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Measuring Implicit and Explicit Attitudes

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ABSTRACT

Two experiments examined implicit and explicit attitudes for attitude-congruent material. Both implicit and explicit memory was measured with the same stimuli and the same responses in both experiments. 22 (14 female, 8 male) university students took part in experiment 1 where implicit and explicit attitude was measured for positive or negative images in combination with positive or negative words. 20 (5 female, 15 male) university students took part in experiment 2 where implicit and explicit attitude was measures for attractive or unattractive faces in combination with positive or negative words. The hypothesis that congruent material should show implicit attitude proved to be false in both experiments. The hypothesis that congruent material should show explicit attitude proved to be true in both experiments. It was argued that the implicit part of the experiment, which was based on a recognition memory test was to difficult, and that further research should focus on finding a suitable level of difficulty for further testing implicit attitudes.

Keywords: Implicit attitudes, explicit attitudes, memory

Implicit measures have been an active topic in social psychological research over the last few years, and have been researched in a variety of domains such as attitudes, stereotypes, self-esteem, close relationships and health behavior (Fazio & Olson, 2003). An implicit measure is when something is measured indirectly, usually without the testee's knowledge. For example we tell the participant that we measure A but are actually measuring B in the hope that the participant is unaware of the fact that B is being measured. An explicit measure on the other hand is when we say that we measure A and actually measure A directly, with for example a questionnaire where we ask direct questions. One problem with implicit attitudes is whether or not they are distinct from explicit attitudes, how can we know that they are separate constructs?

According to Greenwald & Banaji (1995) implicit attitudes are mental representations that connect social concepts and attributes that we are unaware of. If this is true then people should show an association between an object and a concept in an implicit measure but in an explicit measure show that they have little knowledge of the same association. If a correlation between the implicit measure and the explicit measure showed a negative or no correlation then there would be support for the definition presented by Greenwald & Banaji above. I. e. an implicit measure should show that women are considered bad at math, while an explicit measure should show that women are considered good at math. Or for that matter the opposite, for the sake of the correlation an implicit test could just as well show that women are considered good at math whilst the explicit measure show that they are considered bad at math. As long as the correlation is negative or zero, implicit and explicit measures can be considered separate.

The connection between indirect and direct attitude measures has been found to be low and sometimes zero (Blair 2001; Dovidio, Kawakami, Beach, 2001; Brauer, Wasel, Niedenthal, 2000), supporting Greenwald & Banajis definition. Fazio & Olson (2003) on the other hand mean that the low correlation between indirect and direct measures can be explained by motivation to control prejudice as a moderating factor. If people are aware that an attitude is prejudiced and socially unacceptable (e.g. the view that women are bad at math) and have the ability to compensate for this view in an explicit test, they will do so. I.e. if a participant takes an explicit (direct) test, but has a high motivation to appear without prejudice, they would probably score rather low, since they are motivated to correct their views to avoid a high score (which would indicate prejudice). The same participant then takes an implicit test, this time unaware that prejudice of some form is being measured. In this case the participant isn't aware that prejudice is being measures, and hence cannot correct their views, scoring higher than in the first explicit test. If these two tests were to be compared,

it's likely that the first test (where the participant knowingly answers to appear unprejudiced and got a low score) is uncorrelated with the second test (where the participants is unaware of that prejudice is being measured, and got a higher score), but in this case the lack of correlation can be explained with that the participants wish to appear unprejudiced in the first test.

This thesis will deal with measuring attitudes both implicitly (indirectly) and explicitly (directly) in the same test. This solves two problems: Firstly, explicit and implicit attitude measures have used different formats, for example questionnaires for explicit attitudes and reaction time for implicit attitudes. This could explain why there is a low correlation between the two. By using the same material to measure both attitudes in the same test this can be solved. Secondly, if the same characteristics exists in both the implicit and explicit tests that are being compared they will automatically be correlated. This could be solved by separating the implicit and explicit attitudes so that they are logically independent, making it possible to see if they correlate or not.

Information that is attitude-congruent (e.g. a combination of a picture of something negative together with a negative word) has exhibited a response bias towards being rated as old (present earlier in the test) in recognition memory tests, whether this was the case or not (Eagly, Chen, Chaiken, & Shaw-Barnes, 1999). Since attitudes are associations between a concept and an attribute, such a response bias should act as an indication towards an implicit attitude. A response-bias will be used in this thesis to measure implicit attitudes. Consider an experiment similar to the old children's game of Memory. A series of combinations, each containing a picture together with a word is shown, one after the other they appear together on a computer screen. Then in the second part of the experiment twice as many combinations are shown in the same manner. Some are old, and were presented earlier, whilst some are rearrangements of the old combinations of pictures and words, forming new combinations. The task is to judge whether the combinations are newly formed ones or old ones, presented in the first part of the experiment. This is done by pressing "old" or "new". Now consider that some of the pictures and words are a proper fit, like say a picture of an ice-cream together with the word "tasty". Whilst other pictures and words are a bad fit, say a bumblebee together with the word "construction site". Since there are a lot of combinations in the experiment, its impossible to correctly recollect all of them and some will have to be guessed. When guessing, it's more likely that the ice-cream and tasty combination is recollected as old than the bumblebee and construction site combination, since the former are attitude-congruent. We are more likely to say that something was present if it feels familiar, and ice cream + tasty is more familiar than bumblebee + construction site. By measuring how often attitude-congruent and attitude incon-

gruent (for comparison) material is rated as old, we can see if there is a bias towards saying that the attitude-congruent material was present in the test more often than attitude-incongruent material. By measuring this bias we have an implicit measure for the attitude in question (in this case to see whether ice-cream is considered tasty). At the same time explicit attitudes are measured. Imagine the second part of the experiment again, the pictures combinations are shown, and the participant has to judge whether they are old or new just like above. But this time there is a second task at the same time, besides pressing "old" or "new". Now they also have to judge whether the picture and word are a correct combination by pressing "agree" or "disagree". This is an explicit test to see whether they consider ice-cream to be related to the word tasty and bumblebee to the word construction site. These two results can then be compared, the old - new task, which measures response-bias and hence implicit attitudes and the agree - disagree task which measures explicit attitudes. The participant has conducted two tests at once, one is based on memory and is implicit, the other is based on a judgment task and is explicit.

The purpose of this thesis is to measure implicit and explicit attitudes by using the two separate tasks presented briefly above. To manage this one pilot experiment and two experiments were conducted:

The pilot experiment used different types of stimuli in the form of pictures of either positive or negative valence in combination with positive or negative words in a recognition memory task. Following this task the participants decided whether a combination of picture - word was old or new (the implicit part of the experiment) and whether or not they agreed that the combination was correct or not (the explicit part of the experiment). Following the pilot experiment the stimuli and the test itself were evaluated before the first experiment.

Experiment 1 had a similar setup as the pilot experiment, but with a larger amount of participants.

Experiment 2 used stimuli consisting of either attractive or unattractive faces in combination with words depicting either positive or negative characteristics instead of positive and negative pictures and words. This tested a socially relevant stereotype for physical attractiveness, where physical attractive individuals are attributed positive characteristics.

Attitude-congruent material was expected to show an implicit attitude. Attitude-congruent material was also expected to show an explicit attitude.

MEMORY

Memory can roughly be divided into two categories; short term memory, which deals with the retention of small amounts of information over short time-spans (Baddeley, 2000), and long-term memory which is used for storing large amounts of information for indefinite periods of time (Galotti, 1999). Baddeley & Hitch (1974) incorporated short term memory in the working memory framework, which includes the facilitation of complex cognitive activities such as reasoning, learning and comprehending besides the traditional retention of the here and now. The term long term memory has gone from being considered a simple structure, compared to a treasure chest of information (Galotti, 1999) or a tape recorder where events are stored and then recalled when needed into the view that we remember reconstructions of events influenced by factors such as mood, expectations, and additional information acquired after the memory was stored. A famous example of the reconstructive nature of the human memory is from a classic study by Bartlett (1932) where participants read a story called "The War of the Ghosts" which describes how two men who are going out to hunt seals meet a war-party, one of the men accompany the warriors who later turn out to be ghosts. The story is open for interpretation and when the participants later retold the story there were changes according to the specific participants implicit expectations. Instead of seal hunting the men were going fishing, instead of ghosts the warriors were recalled as Indians. Information that wasn't present in the story but made sense was added, according to the implicit, culturally derived expectations of the readers. Bartlett's belief that recall is influenced by expectation and psychological set is now established. Instead of a tape recorder that spits out information when asked, our memory is constructive and reconstructive in its nature, being more like a sketch that is drawn, then edited over time, sometimes resembling something quite different in the end.

Long term memory can be divided into declarative and non-declarative memory. Think of declaring something, saying something out loud and you have the essence of declarative-memory; memory that can be declared or stated. Declarative memory can also be divided into two groups, episodic memory and semantic memory. Episodic memory is the memory of episodes from our past lives, acting as a personal and autobiographical memory. An episodic memory can be recollecting an event where you went swimming last summer, or a trip to the pyramids in Egypt. Semantic memory on the other hand reflects general knowledge, such as doing maths, geography or historical information, and is unrelated to events occurring in our everyday lives. A semantic memory is unlikely to share information in regards to when and where a memory was gained. Whilst most people

will remember visiting the pyramids as an episode, few remember the date they learnt that the pyramids were built in Egypt. Non-declarative memory is memory that is revealed when experience in a task is facilitated by prior experience or practice. This includes procedural memory (which governs motor and cognitive skills), the perceptual representation system (which handles perceptual priming), non-associative learning (which is used in habituation and sensitization) a well as classical conditioning that governs conditioned response (you remember Pavlov right?). (Gazzangia *et al.*, 2002)

Our semantic long term memory interacts with our episodic long term memory, effectively mixing our memory of what actually happened with our expectations, views and prior knowledge when we recall a certain episode, much like the example from Bartlett above (Roediger & McDermott, 2001). In memory tests dealing with recognition this phenomenon is usually seen when participants identify material that fits their expectations as old whether it is old or new. This bias towards responding old for congruent material can have several reasons. One probable reason is that information that relate to the participants prior knowledge and expectations is easier to process. This fluency in processing is seen by the participant as a sign that the information is an actual memory (Kelley & Rhodes, 2002) It's been shown that semantically related related test-items (Rajaram & Geraci, 2000) were falsely though to be present in a study even if they were not.

As mentioned above encoding is influenced by our knowledge, values and expectations. Semantic memory in particular plays a part when encoding and retrieving new information, the general knowledge we have about the world influences our memories. This results in a form of over encoding, where we generally encode more information than what was presented in the stimuli, like in Bartlett's tale above. The type of material can also affect encoding, one case is the picture superiority effect, where pictures are typically remembered much better then words (Brown & Craik, 2000). According to Paivio (1971) this is due to pictures being encoded in two modalities, both as verbal code and as image codes, whilst words are just stored in verbal code. When it comes to retrieval of memories our memory is again constructive and reconstructive. Our views and expectation play a part in what we perceive but also in memory retrieval itself. (Brown & Craik, 2000)

ATTITUDES

In today's society there are attitudes that are deemed socially incorrect to express or possess. Different forms of attitude tests have been devised during the last century with the purpose of measuring these attitudes.

In earlier psychological research it was generally assumed that attitudes operated in conscious mode. The common method of measuring attitudes during most of the 20th century was with the aid of direct measures such as self report questionnaires, where the participants themselves rated their attitudes. This form of measurement is referred to as an explicit attitude test, since it relies on instructed self-report as a means of measuring an attitude. Greenwald & Banaji (1995) showed that people have also have indirect, unconscious or implicit modes of operations for attitudes and stereotypes.

A widespread but perhaps seldom thought about stereotype is that of physical attractiveness. What is beautiful is good; The view that those who are beautiful are also good was tested empirically by Dion, Berschied and Walster (1972), who in an article carrying the same title demonstrated that in modern times humans attribute positive qualities to attractive people and negative qualities to those who are less physically fortunate.

More recently Langlois *et al*. (2000) performed a series of meta analytic studies on how attractiveness affects our daily lives, studying the contradictions between common knowledge which sometimes states that attractiveness has nothing to do with other positive qualities and to evaluate the current status of social expectancy theory and fitness related evolutionary theory.

Langlois *et al.* (2000) compare common myths regarding beauty with results from psychological research. One myth is that beauty is in the eye of the beholder. According to this saying people have different ides about what is beautiful, and hence should not agree about who is and who is not attractive. If this was the case then attractiveness should show little consistency among raters. Langlois *et al.* (2000) only mentions one meta-analysis that has qualitatively evaluated reliability coefficients of attractiveness judgments; Feindgold (1992) who examined panels of raters in the United States and Canada and compared the results. A high level of agreement among adult raters was found. It's probably likely that the saying is more correct between cultures than within since its presumed that different standards of beauty exists in different cultures.

The standards of beauty are generally similar within cultures, and perhaps more disconcerting, attractive people are attributed positive qualities whilst unattractive people are attributed negative qualities based on the appearance.

STEREOTYPES AND MEMORY

Stereotypes have been argued to be the cognitive component of prejudiced attitudes and to be functional to the individual, an inevitable consequence of ordinary categorization of members of another group that allows us to free cognitive resources. Patricia Devine showed that both high and low prejudiced people have the same knowledge of racial stereotypes and show the same amount of automatic activation of these stereotypes. These stereotype-congruent views will show when our ability to process information is limited (Devine, 1989; Sherman *et al.*, 1998). Congruent information is easier to encode compared to incongruent information, since incongruent information requires more elaborate processing (Allport, 1954; Fiske & Taylor 1991). This means that by stereotyping we can limit the amount of information that has to be managed by generalizing about members of another group. Hence stereotypes become a way of freeing up resources when we have limited resources since stereotypical information is more fluent and easily accessible (Sherman *et al.*, 1998). Another reason why we avoid incongruent information is that perceivers prefer information that support their beliefs rather than information that challenge the same in an effort to maintain cognitive consistency, since the conflict between inconsistent factors produce dissonance (Festinger, 1957, 1964).

On the other hand, there is the view that stereotype-incongruent information receives more resources since it goes against our stereotypical expectancies, being scrutinized more carefully (Eagly et al., 2000). We notice incongruent information since it doesn't make sense according to our expectations. In general stereotype-incongruent information should have a higher rate of recall compared to stereotype-congruent information when encoded under full attention (Fiske, 1998) because of this deeper encoding.

ATTITUDE MEASURES

From the 1930s until fairly recently most social psychologists have assumed that attitudes are conscious operations, that people are aware of their attitudes towards social objects. During this period mainly explicit measures such instructed self-reports (e.g. questionnaires) have been used to measure attitudes (Greenwald & Banaji, 1995). But over the last few years a large interest in measuring attitudes indirectly or implicitly has been sparked (Fazio & Olson, 2003) and as a result a variety of different techniques for implicit measures have been developed.

One technique used by Fazio et al (1995) involved priming the participants with photos of either black or white undergraduates. The participants task was to indicate the connotation of an evaluative adjective (for example "pleasant" or "awful") as quickly as possible. A cover story that told the participants that judgment of word meaning was an automatic skill that should be unaffected by the performing of another skill simultaneously was presented. Each target adjective was preceded by a brief presentation of the above mentioned photos. The participants were instructed to remember the faces so that they would be able to pick them in a later phase in the experiment. The black or white faces had different consequences for the word evaluation task. The black faces facilitated when responding to negative adjectives, whilst they interfered in the responses to positive adjectives. It was easier for the participants to associate black faces with negative words and white faces with positive words.

The Implicit Association Test is probably the most well known implicit measurement technique. It was developed by Greenwald *et al.* in 1998 and measures the strength of an association between a target concept and attribute dimension by measuring the latency of the participants response. The participants respond by pressing two respond keys, each with a dual meaning. The test employs two categories, for example one could be "good – bad" and the other "black – white". First the participant gets to categorize good and bad items by pressing buttons; positive or negative words are shown, one button signifies good, the other button bad. Secondly the participants get to categorize black and white people, one response means that the picture shown is that of a black person, whilst the other button indicates that the picture is that of a white person. Then in the last part of the test both of the categories are shown at once. On one side you have good – white, on the other bad – black. Now either positive or negative words, as well as black and white pictures can be shown, and the participant has to press the left button to indicate good *or* white, and the right button for bad *or* black. Then the combinations are turned, good – black, bad – white. In this case the but-

tons again have a dual meaning, but this time good words and black go to the same side and share the same button, whilst bad and white shares the other. The test finally measures which response is faster, the ones where good is paired with white, or where good is paired with black. In an experiment carried out by Greenwald *et al.* in 1998 where the categories were clearly positive or negative words as well names of either clear African American origin or of clear Caucasian origin the participants were much faster at pairing black with negative words then black with positive words. Indicating that the participants had an easier time associating white with positive and black with negative then the other way around.

Another way of measuring racial prejudice (Son Hing et al., 2002) or stereotypes (Sinclair & Kunda, 1999) is by considering how word stems are completed. In a study by Sinclair & Kunda (1999) to se how motivated inhibition or activation of conflicting stereotypes was affected by either positive or negative or negative feedback given during an evaluation of the participants interpersonal skills. The participants were told that they were taking part in an effort with local corporation to develop a training program designed to to teach personnel managers how to use a questionnaire to asses employee's personal skills. In the experiment the participants gave verbal responses to a series of questions evaluating social skills. They were told that a manager in another room was listening to their responses over an intercom, they never actually saw this manager. Instead they were presented with a videotape of either a black or white manager who gave them either a positive or negative evaluation. Next they completed a measure of their activation of the Black stereotype consisting of 84 word fragments. 13 of the word fragments had as one possible solution a word associated with the Black stereotype (e.g. _ _ O R (POOR), CR _ _ _ (CRIME)). After finishing the word-completion task the participants filled out a questionnaire where they evaluated the manager that had evaluated them. The results showed that the participants who received a positive evaluation from the black manager inhibited the Black stereotype whilst the participants who received negative feedback from the same man activated the Black stereotype.

This thesis will measure attitudes with the aid of a new method. The goal of this method is to measure explicit and implicit attitudes with the same stimuli and responses, as well as calculating the results in such a way that explicit and implicit attitudes are logically independent. For two variables to be logically independent they have to contain the same characteristics, since when they do, they can be mathematically compared to each other. This is possible since the same material is used to measure both explicit and implicit attitudes.

This solves the other problem that has risen when comparing explicit attitude studies with implicit attitude studies; formats. Since explicit tests vary in format in relation to implicit tests they are hard to compare, since an eventual correlation or lack thereof can be due to other reasons. A low correlation could be due to the tests being quite different (e.g. questionnaires and word stem completion tests) whilst a high correlation could be due to the tests sharing some aspect whilst still not being mathematically separate.

Implicit Attitude (IA) will be measured by calculating the amount of old replies in the four different categories present in the tests themselves: positive picture - positive word (congruent), positive picture - negative word (incongruent), negative picture - negative word (congruent) and negative picture - positive word (incongruent). All the old replies will be summarized into proportions ranging from 0 to 1 for each category and then calculated into IA according to the following formula: "Implicit Attitude = OA (Old Agree) + OD (Old Disagree) - NA (New Agree) - ND (New Disagree)". OA, OD, NA, and ND each contain the four previously mentioned categories (positive picture - positive word, etc.) and will be present in the test phase of the experiments as buttons. For each combination of picture and word the participant chooses either to respond Old - Agree (e.g. if they believe the combination is old and agree that the picture and word fits), Old - Disagree (e.g. if they believe that the combination is old but disagree in regards to whether the picture and word fit), New - Agree (if they believe that the combination is new, and agree with the picture and word combination) or New - Disagree (in the case of a new combination but disagreeing to the combination of picture and word). If a participant has a high amount of old replies for the congruent category positive - positive then the IA rating for that category will be higher than if the same participant would have a low amount of old replies in that category. This is so since the formula for IA adds up the old answers and then deducts the new answers. If there are more old answers then new ones in a given category (in this case positive - positive) then that category gets a positive (high) IA score. Indicating an Implicit Attitude.

Explicit Attitudes (EA) will be measured in the same manner but with the following formula: "Explicit Attitude = OA - OD + NA - ND". In this case the relevant attribute isn't the amount of old replies but rather whether the participant agrees that the combination of picture and word is congruent. As you can se in the above formula for EA if a participant generally agrees that a certain category of words and pictures fit well together (e.g. positive - positive) then that category will have a higher rating of EA.

To summarize, both IA and EA will have 4 different values each in the coming experiments. 1. Positive pictures- Positive words, 2. Positive pictures - Negative words, 3. Negative pictures - Negative words and 4. Negative pictures - positive words. A high amount of old replies (regardless of memory performance) for a category indicates an Implicit Attitude towards that category. A high amount of agree responses indicates an Explicit Attitude towards that category. Both are measured using the same responses, using the same stimuli.

Congruent material is expected to show both an Implicit and an Explicit Attitude.

PILOT

The pilot experiment examined whether attitude-congruent material in the form of positive and negative images in combination with positive and negative words showed a higher rate of old replies compared to attitude-incongruent material. Given that the material was either clearly negative or clearly positive, the expected results was that congruent material would be rated as old more often due to response bias, and that the congruent combinations would get a higher rate of agree answers than the incongruent combinations.

Method

Participants

5 male university students, completed the pilot testing. Mean age was 24 with a standard deviation of 1,14.

Materials

Stimuli consisted of pairs containing a picture and a word. A total of 64 color images were collected from International affective picture system (IAPS, 2005), with an equal amount of pictures of positive and negative valence respectively. The pictures depicted diverse subjects, ranging from scenes of violence, a dirty toilet or an individual struck by famine to hugging couples, puppies or beautiful scenery. Pictures of negative and positive valences were picked according to IAPS norms.

A total of four swedish words were used to signify either positive valence “positiv, bra” or negative valence “negativ, dålig”.

A set of of face - word combinations was compiled for each participant by randomization in MatLab. A total of 64 pictures were used, 32 positive and 32 negative, in combination with 4 words, 2 positive and 2 negative. These were combined randomly to form an equal amount of stereotype

congruent (e.g. positive picture, positive word) and stereotype incongruent (e.g. positive picture, negative word) and stereotype incongruent combinations, in total 64 combinations of pictures and words were used. For the test phase another 64 combinations were compiled in the same manner, and presented together with the first 64 combinations from the encoding phase, for a total of 128 combinations of an equal amount of stereotype congruent, stereotype incongruent, old combinations and new combinations. It should be noted that all the 128 combinations were based on old stimuli. The new combinations were fresh combinations of old pictures and words, so whilst the combination was new, the stimuli was not.

Procedure

Study instructions (se appendix 3) told the participants that combinations of pictures and words would be presented, and that it was important that they payed close attention. The study phase consisted of 64 combinations of pictures and words, presented randomly by MatLab and of an equal amount of congruent and incongruent combinations. Each trial consisted of a picture with a word superimposed over it being presented on the screen, the participants responded by clicking "ready" following which the next combination would be presented.

In the distraction phase the participants completed an 7-item word comprehension test (se appendix 1) where each of the presented words had 5 different alternative answers.

Test instructions told participants to decide whether a given picture-word combination had been present in the first phase of the experiment as well as decide whether they agreed that the given picture-word combination was correct. This was done by pressing one out of four buttons; 1. old-agree, 2. old-disagree, 3. new-agree, 4. new-disagree. The test phase consisted of 128 combinations of pictures and words. 32 were old and congruent, 32 were old and incongruent, 32 were new and congruent and 32 were new and incongruent.

Data analysis

Implicit and explicit attitudes were measured by using the four buttons: 1. old - agree (OA), 2. old - disagree (OD), 3. new - agree (NA), 4. new - disagree (ND), that were used by each participant in the test phase of the experiment. The agree - disagree evaluation is a measure of explicit attitude and was calculated with the formula "Explicit Attitude = OA - OD + NA - ND". The old - new evaluation was a measure of implicit attitude and was calculated with the formula "Implicit Attitude = OA + OD - NA - ND". OA, OD, NA and ND were proportions of the amount of respective re-

sponses in the test itself taken from the output generated by MatLab during testing, each ranging from 0 to 1.

Results and Discussion

A repeated measures ANOVA with picture valence (2: positive pictures, negative pictures) and word valence (2: positive words, negative words) as factors and IA as dependent variable was conducted to se whether there was a bias towards answering old when information was congruent (e.g. positive picture, positive word). The results showed a tendency towards interaction between the two variables picture valence and word valence, $F(1,4) = 4.70$, $p = 0.09$ as can be seen in figure 1, but since this was a pilot testing with a very limited amount of participants (5) this could be circumstantial. According to the hypothesis there should be a bias towards answering old for congruent material, but according to the data seen in figure 1 the opposite would be true. The ANOVA showed no main effects for picture valence ($F(1,4 = 0.00$, $p > 0.05$) or word valence ($F(1,4) = 2.85$, $p > 0.05$).

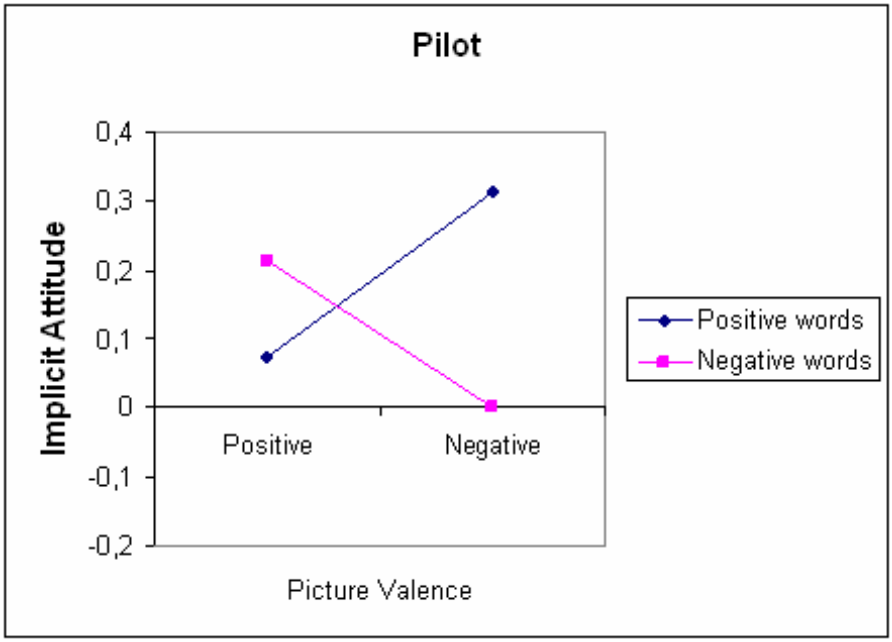

Figure 1.

A second repeated measures ANOVA with picture valence (2: positive pictures, negative pictures) and word valance (2: positive words, negative words) as factors but with EA as dependent variable was conducted to se whether the participants paired pictures and words according to valence (e.g. positive pictures together with positive words rather than with negative words). An interaction was found between picture valence and word valence, $F(1,4) = 2018.27$, $p < 0.05$ which is shown in figure 2, this indicates that the participants generally considered positive pictures as positive and vice

versa. Which was expected since both the pictures and the words were clearly positive or negative. No main effects were found for picture valence ($F(1,4) = 0.390$, $p > 0.05$) nor word valence ($F(1,4) = 0.07$, $p > 0.05$).

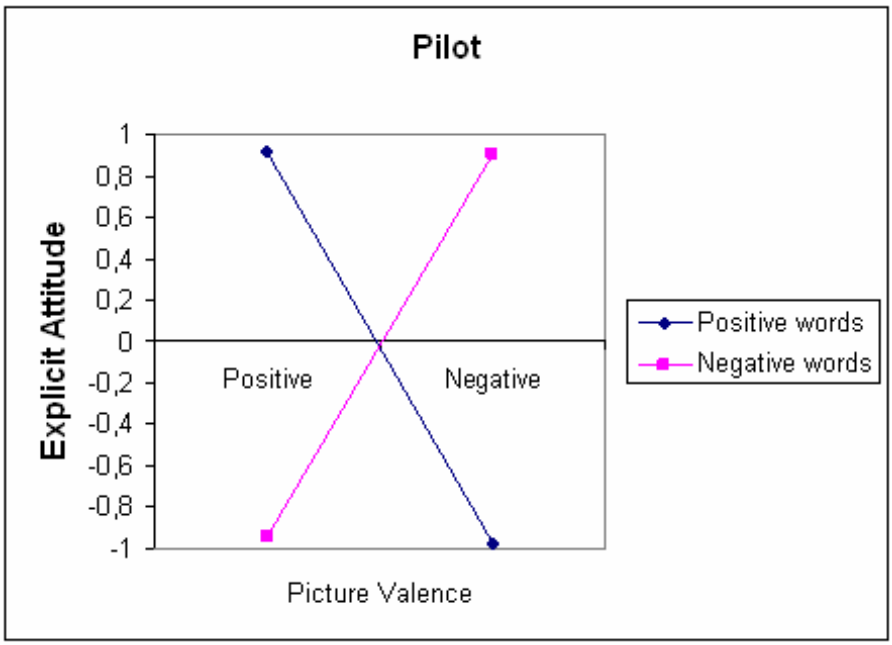

Figure 2.

Several of the participants in the pilot test mentioned that the combinations of negative images and positive words were easier to remember when they were asked about how they experienced the test. Two participants had a general feeling that there were more incongruent combinations present in the test than congruent ones and balanced their answers accordingly. This could explain the tendency towards an interaction between picture and word valence in the implicit (old - new) part of the test ($F(1,4) = 4.70$, $p = 0.09$). Some of the incongruent picture - word combinations were described as "popping out" since they were considered absurd (such as a battlefield with the word good super-imposed onto it). The pictures were also criticized for being to strong in general.

EXPERIMENT 1

Experiment 1 examined whether attitude-congruent material in the form of positive and negative images in combination with positive or negative words showed a higher rate of old replies when compared to attitude-incongruent material. Since the material from the pilot experiment was deemed to strong new images with a lower valence were chosen from IAPS. A distraction task was

also added to avoid strong incongruent combinations of words and pictures. This was done by separating pictures and words by dot patterns, creating a distraction and making the combinations less clear. Given that the material once again was negative or positive the expected results was that congruent material would be rated as old more often due to response bias, and that congruent combinations would get a higher rate of agree answers than incongruent combinations.

Method

Participants

22 university students (8 male, 14 female), completed the first experiment. Mean age was 24 with a standard deviation of 3,13.

Material

Stimuli consisted of pairs containing a picture and a word. A total of 64 color images were collected from IAPS (2005), the difference from the stimuli collected for the pilot testing was that the stimuli chosen for this experiment was weaker in valence. An equal amount of pictures of negative and positive valence was used. The pictures again depicted diverse objects, such as scenes, individuals, scenery or events. IAPS norms were once again used to choose pictures of negative and positive valence.

The same four swedish words that were used in the pilot test were used again to signify either positive valence “positiv, bra” or negative valence “negativ, dålig”.

A set of of face - word combinations was compiled for each participant by randomization in MatLab. A total of 64 pictures were used, 32 positive and 32 negative, in combination with 4 words, 2 positive and 2 negative. These were combined randomly to form an equal amount of stereotype congruent (e.g. positive picture, positive word) and stereotype incongruent (e.g. positive picture, negative word) and stereotype incongruent combinations, in total 64 combinations of pictures and words. For the test phase another 64 combinations were compiled in the same manner, and presented together with the first 64 combinations from the encoding phase for a total of 128 combinations of an equal amount of stereotype congruent, stereotype incongruent, old combinations and new combinations.

Procedure

Study instructions (se appendix 4) told the participants that series with different dot-patterns would be presented on the screen. In-between the dot patterns pictures and words would also be presented. Each series would consist of 1. dot-pattern, 2. picture, 3. dot-pattern, 4. word, 5. dot-pattern and their task was to judge how many of the three dot-patterns were the same. This could be either none, all or two of the patterns. The dot-patterns acted as a distraction to the real task, which was the combination of picture + word presented in-between the dots, but the participants were unaware of this. Each dot-pattern was present for 1.5 seconds, followed by pictures and words were presented for 1 second each, followed by a black screen for 0.5 seconds, giving each series of 3 patterns, 1 picture and 1 word a time-span of 7 seconds. A total of 64 series were presented, 32 with congruent combinations of pictures and words, and 32 with incongruent combinations of the same.

A separate distraction task was presented in the form of a 7-item word comprehension test (se appendix 1) where the participants could choose between 5 answers to each presented word (se appendix 1.).

Test instructions told the participants to decide if a given combination of picture and word had been presented earlier during the first phase of the test by choosing either to reply old or new. At the same time they would also decide whether a given combination of picture and word were a proper fit by deciding if they agreed or disagreed. This was done by pressing one out of four buttons; 1. old-agree, 2. old-disagree, 3. new-agree, 4. new-disagree. The test phase consisted of 128 combinations of pictures and words. 32 were old and congruent, 32 were old and incongruent, 32 were new and congruent and 32 were new and incongruent. For each picture-word combination the four response buttons were randomly shuffled to avoid response bias. As in the pilot experiment all 128 combinations were created with old stimuli, but with 64 new combinations consisting of old words and pictures.

Data analysis

Measures of implicit and explicit attitudes were in the same manner as the pilot experiment and were measured by using the four buttons: 1. old - agree (OA), 2. old - disagree (OD), 3. new - agree (NA), 4. new - disagree (ND), that were used by each participant in the test phase of the experiment. The agree - disagree evaluation is a measure of explicit attitude and was calculated with the formula “Explicit Attitude = OA - OD + NA - ND”. The old - new evaluation was a measure of im-

plicit attitude and was calculated with the formula "Implicit Attitude = OA + OD - NA - ND". OA, OD, NA and ND were proportions of the amount of their respective replies during the test phase.

Results and Discussion

A repeated measures ANOVA with picture valence (2: positive pictures, negative pictures) and word valance (2: positive words, negative words) as factors with IA as dependent variable was conducted to se whether there was a bias towards answering old when information was congruent. No interaction was found between the two variables picture valence and word valence, $F(1,21) = 0.73$, $p > 0.05$ which can be seen in figure 3. A tendency towards a main effect for picture valence was found, indicating that there was a difference between the positive and negative images, $F(1,21) = 0.13$, $p = 0.06$. No main effect was found for word valence, $F(1,21) = 2.31$, $p > 0.05$.

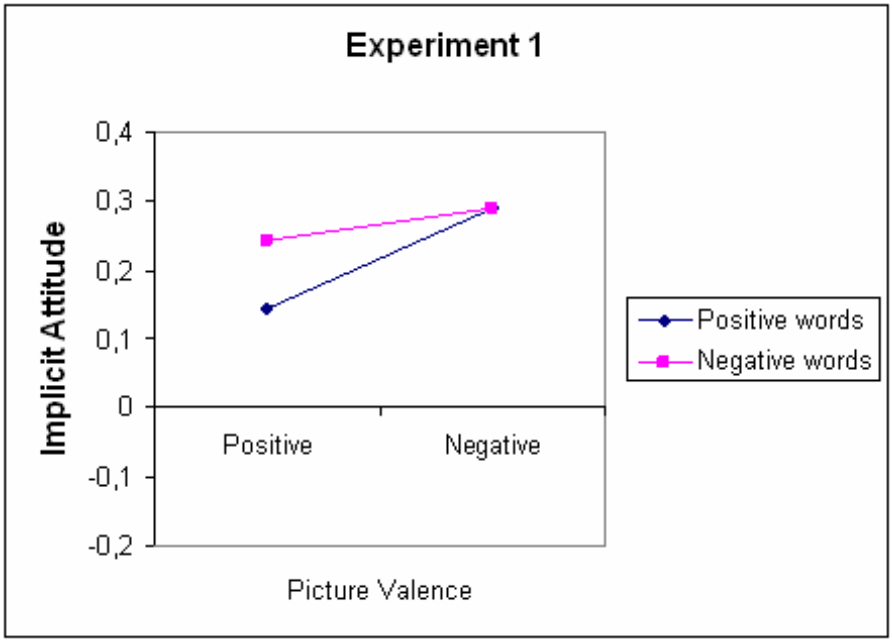

Figure 3.

Another repeated measures ANOVA with picture valence (2: positive pictures, negative pictures) and word valance (2: positive words, negative words) as factors with EA as dependent variable was conducted. An interaction was found between picture valence and word valence, $F(1,21) = 39.22$, $p < 0.05$, as can be seen in figure 4, indicating that the participants considered the congruent combinations to be correct. No main effect was found for picture valence, $F(1,21) = 1.15$, $p > 0.05$. There was however a significant main effect for word valence, $F(1,21) = 19.58$, $p < 0.05$ indicating that there was a difference between the positive and negative words.

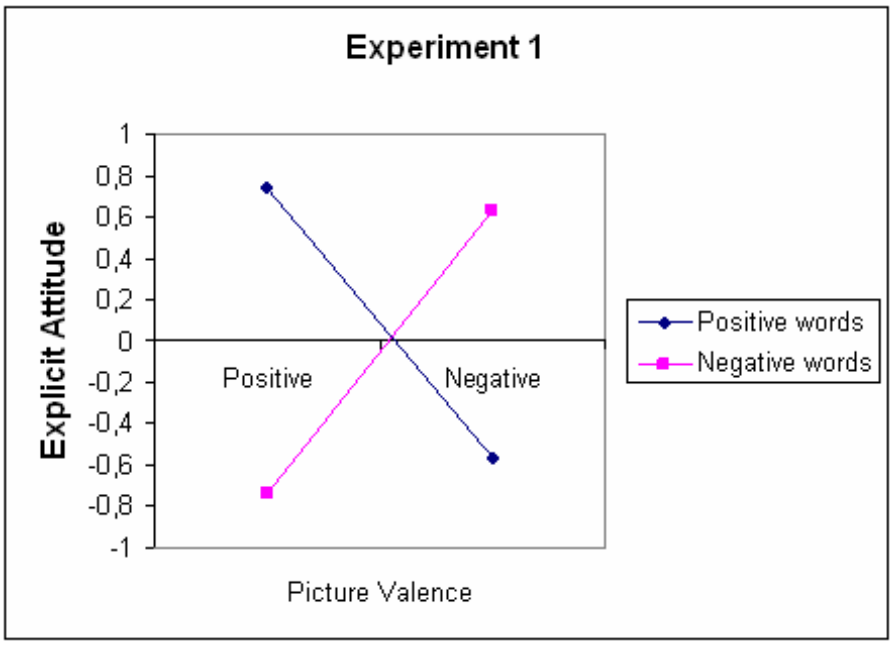

Figure 4.

A similar result to the pilot experiment was found. Only the explicit task agreeing or disagreeing to the congruent and incongruent picture - word combinations showed an interaction effect ($F(1,21) = 39.22$, $p < 0.05$) as mentioned above. Some participants expressed that they were merely guessing when they judged whether combinations were old or new in the last task of the test since they had focused heavily on the dot-patterns. Further investigation showed the participants had a high number of correct answers to the dot distraction task (M = 84%). The conclusion was that the explicit (agree - disagree) aspect of the test was working correctly, but that the implicit (old - new) needed some work.

EXPERIMENT 2

Experiment 2 examined whether attitude-congruent material in the form of attractive and unattractive-faces in combination with words of either positive or negative characteristics showed a higher rate of old replies when compared to attitude-incongruent material. A distraction task was once again present but the number of series was cut down to 40 instead of 64 in the encoding phase and 80 instead of 128 in the test phase. The word comprehension distraction task was also removed. Given that there is evidence that positive qualities are attributed to attractive people the expected

results was that congruent (attractive - positive characteristic, unattractive - negative characteristic) material would be rated as old more often due to response bias, and that congruent combinations would get a higher rate of agree answers than incongruent combinations.

Method

Participants

20 university students (15 male, 5 female), completed the second experiment. Mean age was 24 with a standard deviation of 3,87.

Material

Stimuli consisted of pairs containing a face and a word. A total of 40 greyscale images that originally were collected from Ekman and Friesen's Pictures of Facial Affect (1976), the internet as well as the Karolinska Directed Emotional Faces (Lundkvist, Flykt, & Öhman, 1998) were used. The faces (originally 142 grayscale images) had been rated by six judges (3 male, 3 female) ranging from very attractive to very unattractive, the 40 that were used had all received the highest and lowest averages. An equal amount of males and females was chosen. An ANOVA with stimuli as cases also confirmed that attractive faces received significantly higher average attractiveness ratings then unattractive faces, $F\,(1,38) = 231,14$, $p > 0.05$.

A total of 40 swedish words (se appendix 2) were used to signify either positive traits or negative valence traits, an equal amount of each. Originally 93 that described personality traits, abilities and various psychological states words were rated by 6 judges (3 males and 3 females, not the same as above) for valance (for a word to be rated as positive or negative it had to be considered so by all 6 judges). Positive and negative words were matched on frequency of occurrence in Swedish newspapers and on word length.

A set of face - word combinations was compiled for each participant by randomization in MatLab. A total of 40 pictures were used, 20 attractive and 20 unattractive, in combination with 40 words, 20 positive and 20 negative. These were combined randomly to form an equal amount of stereotype congruent (e.g. attractive face, positive word) and stereotype incongruent (e.g. attractive face, negative word) and stereotype incongruent combinations, in total 40 combinations of pictures and words. For the test phase another 40 combinations were compiled in the same manner, and presented together with the first 40 combinations from the encoding phase, for a total of 80 combina-

tions of an equal amount of stereotype congruent, stereotype incongruent, old combinations and new combinations. As in the pilot experiment and experiment 1 all the 80 combinations consisted of old stimuli. The 40 new combinations were new combinations of old words and faces.

Procedure

Like in experiment 1 study instructions (se appendix 5) told the participants that series with different dot-patterns would be presented on the screen. In-between the dot patterns pictures and words would also be presented. Each series would consist of 1. dot-pattern, 2. picture, 3. dot-pattern, 4. word, 5. dot-pattern and their task was to judge how many of the three dot-patterns the same. This could be either none, all or two. The dot-patterns acted as a distraction to the real task, which was the combination of face + word presented in-between the dots, but the participants were unaware of this. Each dot-pattern was present for 1.5 seconds, faces and words for 1 second each, followed by a black screen for 0.5 seconds, giving each series of 3 patterns, 1 picture and 1 word a time-span of 7 seconds. A total of 40 series were presented, 20 with congruent combinations of pictures and words, and 20 with incongruent combinations of the same.

Test instructions told the participants to decide if a given combination of picture and word had been presented earlier during the first phase of the test by choosing either to reply old or new. At the same time they would also decide whether a given combination of picture and word were a proper fit by deciding if they agreed or disagreed. This was done by pressing one out of four buttons; 1. old-agree, 2. old-disagree, 3. new-agree, 4. new-disagree. The test phase consisted of 80 combinations of pictures and words. 20 were old and congruent, 20 were old and incongruent, 20 were new and congruent and 20 were new and incongruent. For each picture-word combination the four response buttons were randomly shuffled to avoid response bias.

Data analysis

Measures of implicit and explicit attitudes were in the same manner as the pilot experiment and experiment 1 and were measured by using the four buttons: 1. old - agree (OA), 2. old - disagree (OD), 3. new - agree (NA), 4. new - disagree (ND), that were used by each participant in the test phase of the experiment. The agree - disagree evaluation is a measure of explicit attitude and was calculated with the formula “Explicit Attitude = OA - OD + NA - ND”. The old - new evaluation was a measure of implicit attitude and was calculated with the formula “Implicit Attitude = OA + OD - NA - ND”.

Results and Discussion

Just like in the first two experiments a 2 x 2 ANOVA was conducted but with attractiveness (2: attractive faces, unattractive faces) and word valence (2: positive characteristics, negative characteristics) as factors with IA as the dependent variable, to se whether the participants had a bias towards rating congruent (e.g. attractive faces together with positive characteristics) combinations of picture + word as old. No interaction effect was found between picture valence and word valence, $F(1,19) = 0.41$, $p > 0.05$ as can be seen in figure 5. Nor was a main effect found for word valence, $F(1,19) = 0.52$, $p > 0.05$. A main effect was found for picture valence however, $F(1,19) = 4.86$, $p < 0.05$, indicating that there was a difference in how often the attractive and unattractive faces were rated as old.

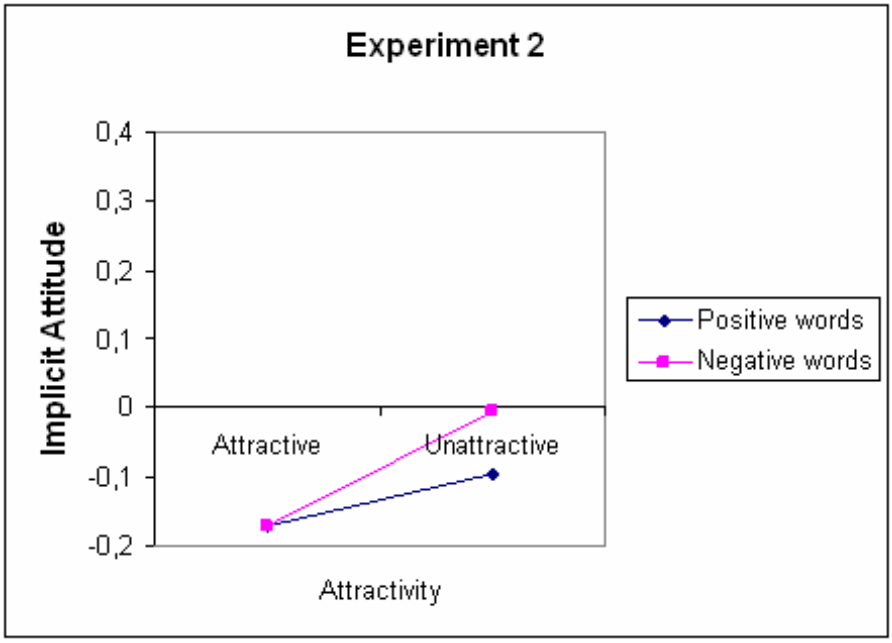

Figure 5.

A second ANOVA was conducted in the same manner with attractiveness (2: attractive faces, unattractive faces) and word valence (2: positive characteristics, negative characteristics) as factors but this time with EA as dependent variable (the same as in experiment 1 and 2). There was an interaction between picture valence and word valence, $F(1,19) = 39.35$, $p < 0.05$, showing that the participants more often rated congruent combinations as correctly described, se figure 6. There was also a main effect for word valence, $F(1,19) = 12.47$, $p < 0.05$, indicating that there was a difference between the positive and negative characteristics. No such main effect was found for picture valence, $F(1,19) = 0.104$, $p > 0.05$.

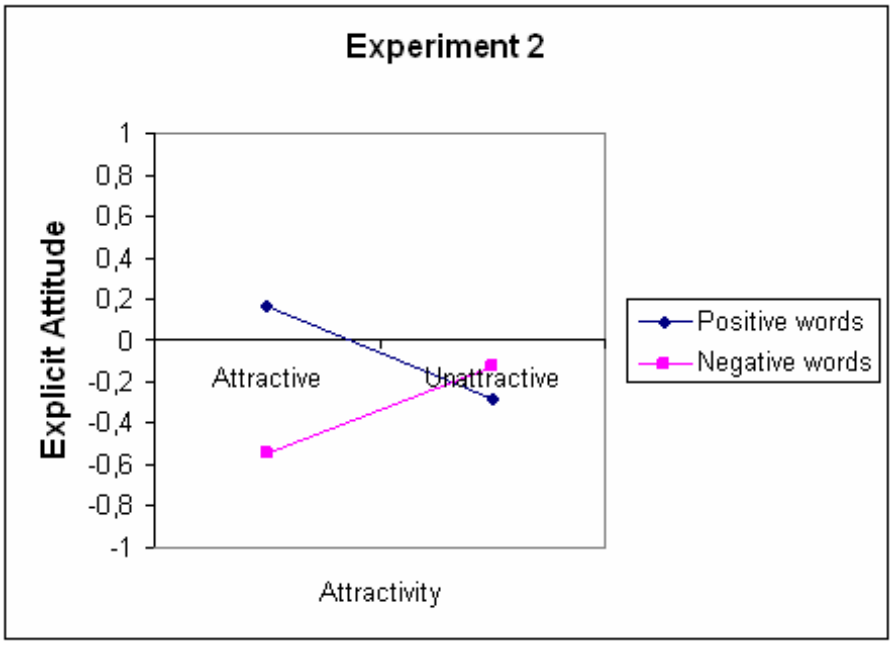

Figure 6.

Once again the explicit (agree - disagree) part provided an interaction effect as can be seen above. But the main hypothesis in regards to the implicit aspect of the test proved to be false.

DISCUSSION

The purpose of this thesis was to measure implicit and explicit attitudes by using two separate tasks, both based on the same material and by measuring the same responses. By calculating both implicit and explicit attitudes from the same data it should have been possible to se whether there was a correlation between implicit (indirect) and explicit (direct) attitudes. To reach this goal two experiments were conducted. The first experiment used a wide range of positive and negative pictures. This could be negative images such as that of a war-zone or car crash victim, or something positive such as a puppy or loving couple. These clearly positive or negative images were shown together with positive or negative words in a distraction task that was created (after the experiences with the pilot testing) to avoid extra attention towards strong pictures in combination with incongruent words. The hypothesis that congruent material should show an Implicit Attitude proved to be false for the first experiment, with no interaction effect between picture valence and word valence. The hypothesis that congruent combinations would show an Explicit Attitude proved to be true, showing a clear interaction between picture valence and word valence. No further testing was done since the results for the implicit part of the test were insignificant.

The second experiment exchanged the positive and negative images and words for social attitude objects. Attractive and unattractive faces in combination with different positive and negative words that described personality traits, abilities and various psychological states were used as stimuli. The amount of series was lowered from 128 to 80 in the test phase and from 64 to 40 in the encoding phase respectively as a response to the results from the first experiment which had proven to be to hard for the participants. A similar result as the first experiment was shown with an interaction effect between attractiveness and word valence in regards to the hypothesis that congruent combinations would show Explicit Attitude. Once again no support for the hypothesis that congruent material should show Implicit Attitude: No interaction was found between attractiveness and word valance.

Whilst the explicit part of the two experiments and pilot worked well from the start the implicit part was harder to pin down. In the pilot testing the stimuli consisted of strong pictures with words superimposed onto them. Images are dominant stimuli (Paivio, 1971) and incongruent material such as the burning wreck of a car with a superimposed "positive" over it proved easy to remember, in fact so easy to remember that the participants showed a bias towards rating them as old, completely against the hypothesis that congruent combinations would be considered the same. To avoid this effect in the first experiment the pictures were toned down somewhat and a distraction task was added to separate the images and words with dot patterns. The participants were under the impression that the dot patterns were their main task and several were surprised when they had to rate whether the combinations of pictures and words were old or new in the test phase, many had disregarded the pictures during encoding. With a mean of 84% correct answers on the relatively demanding dot pattern task the pictures and words were left in the shadow. To try and make the test easier for the participants the last experiment was cut down from 128 to 80 combinations in the test phase. This changed very little and the results were similar. It should be noted that incongruent combinations are sometimes noticed more then congruent ones, due to getting more attention since they appear not to make sense (Eagly *et al.,* 2000). This is a memory error, and the experiments used in this thesis aren't measuring the amount of correct memories, but rather the bias towards responding old. This is done by measuring the responses on the different categories regardless of wether the response is correct or not, trying to measure what the participants experienced as old, not wether their experience was correct or not. But perhaps it is possible that a response bias occurred since the participants subjectively experienced odd combinations as more frequent, and then answered accordingly in the test phase.

Another aspect could be the number of participants in the two experiments. The first experiment had 20 participants, no interaction effect was found and the effect size for the implicit part of the test was small, $\eta^2 = 0.033$ (3% explained variability). The second experiment had 22 participants, with a similar result, the effect size was once again low for the implicit half of the test, $\eta^2 = 0.021$ (2% explained variability). Based on these low effect sizes its unlikely that a larger amount of participants would have had a large impact on the results.

Conclusion

If further research is to be conducted by using recognition memory bias as an implicit measure then the following should be kept in mind: Keep the material simple, avoid using strong stimuli and have the participants focusing on a task that leaves them enough cognitive resources to still encode the pictures - word combinations. The participants should feel that they are doing qualified guesswork, not that the test is almost impossible.

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APPENDIX 1

Word comprehension task words: (with their respective options)

Konfiskera: Underhandla, Beslagta, Övergå till annan tro, Bekräfta, Bevara hemlighet
Fryntlig: Korpulent, Komisk, Gladlynt, Tantig, Argsint
Avyttra: Sälja, Invända, Utjämna, Skaffa sig, Tappa bort
Prekär: Brydsam, Högtravande, Omtyckt, Förutsedd, Oväntad
Repressalier: Tillrättavisning, Rikssymboler, Hämnd, Hämningar, Hinder
Granntyckt: Sällskaplig, Vacker, Snål, Skicklig, Nogräknad
Metamorfos: Bild, Frälsning, Overklighet, Förvandling, Mystik

APPENDIX 2

Positive and negative words:

Negative:
improduktiv
ointelligent
obegåvad
fantasilös
ångestfylld
håglös
inbunden
inkompetent
opålitlig
ineffektiv
nedstämd
otrevlig
slarvig
nedslagen
trög
passiv
ängslig
olycklig
ledsen
orolig

Positive:
skarpsinnig
företagsam
ihärdig
handlingskraftig
tillförlitlig
utåtriktad
älskvärd
produktiv
uthållig
målmedveten
energisk
dynamisk
ambitiös
pålitlig
kompetent
begåvad
skärpt
effektiv
trevlig
aktiv

APPENDIX 3

Test instructions pilot experiment:

1. 'Du kommer att få se ett antal kombinationer av ord och bild. Var vänlig och titta på bilden och läs ordet tyst för dig själv; klicka därefter Fortsätt för att se nästa kombination.Klicka på Klar för att börja.

2. I nästa test kommer du att se ett antal ord efter varandra och din uppgift är att ange vilken betydelse det vänstra ordet har genom att klicka på ett av alternativen till höger. Tryck på Klar när du är redo.

3. Du kommer nu att få se samma bilder och ord som visades i första fasen; en delkombinationer av ord och bild visades tidigare, andra kombinationer av ord och bild är nya. I testet visas alltså gamla kombinationer av gamla ord och gamla bilder och nya kombinationer av gamla ord och gamla bilder. Dina uppgifter är att ange om en kombination är gammal eller ny, samt om du anser att ordet stämmer överens med bilden eller inte. Om du bedömer att en kombination är gammal och om du tycker att ord och bild passar ihop väljer du alternativet Gammal & Håller med. Om du bedömer att en kombination är gammal och om du tycker att ord och bild inte passar ihop väljer du alternativet Gammal & Håller inte med.Om du bedömer att en kombination är ny och om du tycker att ord och bild passar ihop väljer du alternativet Ny & Håller med. Om du bedömer att en kombination är ny och om du tycker att ord och bild inte passar ihop väljer du alternativet Ny & Håller inte med. Observera att svarsalternativen byter plats mellan varje visning. Klicka på Klar för att börja.

APPENDIX 4

Test instructions experiment 1:

1. Du kommer att få se tre uppsättningar med fyrkanter i olika positioner som följer i en serie; mellan varje uppsättning kommer även antingen en bild eller ett ord att visas på skärmen. Din uppgift är att vid seriens slut bedöma hur många av uppsättningarna som var lika; detta kan antingen vara samtliga, två eller att alla var olika. En serie består alltså av följande: (1) Fyrkanter, (2) Bild, (3) Fyrkanter, (4) Ord, (5) Fyrkanter. Vid varje serie är din uppgift att bedöma hur ofta fyrkanterna visas i samma position. Om fyrkanternas position är samma vid (1), (3) och (5) väljer du svarsalternativet ”Alla lika”. Om fyrkanternas position är samma vid (1) och (5), vid (1) och (3), eller vid (3) och (5) väljer du svarsalternativet ”Två lika”. Om fyrkanternas position är olika vid samtliga visningar väljer du svarsalternativet ”Alla olika”. Uppgiften är ganska krävande så det är viktigt att du är uppmärksam under hela testet. Klicka på klar för att fortsätta.

2. I nästa test kommer du att se ett antal ord efter varandra och din uppgift är att ange vilken betydelse det vänstra ordet har genom att klicka på ett av alternativen till höger. Tryck på Klar när du är redo.

3. Du kommer nu att få se samma bilder och ord som visades mellan uppsättningarna av fyrkanter i första fasen. En del kombinationer av ord och bild är gamla och visades tidigare i inom en serie, andra kombinationer av ord och bild är nya och visade inte tidigare inom en och samma serie. En serie bestod av sekvensen (1) Fyrkanter, (2) Bild, (3) Fyrkanter, (4) Ord, (5) Fyrkanter. I testet visas alltså gamla kombinationer av gamla ord och gamla bilder, och nya kombinationer av gamla ord och gamla bilder. Dina uppgifter är att ange om en kombination är gammal eller ny, samt om du tycker att ordet stämmer överens med bilden eller inte. Om du bedömer att en kombination är gammal och om du tycker att ord och bild passar ihop väljer du alternativet Gammal & Håller med. Om du bedömer att en kombination är gammal och om du tycker att ord och bild inte passar ihop väljer du alternativet Gammal & Håller inte med. Om du bedömer att en kombination är ny och om du tycker att ord och bild passar ihop väljer du alternativet Ny & Håller med. Om du bedömer att en kombination är ny och om du tycker att ord och bild inte passar ihop väljer du alternativet Ny & Håller inte med. Observera att svarsalternativen byter plats mellan varje visning. Klicka på Klar för att börja.

APPENDIX 5

Test instructions experiment 2:

1. Du kommer att få se tre uppsättningar med fyrkanter i olika positioner som följer i en serie; mellan varje uppsättning kommer även antingen en bild eller ett ord att visas på skärmen. Din uppgift är att vid seriens slut bedöma hur många av uppsättningarna som var lika; detta kan antingen vara samtliga, två eller att alla var olika. En serie består alltså av följande: (1) Fyrkanter, (2) Bild, (3) Fyrkanter, (4) Ord,(5) Fyrkanter. Vid varje serie är din uppgift att bedöma hur ofta fyrkanterna visas i samma position. Om fyrkanternas position är samma vid (1), (3) och (5) väljer du svarsalternativet ”Alla lika”. Om fyrkanternas position är samma vid (1) och (5), vid (1) och (3), eller vid (3) och (5) väljer du svarsalternativet ”Två lika”. Om fyrkanternas position är olika vid samtliga visningar väljer du svarsalternativet ”Alla olika”. Uppgiften är ganska krävande så det är viktigt att du är uppmärksam under hela testet. Klicka på klar för att fortsätta.

2. I nästa test kommer du att se ett antal ord efter varandra och din uppgift är att ange vilken betydelse det vänstra ordet har genom att klicka på ett av alternativen till höger. Tryck på Klar när du är redo. Du kommer nu att få se samma bilder och ord som visades mellan uppsättningarna av fyrkanter i första fasen. En del kombinationer av ord och bild är gamla och visades tidigare inom en serie, andra kombinationer av ord och bild är nya och visade inte tidigare inom en och samma serie. En serie bestod av sekvensen (1) Fyrkanter, (2) Bild, (3) Fyrkanter, (4) Ord, (5) Fyrkanter. I testet visas alltså' gamla kombinationer av gamla ord och gamla bilder, och nya kombinationer av gamla' ord och gamla bilder. Dina uppgifter är att ange om en kombination är gammal' eller ny, samt om du tycker att ordet stämmer överens med bilden eller inte. Om du bedömer att en kombination är gammal och om du tycker att ord och bild' passar ihop väljer du alternativet Gammal & Håller med. Om du bedömer att en kombination är gammal och om du tycker att ord och bild inte passar ihop väljer du alternativet Gammal & Håller inte med. Om du bedömer att en kombination är ny och om du tycker att ord och bild passar ihop väljer du alternativet Ny & Håller med. Om du bedömer att en kombination är ny och om du tycker att ord och bild inte passar ihop väljer du alternativet Ny & Håller inte med. Observera att du INTE ska bedöma om du känner igen en viss bild eller ett visst ord utan om du känner igen en viss KOMBINATION av bild och ord. Observera även att svarsalternativen byter plats mellan varje visning. Klicka på Klar för att börja.