral and against condition ($t = -2.826$, $p_{bonferroni} = .017$), however, it was still significant. See figure 3 for an illustration of these effects.

There was no main effect of Attitude Group ($F(2,106) = .597$, $p = .552$, , $\eta^2 = .004$), nor an interaction effect between Type of Headline and Attitude Group ($F(4, 212) = .409$, $p = .802$, $\eta^2 = .004$), indicating that one's attitude had no influence on the ability to remember a title.

Figure 3

An Estimated Marginal Means Plot of a Repeated Measure ANOVA.



Note. Figure 3 illustrates the three conditions of types of headlines and how well the participants scored in each condition on the memory task. The circle shows the mean of each condition and the error bars show a 95% confidence interval.

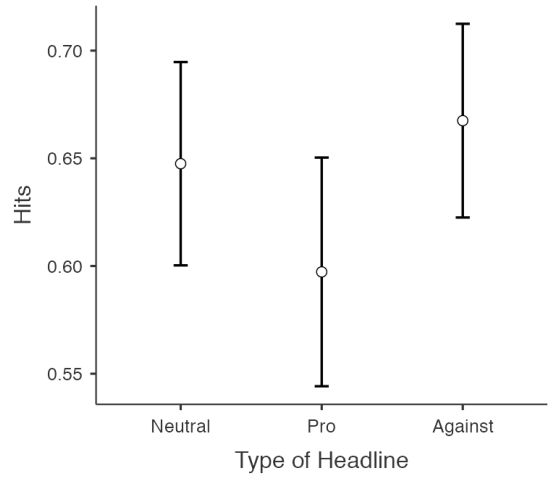
Hits

When analyzing the hits, the amount of correct answers on the memory task, in relation to types of headlines and attitude, there are no significant numbers to report. This was done with a Mixed Model ANOVA with the Type of Headline (Pro, Neutral, Anti) as the within-subject independent variable and Attitude Group (Neutral, Pro, Against) as the between-subject independent variable and Hits score as the dependent variable. View Figure 4 for an illustration of these effects.

The main effect of the Type of Headline was almost significant ($F(2,212) = 2.870$, $p = .059$). There was no main effect of Attitude Group ($F(2,106) = 1.134$, $p = 0.326$, , $\eta^2 = 0.010$). There was no significant interaction effect between Type of Headline and Attitude Group ($F(4,212) = .287$, $p = .886$).

Figure 4

An Estimated Marginal Means Plot of a Repeated Measure ANOVA.



Note. Figure 4 shows the three conditions of types of headlines and the amount of hits scored within each condition. The circle shows the mean of each condition and the error bars show a 95% confidence interval.

False Alarms

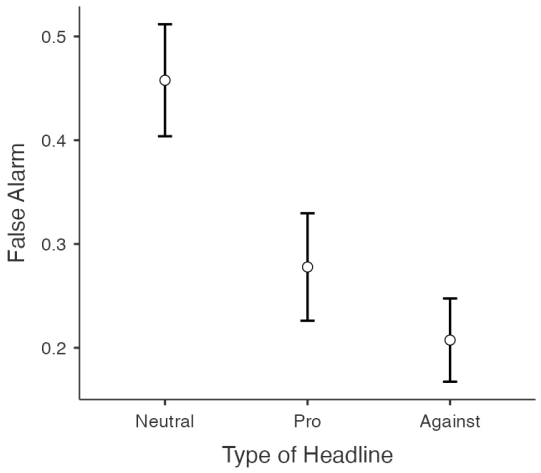
False alarms, which is when a participant selects that they remember a new headline, were also analyzed with a Mixed Model ANOVA. The Type of Headline (Neutral, Pro, Against) was the within-subject independent variable, Attitude Group was the between-subject independent variable and false alarm score was the dependent variable.

There is a main effect of Type of Headline ($F(2,212) = 39.801$, $p < .001$). However, there is no significant main effect of Attitude Group ($F(2,106) = 1.053$, $p = 0.352$, , $\eta^2 = .009$). When conducting a Post-Hoc test, the greatest effect can be seen when comparing neutral headlines to pro/against (Neutral - Pro, $t = 5.854$, $p_{bonferroni} < .001$) (Neutral - Against, $t = 8.192$, $p_{bonferroni} < .001$). This means that when a title was neutral, participants were more likely to select them as old than if the title was pro or against. The difference in false alarms made by pro versus against groups is also significant (Pro - Against, $t = 2.797$, $p_{bonferroni} = .018$). The difference is illustrated below with an estimated marginal means plot in Figure 5.

However, the Repeated Measure ANOVA shows no interaction effect of Type of Headline and Attitude Group ($F(4, 212) = .730$, $p = .572$). In other words, the number of false alarms were not affected by each participant's attitude towards drugs.

Figure 5

An Estimated Marginal Means Plot of a Repeated Measure ANOVA.



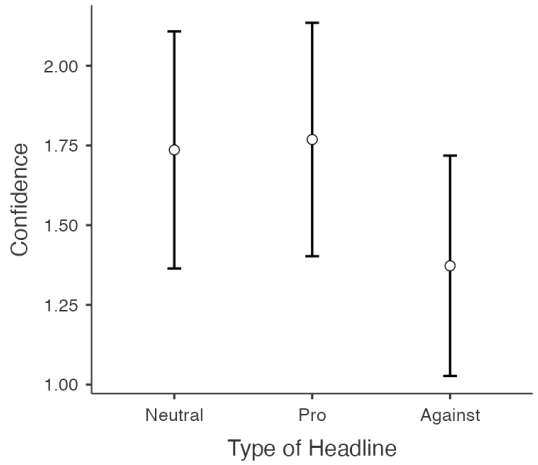
Note. Figure 5 illustrates the three conditions of types of headlines and the amount of false alarms that were done for each condition. The circle shows the mean of each condition and the lines from it shows the range of score within the condition.

Confidence rating

A Mixed ANOVA was conducted to analyze if there was a relationship between neutral, pro-drug or anti-drug attitude and confidence. Type of Headline was the within-subjects independent variable, Attitude Group was the between-subject independent variable, and Confidence was the dependent variable. There was a main-effect of Type of Headline ($F(2, 212) = 6.66$, $p = .002$) . When taking into account attitude scores, participants generally were more sure in their rating for pro-drug and neutral headlines than anti-drug headlines. See figure 3 for an illustration of these effects. A Bonferroni Post-Hoc test showed that (Confidence Neutral - Confidence Against, $t = 2.966$, $p_{bonferroni} = .011$) and (Confidence Pro - Confidence Against, $t = 3.345$, $p_{bonferroni} = .003$). This indicates that there was a greater effect when comparing pro-drug headlines and anti-drug headlines than neutral and anti-drug headlines. When conducting a Repeated Measure ANOVA for Type of Headline and Attitude Score, there was no interaction effect ($F(2, 106) = .566$, $p = .570$), revealing no effect of attitude score on level of confidence.

Figure 6

An Estimated Marginal Means Plot of a Repeated Measure ANOVA.



Note. Figure 6 shows the Type of Headline (Neutral, Pro, Against) on the x-axis and the Confidence variable on the y-axis. The circle shows the mean of each condition and the error bars show a 95% confidence interval.

Language as a Factor

Lastly, all ANOVAs were conducted again with the same independent and dependent variables as the previous analyses and with the additional between-subject factor Language (English/Swedish). There were partially significant differences between the experiments conducted in English versus Swedish (Main Effect P_r p = .044, Interaction effect Pr p = .047, Main effect Hits p = .083, Interaction effect Hits p = .486, Main Effect false alarms p = .421, Interaction Effect false alarms p = .032). However, the plots in each graph follow the same curve (Figure 7, 8 and 9) but have different values. Meaning that the effects of the experiments are about the same but the scores are different.

Figure 7; Figure 8; Figure 9

An Estimated Marginal Means Plot of a Repeated Measure ANOVA.

Figure 7

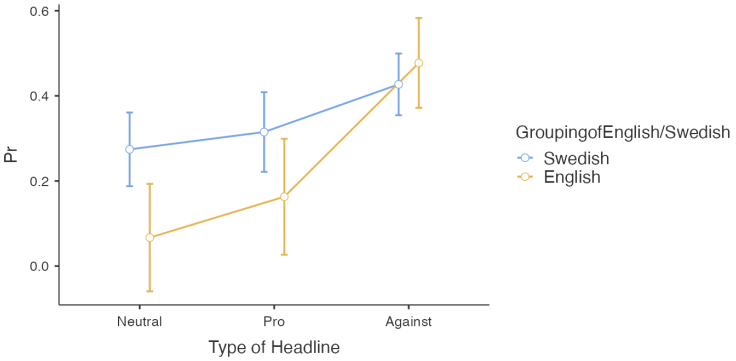


Figure 8

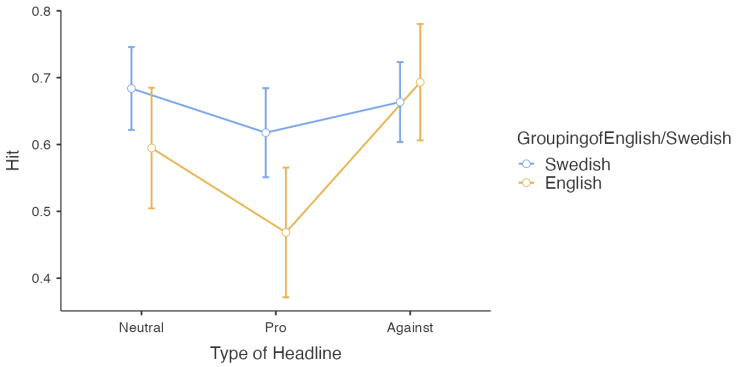
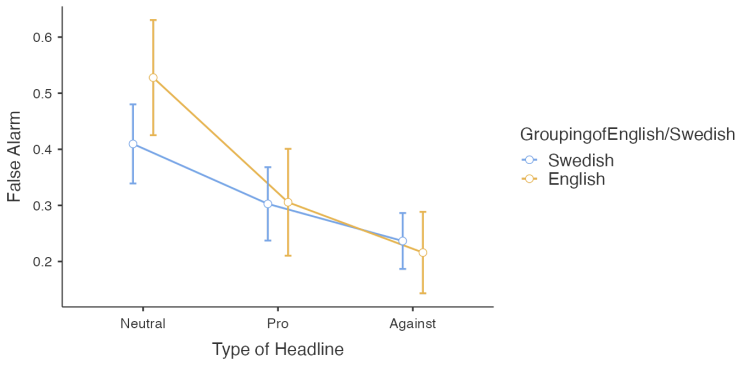


Figure 9



Note. Three plots showing the between subject effect of Language (English, Swedish) on Pr (Figure 7), hits (Figure 8) and false alarm (Figure 9) and Type of Headline (Neutral, Pro, Against). The circle shows the mean of each condition and the error bars show a 95% confidence interval.

Discussion

Our results show that people are generally best at remembering headlines that are negatively biased compared to headlines that are positively biased or neutral towards drugs. They also indicate that people are better at remembering positively biased headlines than neutral headlines. Further, the participants had a greater tendency to select new neutral headlines as old compared to anti-drug and pro-drug headlines. However, there is no existing relationship between attitude towards drugs and greater recognition of information that is in line with one's attitude. The confidence rating component of our experiment also showed no relationship to pro, neutral or anti-drug attitudes, however, results suggest that people generally are more confident in their answer for pro and anti-drug headlines than neutral.

Therefore, people were not more or less confident in their answers depending on their attitude towards drugs.

When comparing these results to previous studies done by Frost et al. (2015) and Alper & Korchins (1952), our results did not align with theirs. Their results were significant for recognition of information that supported the participants' viewpoint, which our experiment did not. This might be due to a number of factors which will be discussed in the next section of this report.

Most of our participants responded in opposition to drugs in our attitude questionnaire. Given that our data revealed that anti-drug headlines were best remembered, we can infer that these findings are actually compatible with our hypothesis. This study was technically conducted on an anti-drug sample and produced results that match Frost and colleagues research (2015). However, this should be tested with an even grouping of attitudes that are pro, neutral and against drugs in order to form a conclusion about pro-drug attitudes. Because we grouped the participants using a three-way median split when conducting our analysis, the division of pro, neutral and against-drug groups was not represented well. However, this split was made in order to conduct statistical analyses with groups of an even number of participants.

The data presented significant results that imply that people remember information that is phrased to have a positive or negative approach to an issue compared to information that is phrased neutrally. This becomes clear when looking at the results for false alarms since participants' false alarms were higher for neutral headlines than pro-drug and anti-drug headlines. It was more difficult to distinguish new information from old information when the headlines were neutral. This can be supported by research suggesting that people remember negative words better than neutral words (Kensinger & Corkin, 2003). Evidence proposes that this is because negative words elicit more vivid memories than neutral words. Kensinger and Corkin analyzed recognition of words, therefore both recollection (remembering details) and familiarity (knowing), and concluded that participants performed better when testing both recollection and familiarity of negative words versus neutral words. Other research shows that people tend to overestimate positive confirmatory evidence and underestimate negative discriminatory (Pyszczynski and Greenberg, 1987). This can partially explain our result, and explain why people remember positive headlines.

Moreover, people may have recognized pro or anti-drug headlines as opposed to neutral headlines because they filled out the attitude test which later primed them to search for and recollect pro and anti-drug headlines during the memory test (Kelley, 1950). There were no neutral questions in the attitude test which may explain why there was lower recognition for the neutral headlines. Priming can lead to confirmation bias, since participants are implanted with biases before the experiment and might attend to that information more than neutral information.

Strengths and Limitations

Two versions of this experiment were created, one in Swedish and one in English, in order for all participants to clearly understand each question and answer in their native language to the best of their abilities. Criticism can be directed towards this decision as translating questions poses a risk for information to be formulated, conveyed and understood differently in different languages. This poses a risk for a decrease in the study's internal validity as it is impossible to ensure that participants conducting different versions of the experiment interpret the content identically. However, this risk would still exist if the study had one version in the same language because it is impossible to know how each participant comprehends each statement. Therefore, it is important to be as clear as possible to eliminate risk for confusion or misinterpretation. For example, by providing definitions for each drug type, we intended to eliminate any chance for misinterpretation of the drug attitude test. Because there are many different names and interpretations for different drugs, it was important to define each one so that all participants could respond to the questions with the same preconditions (Appendix C).

However, when analyzing the difference in scores between Swedish and English versions, test results showed that the Chronbach's alpha was high and about the same for both of them: .935 and .924 respectively. This suggests that there were no significant changes in the overall aim of the attitude questions. The analyses, however, show significant differences between the English and Swedish experiments. Figure 7, 8 and 9 indicate that the test scores are different but the language groups' statistics follow the same curve. When discussing the difference between the groups of native Swedish and English speakers, two main factors come to mind. First, there were more participants that spoke Swedish (70 participants, 64%) than English (39 participants, 36%) which could have impacted the results. Moreover, in Figure 2 it becomes clear that in general the English speaking participants were more

pro-drugs than Swedish speaking ones making the data significantly different between the groups. This might be due to the differences in laws and regulations concerning drugs in Sweden versus in the United States, or due to potential cultural differences.

Furthermore, the experiment was distributed online to increase the convenience for all participants and therefore maximize our sample size. This ensured further anonymity of the participants as they did not have to be monitored by an experimenter. However, this made it impossible to control the experimental setting. At the start of the experiment, participants were instructed to perform the experiment in a calm and quiet setting (Appendix A), however, it is impossible to know each participant's location or surroundings. Therefore, there are possible environmental factors that may have affected the results. Some participants may have performed the test apart from distractions and some may have been in an environment unsuitable for performing a memory task. This could contribute to why the results were partially insignificant.

Attitude test

The study used the Drug Attitude Scale because it was available to the public, had high reliability and was recurrent in research regarding attitudes towards drugs. In retrospect, the test had a high Cronbach's alpha and was reliable, however, it did not form the clear attitude grouping that the study aimed for. When choosing the topic of drugs, the purpose was to form two groups containing opposing opinions. However, when examining the results the average score of the attitude test was 76.073. A majority of the participants scored below 76.073 and would actually be considered part of the "anti-drug" group, causing the data to be skewed towards anti-drugs. This could be a cause for no significance between attitude towards drugs and memory of pro, neutral or anti-drug headlines. In future research, it would be essential to specify a target group beforehand and recruit participants that are bfoth against drugs and pro-drugs.

Further, the experiment did not ask participants to answer any questions about demographics in order to increase their anonymity. We did not collect personal information about each participant because we aimed to create a safe space for the participants as the topic of drugs can be sensitive and private. Although this creates a safer space for the participant to respond truthfully, excluding demographic questions prevents us from analyzing how diverse our sample is. We are unable to see what population our data applies to which limits the range of explanation of the results. There is a risk that convenience sampling formed a homogenous

sample and therefore the data cannot speak for the general population. If the experiment would have collected background data such as age and gender, these factors could be discussed as contributory for the results and generalizations of this experiment. Nevertheless, these questions were not included and therefore such a discussion can not be held.

Memory test

The memory test had one main weakness. There were supposed to be 12 old headlines that had been shown previously in the experiment and 12 new headlines that had not been shown before. These were supposed to be equally distributed with three different conditions (anti-drug, neutral and pro-drug), however, a mistake was made and therefore one new anti-drug title was not included in the experiment making the distribution uneven. This was calculated for in our data when translating the numbers to proportions, however, there is unfortunately an imbalance when interpreting the results. Because of this, each false alarm in this condition has a greater impact on the mean than the other conditions. Moreover, there are only four data points within each condition causing each answer to have a large impact on the experiment, and therefore losing one causes an imbalance in the results.

Another aspect of the memory test that might have affected the result was the inability to randomize the news flashes and headlines in the Sunet survey tool. There was no function within the program to randomize the presentation of headlines, and therefore the test was manually randomized and all participants received the same order of presented headlines and texts. Therefore the primacy and recency effect might have come into play and affected the results. However, the experiment included a distraction task to minimize these types of effects. On a positive note, Sunet was able to randomize the drug attitude questions to eliminate risk for order effects. We could have created and published multiple questionnaires to eliminate order effects, however, we decided to create only one experiment to ensure that no participant took part in the study multiple times and improved their performance because of that. Creating multiple experiments would also require us to recruit a greater sample which there was limited time for, so we voted against that option. Using Sunet was a cost-benefit decision as Sunet was free of charge and therefore the benefits of using a free survey tool for this experiment outweighed the costs of not being able to randomize the headlines.

Future research

Even though parts of our results showed no significance, there are plenty of reasons to continue research within this area. Future research would benefit from being conducted on a

larger scale by increasing the number of participants and also the amount of headlines in the memory experiment. This would provide more data and therefore increase the likelihood of producing significant results. Another approach to expanding the experiment and potentially obtaining significant results is to use a population with a wider range of differing opinions. A larger and more diverse sample can increase the external validity and therefore allow us to form more accurate conclusions for the general population. Further, the experimental setting should be more controlled. With more time and resources, the experiment could be hosted in a laboratory where all participants have the same environmental circumstances, making the results more reliable.

Moreover, the topic of the attitude test should be reconsidered in future studies conducted in Sweden. In previous studies, the topic of gun control was used which does not translate as well in the Swedish context because there is little debate concerning the implementation of gun-control in Sweden compared to the United States (Frost et al., 2015). However, a similar topic that people feel strongly about and that raises lots of debate in Sweden would be applicable for this experiment. Our intention was for the attitude towards drugs to act as a polarizing topic, however, the results showed that the majority of all participants were against drugs. If the topic of drugs would be used again, the attitude test would need more specified attitude questions such as politics and legalization or the actual use of drugs instead of people's general attitudes. The attitude test may also benefit from only concerning questions about a certain type of drug so that it is more specific and encourages people to take a clear stance. For example, narrowing down to questions only concerning cannabis would potentially generate a clear division of pro and anti-cannabis attitudes.

Further research within this area should continue to expand because confirmation bias plays a pivotal role in the shaping of worldviews as it affects how individuals gather and learn information (Vedejová & Čavojová, 2021). Knowledge on how it affects memory can add an additional layer to bias and attitudes and therefore help explain how people perceive the world. Research on the impact of confirmation bias on recognition memory is in need of expansion and development. We were inspired by Frost and colleagues' research on confirmation bias' influence on memory and source monitoring. This led us to conduct a study on participants' attitudes towards drugs and their memory. Although this study's predictions were technically not significant, the knowledge gained from this study can be used

when developing future research in this field. Further, this awareness can be used with the aim to prevent polarization and create a deeper understanding of that phenomenon.

Conclusion

In conclusion, there was a significant tendency for participants to remember anti-drug AI generated news headlines to a greater extent than pro-drug and neutral ones. A majority of our sample resulted in having clear anti-drug attitudes and remembered the anti-drug news headlines better than the other headlines. However, when using the three-way median split to divide the sample into attitude groups, this experiment showed no significant effect of confirmation bias on memory. This study lacked a suitable population to test our hypothesis as a majority of the sample was biased against drugs. There is a possibility that this bias had an effect on memory as a majority of the headlines recognized were anti-drug headlines. This effect must be tested on a more balanced sample with the equal sizes of anti and pro groups in order to clearly distinguish between pro-drug and anti-drug biases. Future research concerning confirmation bias and memory would benefit from being more extensive by applying various polarizing topics to a diverse sample. This study provided insights into how people reinforce their beliefs which can enhance our understanding of the growing polarization in society and contribute to research aimed at preventing it.

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Appendix

Appendix A. Consent form.

We are two students writing our bachelor's thesis in Psychology at Lund University. The experiment is divided into 4 sections and will take around 15 minutes to complete. We recommend sitting in a quiet environment as it requires some focus and concentration. Parts of the experiment will deal with attitudes regarding drugs. We are only measuring your opinion about drugs and not actual drug use.You must be 18 or older to participate. The experiment is voluntary, and you can choose to leave/discontinue at any time. We do not collect any personal data and no data will be connected to your personal identity. The survey is completely anonymous.We appreciate that you take the time to answer the questions truthfully during the experiment.

Important! Please do not complete this survey if you have already completed the Swedish version

Thank you!
//Alva and Sophia
For questions or feedback, please contact us at the following email addresses:
al6316ba-s@student.lu.se or haviuclyansophia@gmail.com

Note. The consent form all participants had to agree to, to be a part of this study.

Appendix B. Adjusted Drug Attitude Scale.

To what extent do you agree with each statement?

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
Using cannabis makes social settings less enjoyable.	☐	☐	☐	☐	☐
It's worth taking opioids regardless of the risks.	☐	☐	☐	☐	☐
Sedatives/Tranquilizers harm more people than they help.	☐	☐	☐	☐	☐
Its okay to use cannabis.	☐	☐	☐	☐	☐
There should be stricter control over the prescription of opioids.	☐	☐	☐	☐	☐
If my close friend had offered me amphetamine (speed) or cocaine, I would probably have taken it.	☐	☐	☐	☐	☐
The legalization of cannabis would be a step in the wrong direction	☐	☐	☐	☐	☐
Sedatives help more people than they harm	☐	☐	☐	☐	☐
It is never okay to use amphetamine (speed) or cocaine	☐	☐	☐	☐	☐
It is better to take sedatives than to wait for the body to handle it on its own	☐	☐	☐	☐	☐
Amphetamine (speed) and/or cocaine should not be used even when feeling tired.	☐	☐	☐	☐	☐
It's okay to use opioids as long as you make sure you don't become addicted.	☐	☐	☐	☐	☐
It's wrong to use amphetamine (speed).	☐	☐	☐	☐	☐
It's not dangerous to use hallucinogens occasionally.	☐	☐	☐	☐	☐
Amphetamine (speed) and/or cocaine are helpful if you need to get more energy when feeling tired.	☐	☐	☐	☐	☐

To what extent do you agree with each statement?

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
Using cannabis can make social situations more enjoyable.	☐	☐	☐	☐	☐
It's better to let the body handle itself than to take sedatives	☐	☐	☐	☐	☐
It's wrong to use cannabis.	☐	☐	☐	☐	☐
It's okay to use amphetamine (speed) or cocaine occasionally.	☐	☐	☐	☐	☐
It's not dangerous to use cannabis occasionally.	☐	☐	☐	☐	☐
The risks of opioids are not worth taking.	☐	☐	☐	☐	☐
The legalization of cannabis would be a step in the right direction.	☐	☐	☐	☐	☐
Hallucinogens like MDMA, LSD, and Ecstasy are too dangerous to experiment with.	☐	☐	☐	☐	☐
If sedatives were dangerous, doctors wouldn't prescribe them so often.	☐	☐	☐	☐	☐
It's always dangerous to use hallucinogens.	☐	☐	☐	☐	☐
It's always dangerous to use hallucinogens.	☐	☐	☐	☐	☐
It's okay to take hallucinogens in party settings.	☐	☐	☐	☐	☐
Even if my close friend gave me amphetamine (speed) or cocaine, I wouldn't use it.	☐	☐	☐	☐	☐
Amphetamines (speed) are a good way to stay alert when there's work to be done.	☐	☐	☐	☐	☐
Hallucinogens can help a person be more social.	☐	☐	☐	☐	☐

Note. The appendix shows all statements participants had to take a stand on in the drug attitude-test.

Appendix C. Instruction Before Attitude test.

2. **Part 1**

Below are 30 statements about your attitude towards drugs and drug use. You will be asked to take a position on the statements on a scale of 1 to 5, where 1 means you do not agree with the statement at all and 5 means you completely agree.

There are many different names for drugs, so here is a clarification of what we mean by the different drugs:

When we talk about sedatives/tranquilizers, we mean benzodiazepines (Benzo) "a group of drugs that have been widely used in the treatment of anxiety and sleep disorders" such as Xanax and Valium.

When we talk about opioids, we mean "a group of substances that have morphine-like properties and effects" such as morphine, fentanyl, and heroin.

When we talk about amphetamine and cocaine, we mean "synthetic central nervous system stimulants that can be taken orally, inhaled through the nose (snorted), or injected" and "a central nervous system stimulant alkaloid derived from the South American cocoa plant" examples include speed, coke, blow, snow.

When we talk about cannabis, we mean "cannabis drugs, a collective term for, among other things, marijuana, weed, bud, grass, hash, THC and CBD."

When we talk about hallucinogens, we mean "psychedelic drugs and narcotic classified psychoactive substances that already in small doses have strong intoxicating effects and can cause euphoric feelings" such as LSD, MDMA, DMT, Ecstasy, and mushrooms.

When we talk about methamphetamine, we mean a "central nervous system stimulant synthetic amphetamine that produces a stronger and faster onset of euphoria than amphetamine and is considered to lead to more severe addiction." such as meth.

Note. Instructions before the drug attitude test

Appendix D. Headlines

Headlines and Type (Old/New) (Pro-drug, Neutral, Anti-drug)

Researchers Explore the Potential of Ecstasy for Increased Social Interaction	Old, Pro-drug
Exploring the Beneficial Aspects of the Cannabis Debate	Old, Pro-drug
Discovery of Positive Aspects of Amphetamine and Cocaine	Old, Pro-drug
My Discovery of the Positive Effects of Tranquilizers for my Anxiety	Old, Pro-drug
Hallucinogens in the Spotlight of Research: Therapeutic Potential or Uncharted Risks?	Old, Neutral
The Path to Cannabis Legalization: A Model for Sweden to Consider?	Old, Neutral
The Dilemma of Opioid Regulation: Pain Relief versus Addiction	Old, Neutral

A Young Woman Navigates her Polarizing Views on Drugs	Old, Neutral
Warning: Dangerous Hallucinogens Raise Physical and Mental Health Risks	Old, Anti-drug
Individual Warns of the Dangers of Cannabis after Witnessing a Friends' Tragedy	Old, Anti-drug
Increased Risk of Addiction and Harm: Drug Abuse on the Rise	Old, Anti-drug
Increased Concern About Negative Effects of MDMA Among Youth at Parties	Old, Anti-drug
Encouragement for Safe Use of Hallucinogens: Promoting Health and Mental Well-Being	New, Pro-drug
Enhanced Awareness and Support: The Potential of Medication Use for Well-Being and Recovery	New, Pro-drug
Increased Awareness of Safe Usage and Positive Effects of MDMA Among Youth at Parties	New, Pro-drug
A Person's Enlightenment About the Benefits of Cannabis after a Friend's Transformation	New, Pro-drug
The Balancing Act in Opioid Control: Navigating Between Pain Relief and Addiction Issues	New, Neutral
A Girl Struggling with the Duality of Drug Use	New, Neutral
In the Spotlight of Research: Hallucinogens - Therapeutic Breakthroughs or Shady Dangers?	New, Neutral
Exploring the Path of Cannabis Legalization: A Potential Framework for Sweden to Explore?	New, Neutral
Review: The Harmful Aspects Regarding the Debate of Cannabis	New, Anti-drug
Revelation of the Harmful Effects of Amphetamine and Cocaine	New, Anti-drug
My Shock Over the Harmful Consequences of Tranquilizers for my Anxiety	New, Anti-drug

Note. All headlines in the memory test and what type of headline it is.