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Unintentional retrieval of stereotype congruent memories

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Abstract

The present study investigated the prediction that the stereotype *physical attractiveness* produces automatic memory, this means automatic encoding and retrieval of stereotype congruent information. Furthermore, subjects' relationship between automatic memory and explicit prejudice was explored. Forty-seven subjects participated in a novel implicit memory test. After conceptual priming, they judged the valence of "face-trait word" pairs, in old and new stimuli. Reaction times and self-reported prejudice levels were recorded. Results confirmed automatic memory. However, participants failed to exhibit better automatic memory for stereotype congruent stimuli than for stereotype incongruent stimuli. Significant interactions showed that participants unintentionally retrieved positive and negative traits together with attractive faces faster. A positive trend was found between subjects' automatic memory for stereotype prejudice information and their explicit prejudice attitude. The findings support automaticity of memory.

Keywords: automatic memory, stereotype, explicit prejudice

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Unintentional retrieval of stereotype congruent memories

What’s in the looks? Do beautiful persons have superior traits to ordinary looking people, and are poor traits saved for less attractive people? (Eagly, Ashmore, Makhijani & Longo, 1991). Thinking clearly about this, there is of course no reason to believe in this stereotypical view. However, much of our daily life is lived in a busy environment and time is scarce, leaving us little time to reflect on things. Automatic processes happen without our intention and consciousness, saving us time and effort (Bargh, 1996). Most of the time the outcome is correct, but sometimes it leads us into trouble. Automatic stereotyping may lead us to judge people wrongly and assign them with traits they do not have. Once a person has been stereotyped, it may be very hard to change the attitude towards the person (Kunda, 2001). The traits belonging to a person’s appearance have been encoded and are stored in long-term memory (Bahrick, 1983). Can these memories of stereotypes be retrieved automatically? This question is explored in this study. It is of interest because of the effect it has on our judgements of other people. Once judged always judged, no matter good or bad!

A previous study has been done on the theme of “stereotypes and false memories”. This study concluded that picture-word combinations, as attractive faces-positive words and unattractive faces-negative words were easier to remember. Their result also showed some false memories for these particular combinations (Lundquist and Perten, 2003). The present experiment originates from the same research area on stereotypes and memory functions, but focus is now on automatic memory. It is the first time the relationship between stereotypes and automatic memory is being explored. This is done with a computerised memory test, which is developed at the Department of Psychology, Social Cognition Unit, Lund (2004). In addition to this, a new questionnaire was developed by the authors to explore the potential relationship between subjects’ automatic memory and their explicit attitudes to the examined stereotype.

To introduce the reader to the study, a short introduction of relevant topics will be presented in three main sections. The first section will describe memory, its structure and function. Then a section, which addresses stereotypes, will follow, and finally the theories about automatic memory will be explained.

Memory

What is memory? Metaphorically, it can be described as a huge library inside our brain which stores and manages information until needed. Some times we deliberately have to make an effort to remember things, and other times facts pop into mind without effort or our conscious intention to recall them. The following text will provide the reader with a general understanding of how human memory is structured and its major functions.

When we encounter a stimulus, information is encoded in sensory memory. It means information is translated into a cognitive mental representation, which can be stored in memory for later retrieval. However, if there is no deliberate attention involved, storage is thought to be very brief, less than one second, and similar to the perception process (Neath, 1998). Sensory memory is made up of two different parts, the iconic buffer holds visual images and the echoic buffer holds auditory information. For example, while walking down the street we may pass a lot of people and see many cars driving by, without paying any attention to them. Our perception helps us to not walk into people, crossing the street without getting run over and in general guide us through our daily activities.

The modal view of memory was first described by Atkinson and Shiffrin (as cited in Galotti, 1999). They proposed that information is received, processed and stored differently, for each kind of memory. According to this approach, the length of time information is stored vary for each kind of memory system within the model. An example of the modal view of memory can be seen in Figure 1.

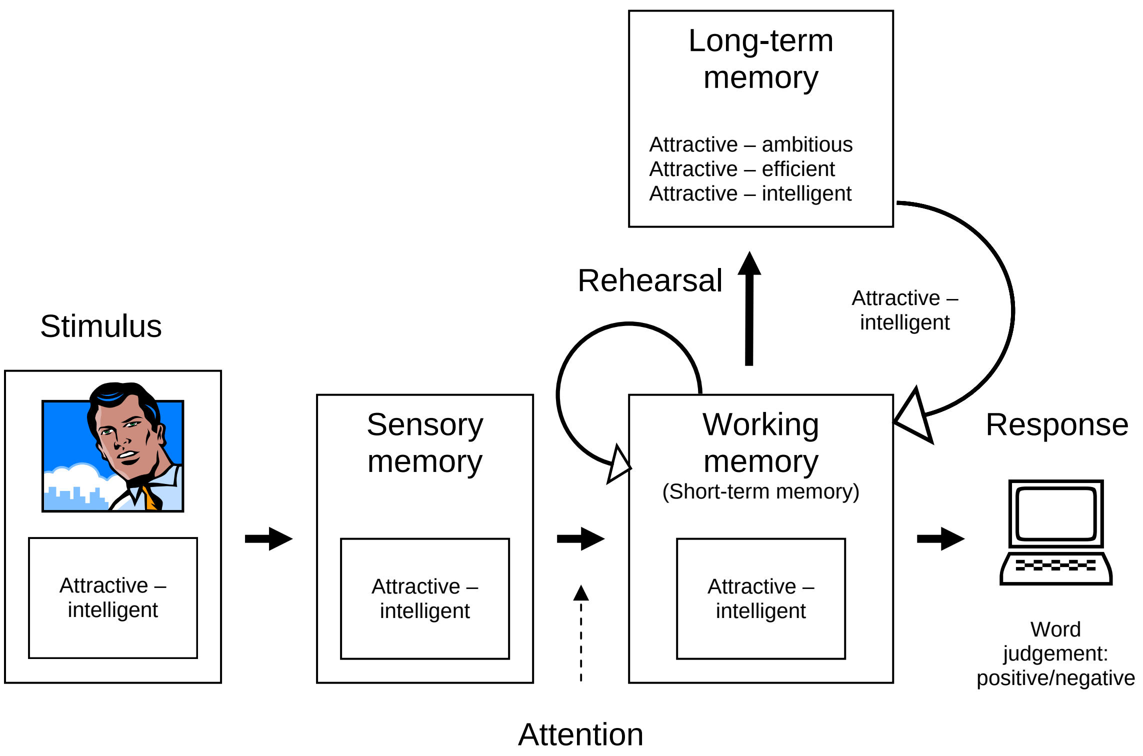

Figure 1. The modal view of memory. Each box depicts a memory storage system. The arrows represent the transfer of information between systems.

If we pay attention to a stimulus it will be stored in short-term memory (STM) for a little while. This memory system is thought to hold information for periods up to 20-30 seconds (Brown, 1958; Peterson & Peterson, 1959) and have a capacity of seven independent units, plus or minus two (Miller, 1994). We may take a brief notice of a person and reflect over how the person is dressed, hairstyle and features of the face, and soon after it will be quickly forgotten.

STM has increasingly been replaced by the more recent concept of working memory (WM). Baddeley and Hitch (1994) proposed this memory system, which stores information temporarily while cognitive operations like; language comprehension, learning and reasoning are being processed simultaneously. The working memory consists of three different subcomponents. The central executive (CE) allocates attention and coordinates resources to cognitive tasks. It guides the flow of information and is thought to have limited capacity. The two slave systems, visuospatial sketch pad and phonological loop, temporarily store and maintain visual images and speech-based information, respectively. A reason for this new approach to STM with subsystems was that it offered an explanation to why people still could perform reasonably well on cognitive tasks, despite being close to STM's capacity limit of seven, plus minus two items. It made sense that storage and controlled processing worked separately and simultaneously to achieve this effectiveness.

Prospective memory deals with our future intensions, plans and actions. It can be viewed as a part of WM where CE schedules, controls and monitors actions. Prospective information can be self-generated or imposed by someone else. It can involve a routine or novel action, which can be general or very specific in its details (Cohen, 1998). Prospective memory is especially sensitive to ageing but can be greatly improved with the help of external reminders like written diaries and calendars (Banich, 2004).

If no external aid (paper and pencil) is available, Murdock (1962) showed that rehearsing the information would increase the likelihood of it entering long-term memory (LTM) from WM. We may meet the same person a couple of times and eventually recognise this person in public or in a photograph. This is illustrated, in Fig 1.

Research by Bahrick (1984) has shown that information in LTM can be stored for hours, days and even decades or permanently. He tested 733 previous Spanish students on their current knowledge of the language. It had past between 0-50 years since they studied it in high school. The result showed that retention was predictable from the original level of training, and between 40-60% of original performance was recognised.

Not only the length of time, but also the amount of information stored increase with LTM, compared to WM. How much information are we able to store for a rainy day? Landauer (1986) tried to estimate the capacity for LTM through various analyses, which measured rates of learning and forgetting. He came to the conclusion that at about 35 years of age, we are able to store about one billion bits of information. Cohen (1998) points to some factors that influence long-term storage of information like: amount and intervals in original training, the level of expertise achieved from the start, to which extent information can be reconstructed from schemas and type of information; declarative, procedural, general or specific knowledge.

LTM is also called retrospective memory (Cohen, 1998) as it stores past experiences. There is no absolute border between prospective and retrospective memory, we often use both for the same task. As, when I remember to phone my friend as planned, I still have to know how to use a phone and the number retrospectively.

Our LTM can be seen as a huge library of memories for knowledge. Different shelves hold different types of knowledge. One of these shelves stores autobiographical information about our lives and personal experience. Tulving (1972) made the distinction between personal experienced knowledge and other more general knowledge, which we store in LTM. Memories derived from personal experience, Tulving named episodic. These memories have a strong self-reference which promotes long-lasting recall. They are organised in a thematic or chronological order, and are used to enhance our self-concept and identity (Cohen, 1998). We may remember birthdays, holidays and travels as separate occasions to ease the search process of information. Our general knowledge is abstracted and generalised from repeated exposure and generalisations, and stored in the semantic memory, according to Tulving. Semantic memory contains facts, ideas and concepts of how we perceive the world in a generic way, without any personal references.

An alternative to the episodic-semantic distinction of LTM, is declarative and procedural memory. Declarative memory is similar to episodic and semantic memory, which stores facts, events, knowledge, ideas about the world and their relationships. Procedural memory stores facts about actions, and supports acquisition and expression of skills (Cohen & Eichenbaum, 1993).

A reason for dividing memory in different subsystems derives from neurological research, which found that damage to some areas of the brain impairs only certain kind of knowledge. Patients with amnesiac disorders have undamaged WM, the memory loss does only affect LTM. Amnesiac patients were unable to recall any additional figure above the seven digit span limit of working memory. However, they performed fine until this limit was reached

(Banich, 2004). The patient studied extensively in regards to amnesia, is known by the initials H.M. The research from his case supports the view of different memory systems. H. M. suffered amnesia because of a surgical procedure, which caused damage to his hippocampal region. As H. M. was evaluated both before and after surgery, it was possible to establish the relation between lesions and memory damage. The dissociation between affected and spared capabilities in amnesia proposes that the brain holds various memory systems (Banich, 2004). H. M. showed evidence of skill learning abilities, even though he was not aware of learning anything. Also, other amnesiac patients have shown to perform quite well on tasks using skills they do not remember learning. The skills are learnt through repeated motor, perceptive or cognitive processes that help performance (Banich, 2004). One possible explanation for this deficit of LTM in amnesiac patients may be that of explicit and implicit memory. Most of the time we are asked to remember information explicitly, and we consciously look back on our experiences to recall or recognise specific facts and events. Many memory tests are explicit recollection of facts. In contrast, memory can also be measured implicitly, and recalled without awareness. The feature of implicit cognition is seen as traces of past experience affecting performance, even though past experience is not remembered in the usual sense. That is to say, it is not available to introspection or self-report (Jacoby, Lindsay & Toth, 1992). This supports why amnesiac patients may not remember anything from LTM explicitly. However, they are able to perform well on implicit memory tasks, and skills they have learnt previously (Shimura, 1986).

As mentioned there are quite a few different alternatives to separate our memory into different subsystems depending on what kind of information is stored and for how long. Stored information is often categorised into groups that share one or more similarities, concepts. A concept is a mental representation of a category of objects that we think belong together (Passer & Smith, 2004). A stereotype may be viewed as a concept, which includes knowledge, attitudes, and expectations about this particular group of people (Hamilton and Sherman, 1994). This knowledge structure is also referred to as a schema, and may also include information about social situations, places, characters, semantic and event based knowledge (Bartlett, 1932). There are specific schemas for routine events, such as doing grocery shopping, visit a doctor or a birthday party, called scripts (Schank & Abelson, 1977). The schemas help us in our daily lives to make sense of the enormous amount of information we are exposed to. They help us to categorise stimulus and connect new information with old, in order to be able to reason and make sound conclusions, interpret situations, communicate and allocate attention, among other things. Knowledge schemas may be organised in hierarchies, overlapping each other, or linked together as a tangled web. They are continuously updated and altered with new information and vary with context.

The activation of a schema highly depends on the individual and how a stimulus is perceived. The salience of a schema or concept may be context dependent. Individuals may have some schemas activated chronically, and some may be more easily accessible than others. Also the individual's goals and motivation may influence the activation of a specific schema (Cohen, 1998).

Mental representations may be viewed as *associative networks*. Collins & Loftus (1975) have proposed an associative network model on how mental representations are activated and retrieved. The networks are built of nodes, which are connected together with links. Each node represent at specific concept, feature or schema with stored knowledge. The connecting links between the nodes vary in strength, with some associations stronger than others. Activation spreads via the links to different nodes, and the activation level for a node varies from time to time. The more activated a node is, the more likely it will be used for encoding new information. After activation nodes gradually deactivate. The activation within this model may display the effects of priming. If a schema has been recently activated it may affect the interpretation of later experienced stimulus (Srull & Wyer, 1979). A consequence of this theory is that the mere exposure to a stereotype congruent stimulus may activate a lot of associated traits for the stereotype. Attractive people may be judged as intelligent, ambitious, talented and rich, just because of their good looks, if the perceiving person holds this stereotyped view.

A problem with the associative network model is that there is no constraint to the spreading of activation. Concepts that contradict each other might be activated at the same time, which make less sense. Therefore, the *connectionist model* (Rumelhardt & McClelland, 1986), provided an extended model, which added the assumption that nodes can be both activated and inactivated, but only by nearby nodes. A link can be positive excitatory between nodes, which mean that activating one will increase activation of the other. There can also be a negative inhibitory link, and then activation of one node will decrease activation of the other node. The positive and negative links work as controls for the activation. If a positive links is set off, this means the two nodes go well with each other, and can both be activated at the same time, or deactivated. If the link is negative, only one of the nodes can be activated at a time, the nodes are not compatible with each other. If someone is perceived as attractive, the node for repulsive should not be activated at the same time, rather the node for beautiful. The aim is to satisfy as many constraints as possible simultaneously. The parallel-constraintsatisfaction models (Thagard & Kunda 1998) have been used to understand how sometimes conflicting facts like stereotypes can exists within a person.

Attribution of fluency is a type of heuristic or rule of thumb. Fluency produces a feeling of familiarity, without necessarily providing the background of previous experience with the stimulus. If a stimulus is seen repeatedly there will be an ease of processing which will facilitate the perception process, for this stimulus. Prior experience to a stimulus will enhance fluency and processing (Jacoby & Dallas, 1981). People may use their fluency for a present stimulus to make attributions to the past, and decide if they have encountered it earlier if it is processed fluently now. Under good circumstances fluency guides people in the right direction when making a decision, but it may also cause errors when other factors than previous experience is relevant in processing a stimulus (Whittlesea & Leboe, 2000). As an illustration, the processing of a new stimulus may be manipulated by priming, without a subject's awareness. The subject will feel familiarity and may think he or she has seen this stimulus before, although the increase of fluency is due to priming (Jacoby & Whitehouse, 1989). There are two fundamental types of remembering; recognition and recall. Recognition is considered easier, as people are shown a stimulus and asked if it appeared within a certain context. Fluency will create a feeling of familiarity in recognition judgements. In a recall decision a context is shown or named, and the person has to remember which stimulus was present in this context (Whittlesea & Leboe, 2000).

Stereotypes and prejudice

Initially the term stereotype referred to typographic work with printing plates made from one fixed metal pies, a rigid and monotonous stereotype, used for reproducing identical copies (Prismas stora uppslagsbok, 1989). In human thought processes the term stereotype was first used in 1922, by Walter Lippmann in his book *Public Opinion* (Lippmann, 1922), to describe the general viewpoint we may have about various groups and what we believe their members are like. When a stereotype is fixed in our minds, we focus our attention on the facts that support it. We do not first see a man, and then define him; we classify him first and then see him. "We imagine most things before we experience them" (Lippmann, 1922). This indicates that we deliberately categorize people before we know them, in stereotype concepts, which persists in our minds.

Stereotypes can be viewed as concepts, which mean that the ideas and debates emerging from research and theory about concepts also can be applied to stereotypes (Carlston & Smith, 1996). Without concepts including categorization, inferring additional attributes, guiding attention and understanding, communication, and reasoning, our world would make little sense. Stereotypes and concepts connect information and give meaning and structure to characteristics that could be difficult to understand otherwise (Kunda, 2002). This means in general that when we meet people or view behaviours or objects, we classify them as instances of particular concepts. This classification is vital because it allows us to treat diverse objects as the same, and it enables us to use our knowledge about categories to make sense of individual members of these categories (Kunda, 2002). For example, it may be wise to apply the concept of carpenter to a person carrying a hammer.

Stereotypical thinking is seen as an ever-present aspect of daily life and function as energy-saving devices in social cognition. Because we form expression easier due to stereotypes, we can release cognitive recourses for carrying out other necessary or desirable activities (Macrae, Milne & Bodenhausen, 1994).

However, there can be negative consequences of stereotyping leading to inaccuracy when judging people. There are three forms of inaccuracy: stereotypic inaccuracy, (the error of viewing a group as more or less stereotypic than it really is), valence inaccuracy (the tendency to see the group as more positive or negative than it actually is), and dispersion inaccuracy (the tendency to see the group as either more or less heterogenic than it actually is on a trait dimension) (Judd & Park, 1993). These negative aspects of stereotypes raise an interesting theoretical question: If stereotypical judgements are inaccurate and irrelevant, why do we continue to make them? (Macrae, Milne & Bodenhausen, 1994).

Where does our individual stereotyping come from in the first place? Theories claim that the answer lies within three various areas. First, stereotypes are believed to come from culture; learnt from the family, friends and the media. Second, stereotypes are assumed to come from peoples' personal needs to feel better, compared to other people outside ones own group. Finally, stereotypes are thought to be the product of cognitive processes of judgement and generalizations recruited to make sense of the huge amount of information that surrounds us. The contents and the existence of stereotypes are accepted by now and researchers focus their attention on trying to identify when and how they work (Kunda, 2002).

The modern perspective of stereotypes is normally viewed as cognitive structures that include our understanding, attitudes, and expectations about a social group, which are not necessarily accurate or rational. We often see stereotypes as a mixture of abstract knowledge about a specific group (lawyers are articulated), together with exemplars of the group (my neighbour is a lawyer) (Hamilton & Sherman, 1994). Stereotypes are usually measured and reported as prototypes, with lists of attributes that vary in typicality and they can be organized hierarchically in subtypes, like profession, appearance and gender (Kunda, 2002).

When a stereotype is well established it may be difficult to change. Therefore, we prefer to put the stereotyped person into a subgroup, if their behaviour is contradictory. For example, if my best friend is black and does not fit the stereotype, he or she is placed into the subgroup (Kunda, 2001). The subtyping of counterstereotypic individuals is seen as an active attempt to maintain negative stereotypes of groups, in spite of facts that contradict our judgments (Kunda, 2001). The pattern of our stereotypes is not unbiased. It is the projection of the world built upon our own sense, values, position and rights (Lippmann, 1922). This is probably one of many reasons why stereotypes are maintained.

Automatic stereotyping and priming. In the mid-1980s it was suggested that stereotyping could be activated automatically. However notable is, that automatic stereotyping is not uncontrollable and inevitable: it can be controlled trough an act of effort, even though it can occur unintentionally (Devine, 1989). This indicates the complexity of altering a stereotype we already have in our mind; stored in long-term memory. The process of changing a stereotype requires intention, attention, and time. During a change process one must not only inhibit automatically activated information but also consciously replace such activation with non-stereotypic information. This is probably another reason to the perceived difficulty of changing one's attitude towards members of stereotyped groups (Devine, 1989).

Implicit stereotypes and prejudice can only be measured indirectly, usually by assessing how long it takes to make certain judgements (Grenwald, McGhee & Schwartz, 1998). One of several implicit measurement techniques is priming, which is used as a means of measuring what is automatically activated from memory by the presentation of some attitude objects (Fazio, Sanbonmatsu, Powell & Kardes, 1986; Perdue, Dovidio, Gurtman & Tyler, 1990). The priming method used in the current research experiment is conceptual priming. Participants are exposed to the priming stimuli as a part of a conscious task (supraliminal). This means, they are aware of the priming stimuli, but are not aware of the underlying model that serves to prime a particular concept. The internal mental representation of interest is activated by manipulations in an initial task. This is done in such a way that the participant does not realize the relationship between the activation experience and its' later influence or use, in an unrelated task. To avoid biases, it is vital, that the participants remain unaware of the relations between the two tasks. Conceptual priming is used when the activation of a representation is important. Words or pictures are often used as stimuli in an unobtrusive way for person perception tasks (Bargh & Chartrand, 2000).

Devine was the pioneer in suggesting automatic processes in activating the stereotype of African Americans, and in identifying an implicit social cognition effect (Devine, 1989).

Although, her initial work was criticised for the use of words like: lazy, unemployed and ghetto, as neutral words to automatically bring to mind the cultural African American stereotype. Also, her priming procedure was criticised for activating hostility instead of the African American stereotype (Greenwald & Banaji, 1995; Kunda, 2002). Devine's statement that there is no individual difference in automatic activation of African American stereotypes, was challenged by Fazio, Jackson, Dunton and Williams (1995). To prove individual differences in automatic activations of African American stereotypes, Fazio and his colleagues performed a test to measure participants' response times to adjectives. The adjectives were primed together with photographs of White or Black faces. The findings of this study indicated that White and African American participants reacted differently to Black faces. The automatic response of the African Americans was that, Black faces together with positive words produced faster reaction times, than Black faces together with negative words. In contrast, White participants reacted faster to Black faces paired with negative words. The differences in reaction times suggest that there may be individual differences in automatic activation of the African American stereotype between individuals (Fazio et al., 1995).

Although, research on automatic activation of stereotypes has focused mainly on the African American stereotype, this doesn't mean that the effect of automatic activation is limited to race stereotypes (Kunda 2001).

Expectancy theories. Our expectations and feelings about people and events may arise from concepts such as stereotypes (Kunda, 2001). The three main sources of expectancies are direct experience, other people, and beliefs. They vary along four dimensions: certainty, accessibility, explicitness and importance (Olson, Roese & Zanna, 1996). Peoples confidence in their belief can make them pay special attention to events and information that match their hypotheses, and thereby increase the remembrance of these events. This increased memory for congruent information can lead people to misjudge information to support their hypotheses (confirmation bias) (Klayman & Ha, 1987).

In a study of Cohen (1981), half of the participants were told that the woman in a video film was a librarian, and the other half that she was a waitress. After viewing the video, participants' memories about the woman were measured. It was found that participants were more likely to recall information consistent with their stereotype of the woman, than the actual women in the video. This indicates that information congruent with our expectations may be easier to remember, because we pay greater attention to it, and it is more strongly correlated with our existing ideas (Hastie, 1980).

According to the *filter model* of stereotyping, a number of researchers argue that stereotypes confer efficiency, by acting as filters that smooth the progress of encoding and representation of consistent, relative to inconsistent, information in memory (Bodenhausen, 1988; Stangor & McMillan, 1992; Macrae, Milne & Bodenhausen, 1994). This basic filter model is explained in two different versions. The "week" version clams that it is easier to understand information that fits with our existing expectancies. This is due to conceptual fluency to stereotype congruent information, which reduces the amount of capacity necessary to encode this information. In contrast, stereotype incongruent information consumes greater processing capacity during encoding, because it is more difficult to comprehend. However, some researchers suggest that these filters work as attention filters by directing encoding efforts only towards stereotype congruent information (Bodenhausen, 1988; Macrae, Milne & Bodenhausen, 1994). According to the "strong" version of the filter model, stereotype incongruent information may be ignored, because encoding of this type of information requires a relatively large commitment of resources, and such extra efforts may be uninviting to the perceiver. This indicates that resources and attention are directed toward stereotype congruent information, which is more easily encoded. Consequently, perceivers will be likely to refer to their stereotypes as explanations for behaviours when resources are strained. As a result, stereotype incongruent information may receive little attention. Summing up, if attention capacities are limited, the use of stereotypes becomes efficient. They provide a conceptual filter that makes the processing of congruent information easier, and an attention filter that filters out incongruent information that is difficult to process (Bodenhausen, 1988; Macrae, Milne & Bodenhausen, 1994).

Some models of schematic processing predict that information consistent with a stereotype is more accurately processed than information inconsistent with the stereotype, whereas other models predict that information inconsistent with the stereotype is more accurately processed than information consistent with the stereotype (Stangor & McMillan, 1992). If the information we receive is stereotype incongruent, like an unexpected and unusual behaviour, we may recall this easier than stereotype congruent information (Stroessner, Hamilton & Mackie, 1992). When events and information violate our expectancies we pay extra attention to the issue and use more cognitive capacity to understand it, which make it more memorable (Hastie & Kumar, 1979). According to the filter model, the recall advantage of incongruent information vanishes: (1) when our motivation to resolve incongruence is low, (2) when we do not have enough cognitive resources to interpret unpredictable behaviours (no processing of incongruent material in schemas), (3) and when the information conflicts with our overall goal of forming logical impressions (Stangor & McMillan, 1992).

The filter model have been criticised for proposing a cognitive system that is inherently very conservative. Another viewpoint has been proposed, which is explained in the *encoding flexibility model* (Sherman, Lee, Bessenoff & Frost, 1998). This model suggests that stereotypes are efficient because they smooth the progress of the encoding, of both stereotype congruent and stereotype incongruent information, when capacity is low. Because stereotypical information is expected and therefore conceptually fluent, it may be effortlessly understood, even when resources are limited. As a result, processing resources may shift from stereotype congruent towards stereotype incongruent information, because this is harder to understand under such conditions. This model suggests a clever balance between maintaining stability and allowing plasticity in the cognitive system. In an experiment, participants under cognitive load (holding an eight-digit number in memory) read statements regarding a priest and a skinhead person. They were asked to form impressions about their behaviours, which were both consistent and inconsistent with their assumed stereotyped group. The time it took to read the statements were recorded. It showed that participants devoted longer time to read the inconsistent behaviours, than the behaviours that were consistent with the assumed stereotype of priests or skinheads. This resulted in greater attention to unkind behaviours (skinhead consistent and priest inconsistent) than kind behaviours (priest consistent and skinhead inconsistent) during the experiment. This demonstrates that participants devote greater resources to encoding the stereotype incongruent information than stereotype congruent information when capacity is strained, which is in line with the encoding flexibility model. The same model also claims that when resources are plentiful, conceptual encoding is equally strong for consistent and inconsistent information (Sherman et al., 1998).

The physical attractiveness stereotype. Thorndike named the *halo effect* in 1920 (as cited in Greenwald and Banaji, 1995) after noticing people's tendency to associate positive characteristics with other positive characteristics, when rating personality. In later research by Dion, Berscheid and Walster (as cited in Eagly et al., 1991), physical attractiveness is generalized to influence evaluative judgement on various traits, such as intellectual skills. The halo effect is continuously being used by the advertising world, when products are set in contexts with attractive models or famous entertainers (Greenwald & Banaji, 1995).

"What is beautiful is good", is a widely known statement that has guided many researchers in their study of this bias or halo effect, of the physical attractiveness stereotype. In the classical study of the beauty-is-good stereotype, subjects paired face photographs of individuals with a low, medium or high physical attractiveness together with personality traits and life outcomes. Fascinatingly, subjects credited physical attractive individuals to have more favourable personality traits and more successful life outcomes than unattractive individuals, Dion, Berscheid and Walster, 1972 (as cited in Eagly et al., 1991).

A meta-analysis review concluded that the beauty-is-good effect was moderate and not as strong or general as suggested in a broad series of studies (Eagly et al., 1991). The samples of examined studies were collected from a number of databases, and carried out by using the keywords: physical attractiveness, unattractive, beautiful, ugly, ugliness, facial feature, and physical appearance. The judgements of attractiveness were mainly made from ratings of photographs. The conclusion Eagly and her colleagues reached was that subjects' perception of physical attractiveness varied considerably from study to study, and depended on the type of inference they were asked to make. Good looks have strongest impact on social competence and weaker inferences on potency, adjustment, and intellectual competence, and smaller impact on beliefs about integrity and concern for others (Eagly et al., 1991).

In a study on the theme beauty-is-good, Ramsey and Langlois (2002) found that children biased information about females, based on their attractiveness. Children were of the opinion that attractive females have more positive traits than unattractive females, when in fact the opposite circumstance existed in the study.

Another research was conducted to find the origins of stereotypes. The research team found that 6-month-old infants could categorize between unattractive faces and attractive faces. Infants looked longer at faces rated by adults to be attractive, than faces rated to be unattractive. One explanation to this distinction may be infants' ability to detect similarities among attractive faces and similarities among unattractive faces. However, how this is linked to specific physical attributes of a person is the least understood of this model. Further research will hopefully contribute to explain the beauty-is-good effect (Ramsey, Langlois, Hoss, Rubenstein & Griffin, 2004)

Prejudice refers usually to the generalized negative attitudes towards members of a particular social group. If your initial feeling for a person is dislike, and you have a desire to avoid this person, for example a Muslim, Mexican or homosexual, you may be prejudiced against this group (Kenrick, Neuberg & Cialdini, 2002). Just like stereotypes, prejudice can be explicit or implicit. Explicit prejudice is often measured with questionnaires and interviews (Shaughnessy, Zechmeister & Zechmeister, 2003). People's attitudes, thoughts and feelings are measured with self-report methods, as the *Likert scale*. Self-reports can be biased because participants know their answers are being recorded. Therefore, the pressure may be considerable for people to respond as they "should" believe and not as they truthfully do believe. This phenomenon is called social desirability, because of the pressure to be politically correct (Shaughnessy, Zechmeister & Zechmeister, 2003). Some people deliberately hold back their prejudices, expressing them only when they feel it is safe or socially appropriate. Other people truthfully believe that they have no prejudices, but still show biases when tested with sophisticated implicit methods (Fazio et al., 1995). Implicit prejudice is measured indirectly, usually by assessing how long time it takes to make certain judgements. *The Implicit Association Test* (IAT) is an accepted method for measuring implicit prejudice (Greenwald, McGhee & Schwartz, 1998).

This brief introduction to our world of concepts, stereotypes, expectancies and prejudice will help us understand and interpret our results.

Automatic memory

As this study explores memory and its ability to produce automatic memory performance for stereotypic information, a brief introduction of some relevant theories for this topic will follow. A lot of our daily activities are performed without much conscious effort put into them. They run without much guidance, although initially they might have required a great deal of effort and concentration. However, once a skill is learned we are able to carry it out with little effort. Perceptual motor skills like driving a car and shifting gears, or riding a bicycle and cognitive skills like reading, or speaking a language, are all tasks that can be done without much effort. The concept of automatic performance was known 1899 by Bryan and Harter (as cited in Boronat & Logan, 1997), when they theorised about developing skills for telegraphy.

Features of automatic performance (automaticity), which distinguishes automatic uncontrollable processes from controlled non-automatic processes, differs in the literature and have varied over the years. Speed, effortless, autonomy and consciousness will be described here, as they seem to be the prominent on most lists. According to Logan (1980):

1. Speed is a significant feature for development of automaticity, which results in a decrease in reaction time. With practise or learning individuals become gradually faster at performing a task, with the greatest gains of time in the beginning of trials. The speeding up in performance is proof of automaticity, according to the power function. A sharp reduction of time performing a task initially is followed by a levelling out of the performance, until it reaches an asymptote (Logan, 1988; Cohen, Dunbar & McClelland, 1990). Non-automatic processes take longer time to perform, however eventually all tasks may become faster with practise.

2. Automatic processing is effortless. When a person is able to do two tasks at the same time, without interference, one of the tasks is considered effortless and automatic. Shifting gears while driving a car may be used as an example. Non-automatic processes demand effort, playing a game of chess would demand a lot of cognitive effort even from a professional player.
3. Autonomous means that processing is unintentional. It needs an intention to start; however after this it runs on without any further involvement. The start can be cued by an explicit desire or by an unconscious stimulus. The *Stroop effect* (Stroop, 1935; MacLeod 1991) is an example of autonomous processing were subjects are slower to name the ink-colour if the word spells a different colour, than if it spells the same colour as seen. In this task subjects are instructed to read words out loud that represent names of colours. When subjects only have to read the names of the colours and ignore the colour of the ink, there is no problem. Yet, if the word BLUE is written in GREEN ink, this is done efficiently. It is when subjects have to name the colour of the ink and ignore the word, problems arise. Instead of reading and pronouncing the word BLUE, they are meant to say GREEN. Subjects are much slower to pronounce the ink colour if the word spells the name of a different colour, than if it spells the same colour as the ink. This indicates that there are two processes working at the same time and one runs to completion without intension. The subjects are trying to stop the reading and the interference it causes, when they have to name the ink colour.
4. Automatic processing happens without conscious awareness. Once we have learned a skill like reading, playing the piano or bicycling, it may be carried out without much cognitive awareness of doing it. We may read words from a text without thinking much about it, and still form a semantic gist of the text. The features of unconsciousness have been researched in many priming experiments, when exposure to a prime may speed up or guide response in certain directions, without subjects' awareness. Non-automatic processes are conscious and we are well aware of them.

Bargh (1996) theorised that *autonomous* is the most crucial feature of automaticity. Once a task is put into action, it runs by itself and is hard to stop. A perceived preconscious or post-conscious stimulus is enough to initiate an autonomous process. The only difference between these types of stimuli is their accessibility, which are chronic versus temporary. Otherwise, both occur without attention and consciousness of the process, promptly on the perception of the cue stimulus. Another condition that initiates an autonomous process is goal-dependency. There needs to be a conscious intention to start a task and after that it will run on without supervision. Bargh (1996) gives the example of preconscious automaticity, which merely requires the sight of a group member or object to start processing. The person is not aware of it and has no intention or goal in mind. As mentioned earlier in this section, the Stroop task (Stroop, 1935; MacLeod, 1991) is a classic example of an automatic process that shows evidence of being autonomous.

Instance theory by Logan, (1988, 1990, 1992) attempts to explain the acquisition of automaticy or automatic performance. This memory-based model claims that automatic performance is based on retrieval of mental representations of past solutions from memory. The theory builds on three assumptions:

1. Obligatory encoding, assumes that attended information is encoded and stored in long-term memory. The encoding of information serves as the learning mechanism.
2. Obligatory retrieval, assumes that people retrieve information, which is associated with what one attends. The contents of attention act as a retrieval cue, which retrieves information from memory. The more familiar a person is with a task, the more mental representations there are to retrieve. The support from memory may become stronger, and enough to support performance to become automatic (Logan, Taylor & Etherton, 1996).
3. The third assumption is that each stimulus which is encoded, stored and retrieved in memory represents an instance in memory. An instance is a mental representation of a memory and there are separate representations of co-occurrences. Attention will decide what is the content of an instance and which co-occurrences that will be remembered. The more practise and experience a person has with a task, the more instances they will have encoded of the same thing, to build up a knowledge-base. Also, the more instances for each task, the quicker the retrieval process will be. Metaphorically, there is a “horse-race” between all instances when retrieval is cued, and this race speeds up the response time. Many stored instances and fast retrieval, are the features for development of automaticity, according to the instance theory.

The instance theory views the obligatory retrieval assumption as accountable for the display of automaticity (Logan 1988, Logan & Etherton 1996). Again, using the Stroop effect as an example, it can be viewed as a retrieval process according to the instance theory. People are not able to “switch off” reading when they want to. When subjects attend a word they have seen many times previously, it brings back the instances it has been associated with before, like the motor program for pronouncing it and its semantic meaning. The association between the word and the reading response is evidently stronger, than the association between the word and naming the ink colour of it. This motor program for pronouncing the colour interferes with the process of naming the ink colour, which results in increased reaction time, until the interference is solved. The association strength reflects the practice one has had with these tasks, and it is quite obvious that one of them is more learned than the other, (Stroop, 1935; MacLeod, 1991).

Attention plays an important role in automaticity, as the two assumptions of obligatory encoding and retrieval depends on it (Logan & Etherton, 1994). Information which is attended is encoded and stored in memory, and may be retrieved later on. The level of attention has been used as a manipulation in previous research on this theory. Subjects in a focused attention condition should perform faster than subjects in a divided condition. Divided attention demands more cognitive resources than focused attention in a search task. This means that load effects are greater in a divided condition as the subjects have more information to attend to. However, load effects decrease with practise.

When is performance automatic? According to the instance theory automaticity is a continuum, not a dichotomy. It means processes can be more or less automatic and the features of speed, effortless, autonomous and unconsciousness may be more or less fulfilled. The progress on the continuum depends on practise. Logan and Etherton (1994), assessed automaticity in their experiments as:

1. The power function speedup, which is when reaction time decrease with practise on tasks.
2. A reduction of load effects, as a difference between attention conditions. Load effects should decrease with practise.
3. A reduction in dual task interference with practice.

Bargh (1996), means that automaticity may be a mix of automatic and non-automatic processes. All of above criteria do not have to be fulfilled at the same time; it is not an all-or-none process. Imaging driving a car quite effortlessly, but at the same time there is a deliberate intention of doing it, and hopefully in a controllable manner. This pattern may be present in many social situations, consisting of a mix between uncontrollable and controllable processes.

Previous research seem to have focused on the mechanisms subserving the selection of information, and not so much on when and how this happen. More recent work on instance theory has broaden its view and aimed to explore how and when attention is at work. From the point of memory research it has become important to include the use of both old and new stimuli, to be able to compare the encoding and retrieval processes (Boronat & Logan, 1997; Logan & Etherton, 1994). They found that attention selects the parts of the display that rule automatic performance as a retrieval cue. They tested the attention hypotheses, which predict that people will learn from what they attend to. Attention matters in the process of automaticity. During practice, attention decides what is encoded, stored and retrieved from memory. Learning is a side effect of attending, according to Logan and Etherton (1994). They found support for this in their experiment on focused or divided attention during automatization. Subjects categorized words in an experiment, and had to indicate if a category was absent or present in repeated exposures of a two-word display. The time it took for a subject to respond was recorded. Subjects were split in two groups, a focused attention condition and a divided attention condition. The focused subjects were only to pay attention to one word (green ink) in each word pair, while the divided subjects had to attend to both words. Subjects took first part in a training phase, in which automaticity was developed with repeated exposures of the word pairs. In the test phase that followed, word pairs from training were re-paired, and compared to the old pairs. They found that subjects in the divided attention condition were slower in responding to new pairs, than to old pairs. Subjects from the focused attention condition showed no difference in time between new and old pairs. This suggested that subjects from the divided condition had learned specific pairs in training and were sensitive to the disruption with the new pairs in the test. Subjects from the focused condition had not learned specific pairs and were therefore not disturbed by the change in pairs. The conclusion of their study was that attention decides the contents of an instance and subject's performance depends on instance retrieval from memory. However, there was no indication as to when attention operates, as subject's attentional demands were not manipulated in order to investigate this?

In a subsequent study, Boronat and Logan (1997) tested the instance theory with regards to when attention operates. They were interested to find out whether attention works during encoding or retrieval, or both. The experiment was similar to the one described in the earlier study by Logan and Etherton (1994), except that this time subjects were manipulated in both the training and the test phase. Subjects were categorizing word pairs during the training phase and subsequent test phase. The experiment showed that automaticity developed from practise in the training phase. A decrease in response times across trials, as load effects becomes smaller when people learn to do things with more ease. They found support for the notion that attention operates both at encoding and retrieval, during automatization. Boronat and Logan (1997) concluded that automaticity is a memory-based phenomenon and attention plays a role in the automatization process.

The present study investigates if the stereotype physical attractiveness produces automatic encoding and retrieval of stereotype congruent information. The test method is similar to the one described in Logan's experiments in that, it is a word task with new and old stimuli, and focused attention. However, the memory test is new and attention is not manipulated or investigated as such. Subjects did a word-judging task on computer, including training and test phase. The research is based on the instance theory of automaticity (Boronat & Logan, 1997), and Bargh's (1996) criteria of autonomous processing, and applied to memory research on stereotypes. During training subjects saw a set of stimuli 10 times. This allowed them to learn the combinations of face and word combinations. A set consisted of 20 "face and trait word" pairs. Subjects were required to initially focus on a cross on the screen, which was replaced with a face and a word next to it. Subjects were asked to judge the valence of the word, by pressing a key on the computer keyboard. Stimuli pairs remained the same for all training exposures to permit subjects many opportunities to encode particular pairs and develop automaticity for the stimuli. During the test phase all subjects were tested in the three different conditions including old and new stimuli, which followed promptly after the training.

The hypothesis for this experiment predicts that the stereotype physical attractiveness produces automatic encoding and retrieval of stereotype congruent information. This means that the difference in reaction times for memory retrieval between old and new stimuli should be greater for stereotype congruent information, than for stereotype incongruent information. Old stimuli are expected to produce faster reaction times than new stimuli, due to fast retrieval of all associated instances in memory. Stereotype congruent information is expected to produce faster reaction times than stereotype incongruent information, due to existing associations for congruent facts and fluency. An interaction is therefore predicted between congruency and old/new status. The graph in Figure 2 illustrates this prediction.

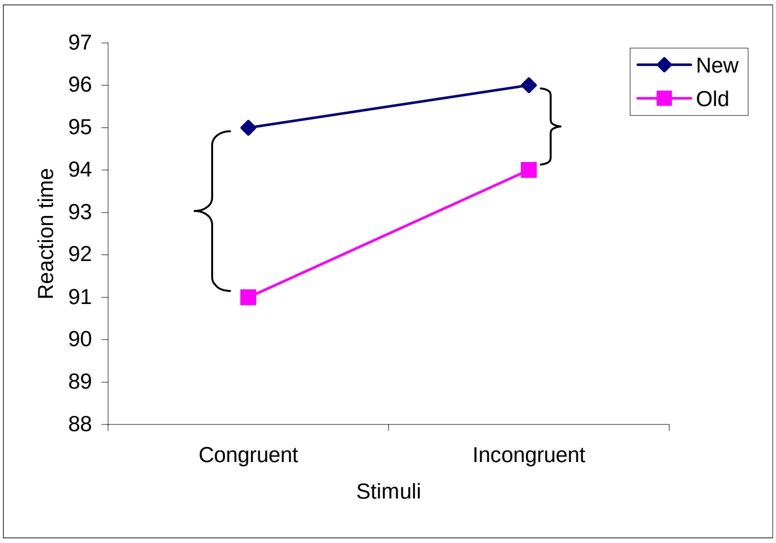

Figure 2. Illustration of automatic memory

A second hypothesis is to find out whether there is any relationship between subjects' explicit prejudice and their automatic memory for the stereotype physical attractiveness. Many times before, comparisons have been done between explicit and implicit tests, however not to automatic memory performance. In this study, it is seen as a sideline to the main research of automatic memory.

Method

Subjects

Forty-seven Swedish-speaking subjects participated in the experiment. The majority of subjects were students from Lund University, and their participation was anonymous and voluntary. They were recruited during their regular lectures, when they wrote name and telephone numbers on a list. The authors contacted them later and a suitable time was agreed upon for their participation in the experiment. The subjects were tested in a laboratory at the Department of Psychology, Lund University. Each subject was tested individually and the whole test procedure took approximately 30 minutes to complete.

One subject was dropped from the study due to a failure to complete the computer test. Of the remaining 47 subjects were 27 women and 20 male and between the age of 16-64 years.

Materials

Stimuli words in memory test. Subjects saw in total 40 trait words from the two categories negative and positive. Twenty words had a negative valence and the other twenty had a positive valence, see Appendix A. The valence stands for how the word is experienced, either with a negative or positive judgement (feeling). Stimuli were presented on the computer screen in an 18-point Helvetica font.

The words were matched according to the Swedish language in respect to frequency of daily use in language and word length. There was no significant difference between the words in word frequency when analysed in an ANOVA (*M* negative = 267.75, *M* positive = 329.70), $F(1,38) = .19$, $p > .66$, and no significant difference between the words in word length (*M* negative = 8.25, *M* positive = 8.85), $F(1,38) = .67$, $p > .42$ (J.-C. Rohner, personal communication, October, 2004).

Stimuli photographs in memory test. Each stimulus word, negative or positive, was seen together with a photograph of a human face on the computer screen during the test. The photographs were selected from a database belonging to the Department of Psychology, Lund University (J.-C. Rohner, personal communication, October, 2004). The faces depicted in the photographs had been used in previous research. Faces were then rated on their level of attractiveness on a Likert scale, where a value of “1” stands for “very unattractive” and value “4” means “very attractive”. The attractive faces had significantly higher values ($M = 3.22$), than the unattractive faces ($M = 1.54$). An ANOVA confirmed a significant difference between the faces, $F(1,38) = 231.14$, $p < .001$ (J.-C. Rohner, personal communication, October, 2004). Twenty female faces and twenty male faces, for each of the two categories of attractive and unattractive appearance, were chosen from 142 photographs in the database. The photographs of the faces were head-and-shoulder photographs, in black and white (200 x 300 pixels) seen on a 17 inch screen. The faces were also matched with their respect to emotional expression (neutral or happy) and gender to prevent individual differences in interpretation of the faces.

Stimuli pairs in the memory test. A set of stimuli (20 pairs) was created by randomly choosing 10 attractive faces and 10 unattractive faces from the original 40 faces, at random. Five faces out of each category (attractive and unattractive) were then paired with 10 randomly selected negative trait words and the remaining 10 faces were paired with ten randomly selected positive trait words. The trait words were selected at random from the original 40 words, and 20 were of negative valence and 20 were of positive valence. This resulted in five stimuli pairs with an attractive face and a negative trait word, five stimuli pairs with an attractive face and a positive trait word, five stimuli pairs with an unattractive face and a negative trait word, and finally five stimuli pairs with an unattractive face and a positive trait word, in total a set of 20 stimuli pairs. Each “face and trait word” pair occurred only once within each set, and each word or face appeared in only one pair. The computer program randomly selected 20 new pairs for each participant.

Questionnaire. The experimenters constructed a questionnaire. This was administered to subjects after the memory test; to measure subject's explicit prejudice attitudes to the physical attractiveness stereotype, see Appendix B. The questionnaire consisted of twelve statements, like "Attractive persons are talented" or "Unattractive persons are unreliable". Each statement included a negative or positive trait word used in the memory test, in relation to the adjective "attractive" or "unattractive". Subjects estimated on a Likert scale between 1 – 9, how they agreed with the statements. Response value "1" stands for "do not agree at all", response value "5" is "neutral" meaning not favouring any part, and response value "9" means that subjects "agree completely". Six of the statements were in reversed direction, to avoid subjects from answering in a routine manor. Demographic variables like age and gender were not included, as they were registered in the memory test.

Apparatus

An Apple Macintosh computer, running Matlab 5 software, controlled stimulus presentation, millisecond timing, and response collection. Responses were entered using the "d" and "l" keys on the computer keyboard. The key "d" was labelled with "–" for a negative response and the key "l" was labelled with "+" for a positive response.

Procedure

Initially, a pilot study including five subjects was performed. It assisted in finding out the optimal blocks of exposures for the training phase to achieve a priming effect in the implicit test phase. It proved that an increase from eight to teen blocks was desirable, to show a noticeable effect on memory performance. This means that there should be a difference in reaction times for old and new stimuli, and old stimuli should have a shorter reaction time. Another purpose of the pilot study was to assess how long the memory test took to complete. The lap between exposures of pairs in the test was shortened to last between 0-1.0 second at random, to speed up the test a couple of minutes.

Only one subject at a time completed the test procedure in the laboratory. Each subject was greeted and asked to sit down next to the computer, as comfortable as possible. A standard verbal instruction was given by the experimenter to explain the test procedure in brief. The real purpose of the test was not revealed to the subject in any instructions. He/she was informed that the test aimed to explore "How we tend to look upon other people and their attributes". He/she was also told that a detailed instruction on how to perform the test was to be presented at the computer screen. After the subject had read the instructions on the screen, he/she started the test by pressing any key on the keyboard. Each exposure started with a cross appearing in the middle of the screen, were subjects had been instructed to initially focus. The cross was replaced by a photograph of a face and a negative or positive trait word, appearing on one side of the photograph. The positioning of the trait word alternated randomly during the test on each exposure, to either left or right side of the face. The face and word pair stayed on the screen until the participant pressed a response key on the keyboard. Subjects responded by judging the trait word to be negative or positive, using the “d” and “l” keys. However, a response time in excess of 3.0 seconds or less than 0.20 seconds was considered an error (and was not included into the statistical analyses). There was a time lag between pressing the response key and the start of the next exposure. This lag randomly varied between 0-1 second. A centred cross always started the next exposure and the face remained in the middle of each exposure with the word appearing left or right of it. The memory test started with a training phase and a test phase followed promptly. There was deliberately no information to disclose when the training was finished and the test phase began. The experimenter left the room and the subject was left alone in the laboratory during the whole test procedure. The memory test lasted for about 18 – 20 minutes. It was finished when subject reached a screen were an id number was asked for, which he/she did not have to fill in. The experimenters entered the id number together with the subject’s age and sex. The questionnaire took an additional 5 - 10 minutes to fill in, after the memory test. When the subject had finished the test, he or she was asked to come outside the room and see us. A short debriefing was made. All subjects were offered to write their e-mail address on a list if they wanted the report and additional information e-mailed to them later on. Experimenters also offered their contact e-mail addresses to subjects.

Test procedure

Each subject went trough a test procedure that was designed as shown in Figure 3.

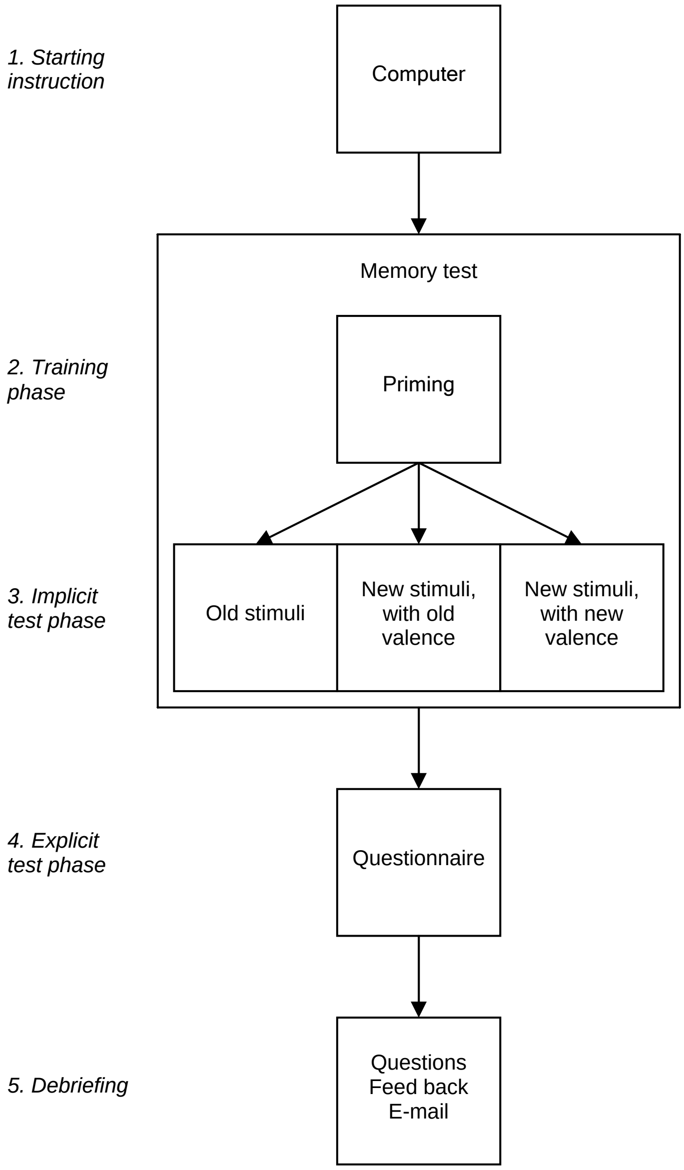

Figure 3. Design overview of test procedure

1. Starting instruction: see Appendix C.

2. Training phase: During training subjects saw a set of stimuli, 10 times (blocks). Each set of stimuli, was made up of 20 pairs of "face and trait word". This initial training worked as priming task. Stimuli pairs remained the same for all training exposures to permit subjects many opportunities to encode particular pairs. For each new subject a new set of 20 stimuli pairs were created at random. The stimuli pairs of "face and trait word" varied at random for each subject. This means that the stimuli pairs were all created from the same source of 40 faces and 40 trait words (20 negative valence and 20 positive valence), but paired at random for each new subject who was tested. The trait words and faces remained the same for each subject during the entire memory test. In total, the training phase consisted of 200 exposures (10 x 20 = 200). A fragment of the training phase is seen in Table 1.

Table 1

Schematic View of Training Phase, with 20 Stimuli Pairs, Repeated in 10 Blocks, at Random

Attractiveness	Word Valence	Attractiveness	Word Valence
Attractive 1	Negative 1	Unattractive 1	Negative 3
Attractive 2	Negative 2	Unattractive 2	Negative 4
Attractive 3	Positive 1	Unattractive 3	Positive 3
Attractive 4	Positive 2	Unattractive 4	Positive 4

Note. Attractiveness and word valence constitutes one stimulus pair. Figures represent a particular face/word.

3. Test phase: The subjects were tested in three conditions during the test phase, which followed promptly after the training phase. The three new conditions were all created from the same original set of pairs, which subjects had seen during training. The test phase consisted of four blocks. Each condition appeared 20 times (one set of pairs) within each block. The three conditions were mixed at random within each block. In the test phase subjects saw a total of 240 exposures, consisting of 20 pairs from each of the three conditions, repeated in four blocks (20 x 3 x 4 = 240).

Condition 1, in the test phase was, “old stimuli”. It was made up of exactly the same set of “face and trait word” pairs, as each subject had seen during their training phase, therefore the name “old stimuli”. A fragment of condition 1 in the test phase is seen in Table 2.

Table 2

Condition 1: Schematic View of Test Phase, with 20 Stimuli Pairs, Repeated in 4 Blocks, at Random

Attractiveness	Word Valence	Attractiveness	Word Valence
Attractive 1	Negative 1	Unattractive 1	Negative 3
Attractive 2	Negative 2	Unattractive 2	Negative 4
Attractive 3	Positive 1	Unattractive 3	Positive 3
Attractive 4	Positive 2	Unattractive 4	Positive 4

Note. Attractiveness and word valence constitutes one stimulus pair. Figures represent a particular face/word.

Condition 2, in the test phase was, "new stimuli, with old valence". Faces and trait words are re-paired at random from condition 1; however, the new pair keeps the old configuration of face and valence. The trait word is exchanged to a new word with the same valence. This means if an attractive face has been seen together with a positive trait word, the same face is now re-paired with another positive trait word in condition 2. A fragment of condition 2 in the test phase is seen in Table 3.

Table 3

Condition 2: Schematic View of Test Phase, with 20 Stimuli Pairs, Repeated in 4 Blocks, at Random

Attractiveness	Word Valence	Attractiveness	Word Valence
Attractive 1	Negative 2	Unattractive 1	Negative 4
Attractive 2	Negative 1	Unattractive 2	Negative 3
Attractive 3	Positive 2	Unattractive 3	Positive 4
Attractive 4	Positive 1	Unattractive 4	Positive 3

Note. Attractiveness and word valence constitutes one stimulus pair. Figures represent a particular face/word.

Condition 3, in the test phase was removed. The memory test originally included three conditions, because the experiment was aiming to evaluate automatic memory from two different perspectives, word and valence. Due to findings during the experiment's progress, the authors, on advice from their supervisor, abandoned this aim. The findings pointed to a potential problem of drawing reliable conclusions from condition 3 and valence memory. The result in this research will reflect automatic memory, without considering the aspects of valence memory. The response data from condition 3 in the memory test is therefore not used or mentioned any further.

4. Questionnaire: Filled in by subjects to measure their explicit prejudice attitudes to the stereotype used in the implicit memory test, physical attractiveness. See Appendix B

5. Debriefing: After the test subjects were debriefed. Their questions were answered and feedback was given on the test procedure and research.

Design

In a repeated measures design, experimenters are manipulating one or more independent factor to contrast subject's behaviour in two or more conditions of an experiment. The subjects were measured in all conditions of the experiment and, thus, served as their own controls.

In the test phase there were four within-subjects factors: Block (4), Combination (2: old or new stimulus), Valence (2: negative or positive word), Attractiveness (2: unattractive or attractive face). (Note: Factor combination excludes the previously mentioned condition 3 with new valence).

Mean reaction times from memory test phase were analysed in repeated-measures ANOVA, including all factors. Mean score of explicit prejudice attitudes from the questionnaire, were correlated with mean reaction time per block from the memory tests.

The dependent variable in the memory test is reaction time. Reaction time is measured in seconds. It reflects the time it takes a subject to judge a specific "face - trait word" pair to be negative or positive, and press a key on the computer keyboard. As subjects were exposed in the same condition 20 times in each block, mean values for each condition were calculated from the repeated exposures. In the statistical work, mean reaction times and indices calculated from them are used. The second dependent variable in the experiment is scores from the questionnaire, which is analysed together with mean reaction times and indices.

To counterbalance for practice effects during the test phase a complete design is used; a block randomization schedule with four repeated blocks, each including all three conditions. Each block consists of 60 exposures of "face and trait" pairs, equating 20 exposures from each condition (3) in a random order. This means that each "face and trait" pair from the three conditions was repeated 4 times during the test phase, and each condition was repeated 20 times in each block. In total there were 240 exposures during the test phase. The division of the test phase into four blocks facilitates the interpretation of the test results. It is easier to detect where in the result a desired effect appears and gives time perspective.

Processing of raw data

Each subject's measurements were inspected for errors and outliers, prior to calculating means for each condition and subject. An error occurred when a subject judged a positive trait word to be negative and vice versa, and these errors were first removed from the data material. This corresponded to a mean rate of errors of 8.12 percent, with a standard deviation of 11.82. In addition to errors, a response time of less than 0.20 and above 3.00 seconds was treated as errors and removed from the data material. Reaction time means, for each subject on each of the three conditions, were calculated after this removal of errors. After means had been calculated for each condition and subject, the data were screened for outliers. The new means were then compared to the criteria of z-values. The z-values of below or above 3, was considered outliers and were removed. Mean numbers of outliers was 2.35 percent, with a standard deviation of 3.79. In total, this corresponded to 2.01 percent of all measurements.

The reaction time data from the memory test resulted in 36 variables from each subject in SPSS, four variables from the training phase and 32 variables from the test phase. Each subject also had variables related to age and gender. New variables were later calculated from the original ones to create indices.

The questionnaire consisted of 12 statements to measure subject's explicit prejudice attitudes to the physical attractiveness stereotype. The six reversed statements (number 2, 4, 6, 8, 9, and 12) were turned before analysing the results. Cronbach's Alpha (α) was .37 for the questionnaire and will be considered in the discussion part of this report. Scores were added up for each subject, and mean values were calculated. A high mean value corresponds to a more prejudice towards the physical attractiveness stereotype.

Results

The significance level for all statistical analyses was set to a p-value of 0.05. The hypotheses of the ANOVAs were two-tailed and for the correlational analysis one-tailed. To correct for violation of the sphericity assumption in the ANOVA, Huynh – Feldt correction was used. For the correlational analysis the Pearson coefficient (r) was used. Reaction time refers to the time it takes to respond to the stimuli.

The main prediction is that the stereotype physical attractiveness produces automatic encoding and retrieval of stereotype congruent information. The difference in reaction time for memory retrieval between old and new stimuli should be greater for stereotype congruent information, than for stereotype incongruent information. This means the difference in reaction time between old and new stimuli pairs, which indicates automatic retrieval of the trait that belonged to a particular appearance, should be greater for stereotype congruent than for stereotype incongruent pairs. During training, subjects develop automaticity for retrieval of past information, which will speed-up reaction time (power function speedup). In addition, fluency for stereotype congruent information will also shorten the reaction time, as less cognitive work is needed for processing of this type of information.

Memory effects

To test the main hypothesis of automatic memory retrieval for stereotype congruent information, mean reaction times where analysed in a Block (4: 1, 2, 3, 4) X Combination (2: old or new stimulus) X Valence (2: negative or positive word) X Attractiveness (2: unattractive or attractive face) within-subjects ANOVA. In this ANOVA an interaction between the factors: block and combination was found, $F(3, 111) = 2.932$, $p < .037$, $\eta^2 = .073$. The greatest difference between old and new stimuli appeared in the first block, when old stimuli were faster than new (See Figure 4). This difference becomes gradually smaller for block 2 – 4, as reaction time decreases across blocks, for new stimuli with practise. This can also be seen as a confirmation of the priming effect. During training subjects learned the initial 20 pairs of “face and trait words”, which were seen 10 times, in the 10 blocks. This learning is crucial to build up memory for the stimuli, which reappear during the test phase. The levelling out of the curve for new stimuli is due to a learning effect. However, notice that “new stimuli” is just novel in the first block and becomes gradually older in the following blocks. Potentially the curve for old and new stimuli would join further on, if there were additional blocks in the experiment. Average reaction time dropped from 0.87 sec. in block 1 to 0.86 sec. in block 4 for old stimulus, while new stimulus dropped from 0.94 sec. to 0.88 sec. over the same period of time. This suggests that automatic memory is reduced over blocks.

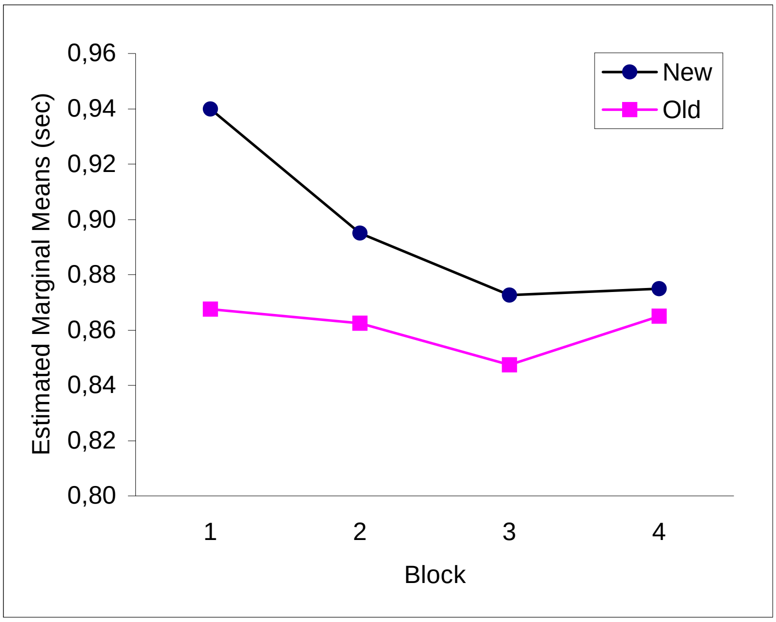

Figure 4. Interaction between block and combination (Old and New stimuli)

There was a main effect (see Figure 4) for combination (Old or new stimuli) $F(1, 37) = 24.295$, $p < .000$, $\eta^2 = .396$. This would generally indicate that old and new stimulus differs regardless of any other factors. In addition, this factor's two conditions account for almost 40 percent of the variance in the reaction time data. In other words, 40 percent of variance in these reactions times is explained, as resulting from changing between old and new stimulus. This is evidence of automatic memory. However, as there is also an interaction (see Figure 4) including combination, some cautiousness is called for when interpreting this result. In the same ANOVA there were also significant main effects for block $F(2.59, 95.84) = 3.106$, $p < .037$, $\eta^2 = .077$, and valence $F(1, 37) = 7.754$, $p < .008$, $\eta^2 = .173$. However, these effects were small in comparison with combination.

The predicted result for the main hypotheses was not confirmed, there was no significant interaction between block, combination, valence and attractiveness $F(3, 111) = .937$, $p < .425$, $\eta^2 = .025$. Neither, was there any significant interaction between combination, valence and attractiveness $F(1, 37) = .025$, $p < .876$, $\eta^2 = .001$. Automatic memory retrieval is not stronger for stereotype congruent information than for stereotype incongruent information. Subjects do not discriminate between stereotype congruent and incongruent memories automatically, as predicted by the experiments main hypothesis.

In the same ANOVA: Block (4: 1, 2, 3, 4) X Combination (2: old or new stimulus) X Valence (2: negative or positive word) X Attractiveness (2: unattractive or attractive face), there was a significant three-way interaction between block, combination and attractiveness $F(3, 111) = 2.802$, $p < .043$, $\eta^2 = .070$. The interaction of these three factors may mean that a two-way interaction between combination (old or new stimuli) and attractiveness (unattractive or attractive face) is significant, and changes depending on which block (1-4) is being analysed. To find out if there was any significant interaction in any blocks, mean reaction times for each block was tested in separate ANOVAs. Significant interactions between combination (old/new) and attractiveness (unattractive/attractive face) were found in block 1, $F(1, 42) = 5.240$, $p < .027$, $\eta^2 = .111$ and in block 3, $F(1, 40) = 5.359$, $p < .026$, $\eta^2 = .118$. In block 2 and 4 there were no significant interactions between combination and attractiveness.

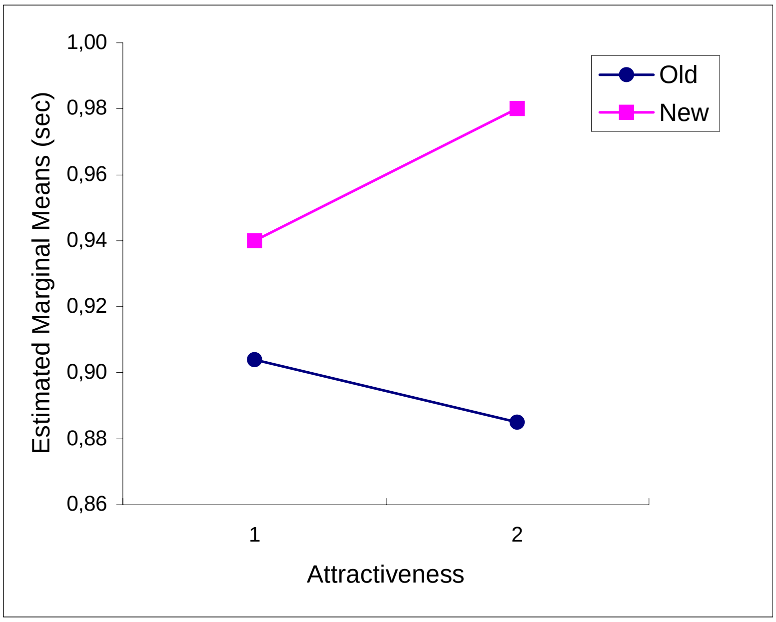

Figure 5. Interaction in block 1 between attractiveness and combination (Old and New stimuli)

1 = Unattractive and 2 = Attractive

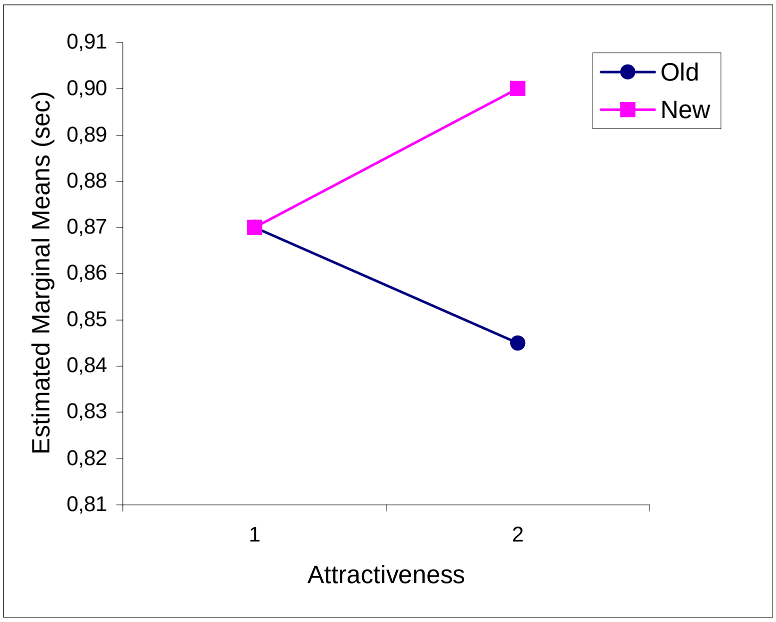

Figure 6. Interaction in block 3 between attractiveness and combination (Old and New stimuli)

1 = Unattractive and 2 = Attractive

Figure 5 shows this interaction between the variables: combination (old/new stimuli) and attractiveness (unattractive/attractive face) for block 1. This means the effect of combination differs depending on the level of attractiveness. The difference in mean reaction time between old and new stimuli, are longer for attractive faces, 0.1 sec. (old attractive negative/positive minus new attractive negative/positive stimulus) in comparison with unattractive faces, 0.04 sec. (old unattractive negative/positive minus new unattractive negative/positive stimulus). The same pattern is repeated in block 3, see Figure 6. The difference in mean reaction times between old and new stimuli, are longer for attractive faces, 0.05 sec. (old attractive negative/positive minus new attractive negative/positive stimulus) in comparison with unattractive faces, 0.00 sec. (old unattractive negative/positive minus new unattractive negative/positive stimulus). As seen in both Figure 5 and 6, the gap between the lines of new and old stimulus, is larger for attractive appearance. The results of these two interactions suggest that participants are faster to retrieve traits, negative or positive, that were encoded together with attractive faces, than traits that were encoded together with unattractive faces. Participants form memory for both appearances of attractive or unattractive faces, but the former is quicker to retrieve. However, as valence is not a part of this interaction, words can be either negative or positive when paired with an attractive face.

Memory effects and explicit attitudes

To examine whether there was any relationship between subjects' explicit prejudice and their memory for the "physical attractiveness" stereotype, the reaction time results from the memory test and the questionnaire's mean scores were correlated. The prediction is that subjects with a higher explicit prejudice attitude have better implicit memory for stereotype congruent information.

The explicit prejudice attitudes for the stereotype physical attractiveness (unattractive face and negative attribute, or attractive face and positive attribute) were measured with a questionnaire. The mean attitude for the subjects was slightly below neutral "5" on the Likert scale (1 – 9) for the questionnaire, see Table 4. Values between (1 – 4) indicate less explicit prejudice and values between (6 – 9) indicate more explicit prejudice. The mean value points to that the subjects in the studied group are fairly neutral in their approach to the examined stereotype of physical attractiveness, or slightly below neutral, which indicates they slightly disagree with the stereotype.

Indices were calculated to categorise and accumulate the reaction time data into one memory variable per participant and block. The new memory index was calculated from the mean reaction times, including the three factors: combination (Old/New), valence (Negative/Positive) and attractiveness (Unattractive/Attractive). The index stands for subject's level of memory for prejudice information. It is equivalent to: the reaction time of stereotype congruent prejudice information minus the reaction time of stereotype incongruent prejudice information. Stereotype congruent prejudice information is: an unattractive (Unattr.) face and a negative (Neg.) trait word, or an attractive (Attr.) face and a positive (Pos.) trait word. Stereotype incongruent prejudice information is: an unattractive (Unattr.) face and a positive (Pos.) trait word, or an attractive (Attr.) face and a negative (Neg.) trait word.

This is the equation used to calculate the index:
((New/Unattr./Neg. – Old/Unattr./Neg.) + (New/Attr./Pos. – Old/Attr./Pos.)) – ((New/Attr./Neg. – Old/Attr./Neg.) + (New/Unattr./Pos. – Old/Unattr./Pos.)) = index for memory of prejudice information for one block. Mean index above zero is interpreted as memory for congruent prejudice information and index below zero as memory for incongruent prejudice information. Each participant has four indexes, one for each of the four blocks in the memory test. Table 4 presents mean values and standards deviation for the correlated questionnaire and the memory test in each block 1 – 4.

Table 4

Mean Values and Standard Deviations for the Explicit Prejudice Questionnaire and the Memory Test in Each Block

Source	*M*	*SD*	*N*
Explicit	4.80	.67	47
Block 1	—	.35	43
Block 2	.11	.37	44
Block 3	–.02	.38	41
Block 4	–.05	.31	42

Note. Memory test block 1 – 4: Index for stereotype congruent prejudice information minus stereotype incongruent prejudice information.

The hypothesis that subjects with a higher explicit prejudice attitude for the physical attractiveness stereotype have better implicit memory for stereotype congruent information was tested. A near significant correlation was found between the explicit test and block 3 (index for memory of prejudice information), $r\ (41) = .25$, $p = .06$.

Table 5

Correlations Between Blocks in Memory Test and Explicit Prejudice Questionnaire

Subscale	Explicit	Block 1	Block 2	Block 3	Block 4
Explicit	—	-.09	.02	.25	.02
Block 1		—	.10	.08	.36*
Block 2			—	-.48*	.06
Block 3				—	.15
Block 4					—

Note. Block 1 – 4: Index (sec) for stereotype congruent prejudice information minus stereotype incongruent prejudice information.

* Correlation is significant at the 0.05 level (one-tailed).

Despite the lack of significant correlations (see Table 5), between any of the blocks and subjects explicit prejudice it may be interesting to notice the near significant value, between subjects explicit prejudice and memory index in block 3. This may indicate a potential trend in the results. In block 3 there may be a positive correlation between subjects' implicit memory for stereotype prejudice information and their explicit prejudice attitude. However, this is not statistically confirmed.

Discussion

The initial conclusion made from the current research is that participants developed automatic memory. Participants' ability to discriminate between old and new "face and trait word" pairs is quite strong as indicated by the amount of explained variation. Old stimuli generate an overall faster response time than new stimuli. Participants have encoded, stored and retrieved the stimuli pairs from long-term memory. They have done this without being aware of it, as the test procedure is indirect. Participants were only instructed to focus on the stimuli pairs and judge the valence of the words by pushing a key; there was no spoken requirement to memorise any information. This alone, confirms that people in general memorise a lot of information without any intention. It is also hard to avoid memorising, especially as we are not aware of it happening. The ecological validity of this conclusion ought to be rather high, as this is common to our daily lives. A lot of our daily activities are performed without much conscious effort. As Macrae, Milne, and Bodenhausen (1994) wrote, stereotypes help us form expressions easier and thereby release cognitive capacity for other tasks. This enables us to be busy with a lot of other things and saves us energy in a positive way. Though, this can also be seen from another perspective, when stereotypes are used for generalisations that provide a negative outcome for people involved. Our conclusion is that automatic memory for stereotypic information is for better or worse!

According to the instance theory of automaticity (Logan 1988, 1990, 1992) encoding is obligatory, meaning that attended information is encoded and stored in long-term memory. Retrieval of information is associated with what one attends. The contents of attention act as a retrieval cue, which retrieves information from memory. Finally, the theory predicts that each stimulus that is encoded, stored and retrieved in memory represents an instance in memory. Attention will decide the content of an instance, and the more practise and experience a person has with a task, the more instances they will have encoded for that specific task. As our memory test is similar to the experiments conducted by Logan (1994, 1997), this theory is appropriate when interpreting the results.

Looking back on the test procedure the retrieval process becomes automatic after a sufficient amount of practice. The automatic memory effect can be easier understood by looking back on what is happening during the whole test procedure. Going all the way back to the training phase, this is when subjects pay attention to particular faces and trait words, encode them, and analyse them with cognitive effort to be able to push the correct answer key (negative or positive) for the judgement. Gradually, learning experience speeds up the test procedure. The more practise participants have with the judging task, the more instances they will have encoded in long-term memory, according to the instance theory. In addition, their skills of pushing the keys will also improve.

Although, subjects are instructed to judge the trait word only, the focus is initially on the face, which appears in the middle of the screen. The face becomes registered as a part of the stimulus, although the attention is focused on judging the word, encoding is obligatory according to the instance theory. As subjects enter the test phase and new stimuli pairs (old pairs, re-paired) are mixed with old ones, this judgement process is interrupted. The instance theory predicts that contents of attention act as a retrieval cue, which withdraws information from memory. When participants judge a new stimulus pair, there are two processes at work simultaneously. One processes the face, which brings to mind a specific trait word that used to be present with this face previously. While at the same time cognitive effort is put into recognition of the identity of the new trait word, by the second process. A conflict is occurring between automatic memory retrieval of old instances (stimuli pairs) and analysing the new trait word, and this takes additional time to resolve. The automatic retrieval process is difficult to interrupt even with conscious effort. Bargh (1996) theorised that a preconscious stimuli, as in our experiment the face, is enough to initiate an autonomous process. Once a task is put into action, it runs by itself and is hard to stop. Another parallel may be drawn to the Stroop test, the classic example of automatic processing (Stroop, 1935; MacLeod, 1991). The word, which is the focus of attention, retrieves instances that have been associated with it in the past, like the semantic meaning of it and the perceptual motor-program for pronouncing it. It is very difficult for the person to stop reading the word (RED), instead of just pronouncing the colour of the ink of the word (BLUE). The appearance of a particular face as in our experiment would cause a similar interference.

The main hypothesis in this research predicted that the stereotype physical attractiveness produce automatic encoding and retrieval of stereotype congruent information. The difference in reaction time for memory retrieval between old and new stimuli, is predicted to be greater for stereotype congruent information, than for stereotype incongruent information. Old stimuli are expected to produce faster reaction time than new stimuli, due to fast retrieval of all associated instances in memory. Stereotype congruent information is expected to produce faster reaction time than stereotype incongruent information, due to existing associations for congruent facts and fluency. As concluded earlier, participants developed automatic memory for the stimuli pairs. However, this was not achieved in accordance with the main hypothesis. The difference in reaction time between old and new stimuli pairs was not greater for attitude congruent stimuli pairs than for attitude incongruent pairs. Participants failed to exhibit more automatic memory for attitude congruent stimuli than for attitude incongruent stimuli. Therefore, the automatic memory is applicable for all stimuli pairs, irrespective of their configuration of face and trait words (attractive/positive, attractive/negative, unattractive/positive, and unattractive/negative). As participants developed automatic memory, this is a confirmation that participants were able to discriminate between old and new stimuli pairs. Then why did they not discriminate between stereotype congruent and incongruent information? A possible explanation may be that the examined stereotype physical attractiveness is not as strong as other stereotypes like, age, gender, and racism.

A contradiction to our test result is the previous work by Lundquist and Perten (2003). They explored if stereotype congruent stimuli produced more familiarity and false memories than incongruent information, in recognition judgements. They found evidence to confirm this, and concluded that participants easier remember stereotype congruent information, and made false memories of it.

Although, participants did not discriminate between congruent and incongruent stimuli pairs, they did show some sensitivity to the pairs' configuration. The results indicated that participants were sensitive to the combinations of old or new stimuli and attractiveness of the face. The face in the stimuli pairs could either be attractive or unattractive, and participants were faster to retrieve stimuli pairs including attractive faces. The valence of the paired word seemed not important for the retrieval, instead retrieval was cued by the face appearance. An attractive face paired with the trait word "talented", or an attractive face paired with "incompetent" is retrieved equally fast. This circumstance emerged in block 1 and 3 only. This points to an automatic memory effect for attractiveness, which varies with block. The reason for this variation between blocks is hard to interpret. The priming effect may be stronger in block one and weaker for oncoming blocks. New stimuli generate gradually a faster response time as participants have seen them in all four blocks. What happens in block three is beyond our comprehension.

Do we pay attention and memorise attractive individuals to a greater extent? This would be in line with the hypotheses by Ramsey et al. (2004), where infants preferred looking at attractive faces. Maybe this preference stays with us in adult life? Is it, that once an attractive face has been memorised, it is not so important what attributes goes along with it? This question may back up our idea that we do judge people for their looks. Again, this processing is all done implicitly and without intention. Even though this testing took place in a cognitive laboratory, there may be little reason to think that this could not happen outside the laboratory.

The relationship between subjects' explicit prejudice and their memory for the physical attractiveness stereotype, pointed towards a positive trend. Subjects with high explicit prejudice attitude for the examined stereotype were predicted to show better automatic memory for stereotype congruent information. The hypothesis was partly confirmed, by the positive trend in block 3. Participants' explicit attitude to the examined stereotype correlates with their implicit memory for stereotypic attitudes in this block. The trend in block 3 proposes that individual differences in attitudes towards the physical attractiveness stereotype are connected with participant's performance on the implicit memory test. For example, if a person expresses a high explicit attitude this correlates with a better automatic memory for stereotype congruent information, and vice versa.

If we relate the filter model (Bodenhausen, 1988; Stangor & McMillan, 1992; Macrae, Milne & Bodenhausen, 1994) to our results, the stereotype incongruent information will not pass through the filter. According to this model, incongruent information will not be encoded and therefore not stored in long-term memory. When participants remember the stimuli pairs, they will only remember the congruent information, which was encoded in the first place. This memory will contain information like; attractive people have positive traits and unattractive people have negative traits. If this is the case for an implicit attitude, then it may also be the case for a strong explicit attitude. From this perspective the result is partly supported by the filter model. On the other hand according to the encoding flexibility model (Sherman et al., 1998), processing recourses may be directed towards stereotype incongruent information, because this is harder to comprehend when recourses are limited.

It is difficult to explain why the correlation only was found in block 3, but we can only speculate. One reason could be, when memory weakens the stereotype effect emerge, but this do not explain why it wasn't found in block 4. Another guess may be that in the beginning of the test participants' concentrate on their performance and motoric skills. After a while these become automatic and participants relax. This allows the implicit memory to surface. This relationship between explicit attitudes and automatic memory has not been explored previously. It would be interesting to further explore if this trend persist in future experiment.

The internal validity of the experiment is believed to be satisfactory. The experiment followed a standard procedure. All participants received exactly the same information before, during and after the experiment. The stimuli words and photographs had been pre-tested on other individuals, to establish their consistency. All participants were anonymous which may help to prevent potential effects of social desirability. However, it is hard to prevent all demand characteristics. Some participants may behave in a way they think is demanded by the researcher and guess the hypothesis of the experiment. In our experiment, the memory test was implicit and participants were therefore unaware of its purpose. The memory test was a repeated measures design, the influence of confounding individual differences variables like age, health, education, IQ and others were reduced; all participants were tested in all three conditions. Practice effects we balanced with a block randomization schedule with four repeated blocks, each including all three conditions. Participants individual difference in memory for particular stimuli pairs is assumed to be due to the configuration of each stimuli new set of 20 pairs, and nothing else. Each new set was created at random.

As mentioned in the method part, Chronbach's alpha for the explicit questionnaire was 0.37. This may be considered low according to statistical standards, where it is desired to reach a value of 0.70 (Aron & Aron, 2003). Chronbach's alpha is a reliability measure, which determines the consistency of a test. The obtained value points to a poor internal correlation between the questions (statements). However, we consider the construct validity of the questions to be appropriate. The questions cover the examined topic and involve both relevant trait words and stereotype characteristics. They are constructed in a manner that allows the subjects to answer true or false in a systematic way. There are no double statements included, which could cause confusion. The results indicate no immense individual variation, with most mean scores around "neutral" (4.8) and a standard deviation of 0.67. Each participant was exposed to a unique set of stimuli pairs. In regards to the questionnaire this may be a bias, as the 12 statements which included one trait word each, may not have been seen previously during the memory test by all participants. Some participants have most likely seen other trait words, as there were 40 in total.

In retrospect, the reliability could probably be improved with a pilot study of the questionnaire, which unfortunately did not take place. An alternative to the questionnaire could be to estimate subjects' explicit attitudes with a computer test similar to the implicit memory test. The same photographs and trait words could have been estimated on the computer. This may enhance the construct validity.

How much can we generalise from our laboratory to the real world? Sometimes it feels difficult to generalise from research on cognitive processes to social situations. One would have to believe that these automatic memory processes, although complex, do exist and work in all human minds. Therefore, they may be generalised to society at large in many contexts. We hope this study will be an entrance to future experiments on automatic memory for other stereotypes.

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APPENDIX A

Trait words in memory test

improduktiv	skarpsinnig
ointelligent	företagsam
obegåvad	ihärdig
fantasilös	handlingskraftig
ångestfylld	tillförlitlig
håglös	utåtriktad
inbunden	älskvärd
inkompetent	produktiv
opålitlig	uthållig
ineffektiv	målmedveten
nedstämd	energisk
otrevlig	dynamisk
slarvig	ambitiös
nedslagen	pålitlig
trög	kompetent
passiv	begåvad
ängslig	skärpt
olycklig	effektiv
ledsen	trevlig
orolig	aktiv

APPENDIX B

Questionnaire

Nedan följer ett antal påståenden. Ange för varje påstående vad som stämmer med Din uppfattning genom att utifrån skalorna nedan ringa in det alternativ som passar bäst. Det är viktigt att Du svarar så ärligt och öppet Du kan. Det finns inga svar som är rätt eller fel. Dina svar kommer att behandlas anonymt.

1. **Attraktiva personer är begåvade.**

1	2	3	4	5	6	7	8	9
Instämmer inte alls				Neutral				Instämmer helt och hållet

2. **Oattraktiva personer är trevliga.**

1	2	3	4	5	6	7	8	9
Instämmer inte alls				Neutral				Instämmer helt och hållet

3. **Oattraktiva medmänniskor är opålitliga.**

1	2	3	4	5	6	7	8	9
Instämmer inte alls				Neutral				Instämmer helt och hållet

4. **Attraktiva personer är passiva.**

1	2	3	4	5	6	7	8	9
Instämmer inte alls				Neutral				Instämmer helt och hållet

5. **Oattraktiva människor är håglösa.**

1	2	3	4	5	6	7	8	9
Instämmer inte alls				Neutral				Instämmer helt och hållet

6. **Attraktiva medmänniskor är ineffektiva.**

1	2	3	4	5	6	7	8	9
Instämmer inte alls				Neutral				Instämmer helt och hållet

7. Attraktiva människor är ambitiösa.

1	2	3	4	5	6	7	8	9
Instämmer inte alls				Neutral				Instämmer helt och hållet

8. Oattraktiva personer är älskvärda.

1	2	3	4	5	6	7	8	9
Instämmer inte alls				Neutral				Instämmer helt och hållet

9. Oattraktiva personer är skärpta.

1	2	3	4	5	6	7	8	9
Instämmer inte alls				Neutral				Instämmer helt och hållet

10. Oattraktiva människor är tröga.

1	2	3	4	5	6	7	8	9
Instämmer inte alls				Neutral				Instämmer helt och hållet

11. Attraktiva studenter är pålitliga.

1	2	3	4	5	6	7	8	9
Instämmer inte alls				Neutral				Instämmer helt och hållet

12. Attraktiva personer är slarviga.

1	2	3	4	5	6	7	8	9
Instämmer inte alls				Neutral				Instämmer helt och hållet

TACK FÖR DIN MEDVERKAN

(2004)

APPENDIX C

Starting instruction on the computer

I testet kommer du att se ett ansikte och ett ord upprepade gånger på skärmen. Din uppgift är att så fort och noggrant som möjligt bedöma om ordet är positivt eller negativt. Först visas ett kryss som du skall titta på. Därefter följer ett ansikte tillsammans med ett ord. Bedöm ordet som positivt eller negativt genom att trycka på de gröna tangenterna. Om ett ord är positivt tryck på den gröna tangenten märkt "+". Om ett ord är negativt tryck på den gröna tangenten "–". Börja med att placera händerna på tangentbordet (utan att trycka på någon tangent) och behåll dem där under hela testet. Testet är ganska långt, men försök att vara koncentrerad hela tiden. Alltså: Titta på krysset och bedöm ordet så fort som möjligt. För att starta testet tryck på valfri tangent, nu.