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The impact of affective visual stimuli on people's intentions to conserve nature

MSc thesis Leisure, Tourism and Environment
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Summary

Nature provides humans with resources to fulfill their basic needs. A line of research suggests that humans are born with a preference for natural environments over built environments. Nevertheless, human behavior causes the degradation of nature areas and the loss of biodiversity. Nowadays it is acknowledged that not solely biological knowledge is important for nature conservation. The role of the social sciences is increasing. A behavioral change is needed to safeguard our natural environment for the future. It might be the case that not only rational arguments account as motives to perform pro-conservation behavior. People's affective bond with nature seems to account as well.

In the Theory of Planned Behavior (TPB) and the Model of Goal-directed Behavior (MGB) intentions are deemed to be the antecedent of actual behavior. Emotions can be either viewed from a dimensional perspective or a discrete perspective. The dimensional perspective is used, with valence being the main concept. Valence can be explained as the extent of pleasantness someone experiences, expressed on a continuous scale. This study is carried out from the perspective of the affective priming paradigm. It is hypothesized that viewing affective pictures has a priming effect on people's intentions to conserve nature. Also it is hypothesized that viewing nature related pictures has a stronger priming effect than non-nature related pictures. To test whether the hypotheses are true or not, an experiment was carried out. Affective pictures from the International Affective Picture System (IAPS) were used to prime participant's emotions. 6 experimental conditions were developed, based on valence and content of the pictures. Intentions were measured by 6 statement concerning nature. 120 participants took part in the experiment.

No priming effect was found of viewing pictures on participant's intentions to conserve nature. Moreover, nature pictures did also not show a priming effect. Currently a heavy debate is going on among priming researchers. The debate concerns the existence of priming effects at all. In this study's experiment the priming effect might had already disappeared before the nature statements were answered by the participants. Also, it might have been the case that the priming was too conscious. Because of the possible disappearance of the priming effect, the socio-demographic characteristics could have had an influence on the results. The sample consisted solely of Wageningen students, which caused a relative low mean age and a high education level.

In future, this current experiment could be carried out with other and larger samples. Gaining more data should reveal if there really is no priming effect of viewing affective pictures on people's intentions to conserve nature. For future research, I would also recommend to remove or replace the psychological nature statements, to enhance the validity of the measurement instrument. Next to using pictures to elicit an emotional reaction among participants, hearing sounds, smelling aromas or the touching of objects could also be used.

Chapter 1: Introduction

1.1 Preface

In this first chapter, the relationship between humans and the natural world is the central theme. Mankind's dependency on and use of nature are discussed (1.2), followed by a paragraph on how to possibly get people involved in nature conservation (1.3). Then, the purpose and preliminary problem statement are explained (1.4). Last paragraph gives a brief outline of the other chapters in this study (1.5).

1.2: Humans and nature

Planet earth is covered with nature. In fact, everything was nature, until people came in. Slowly, a division between the natural world and the human-made, urbanized world, developed (Hinds & Sparks, 2008). People built houses, invented modes of transport, developed industry; they transformed the earth unlike nature would have done by itself. Despite the division, we seem to be attached to nature. Although, this differs per person. One person may claim to love all nature, while others just like the nice views from the sea side. Whatever one thinks of nature, human beings cannot live without their natural surroundings. Nature provides us with resources to fulfill our basic needs; food and water. Starting with the simplest thing, we need the oxygen from the air. Now standards of living are at an unprecedented high level, we extract a lot of natural resources from our planet, like oil, iron and all sorts of rocks. Without our natural surroundings, humans would not be here. This also means that every single one of us is dependent on our planet and all resources that are provided.

Next to the essential features that nature provides for our living, there is the health benefit. Nature offers us restorative qualities, that are not offered by our urban surroundings (see, for example, Van den Berg *et al.* (Van den Berg *et al.*, 2007)). However, nowadays nature is mostly referred to because of its aesthetic values (Swart *et al.*, 2001). Nature is beautiful and perfect for a walk with the family on a sunny Sunday afternoon. Seeing beautiful landscapes makes us feel happy. Outdoor recreation is often associated immediately with nature: it is the place for activities. Herewith it is not only about the activities themselves, but also about the physical benefits of the activities and the social contacts that are provided. Van den Berg *et al.* (Van den Berg *et al.*, 2007) claim that humans are born with a preference for natural environments over built environments, because of evolutionary reasons. Also Kals *et al.* (Kals *et al.*, 1999) note that humans have a biologically based attraction to nature. Moreover, they state that people's well-being depends, to a great extent, on our relationships with the surrounding natural world. The more direct experiences one has with nature, the greater the emotional bonds with nature (Kals *et al.*, 1999).

So in general, we like to be in nature. Especially in The Netherlands, levels of nature-friendliness are relatively high (de Groot & van den Born, 2003). Therefore it seems a contradiction that more and more people live in dense, urbanized areas. As world population is still growing, urbanization is happening every day. Taking into account the increasing use of natural resources, it seems to be inevitable that the pressure on the natural environment is rising (Vlek & Steg, 2007). Tourism has its share in this as well. It is remarkable, that tourism often flourishes in natural settings that are extra vulnerable for human impact (Lim & McAleer, 2005; May, 1991). Think about mass beach tourism,

where enormous hotels are built along a small area of land, as close to the sea as possible. Mountain ranges also attract tourists and as ski lifts are built for winter sports, local ecosystems are forced to adopt. Thus, nature and tourism have not always been friends. Especially in the case of mass tourism in peak seasons, pressure on the environment in destinations can be enormous (Romeril, 1989). For example, a huge local increase in water use, waste production, land use and crowding of public spaces.

Tourism has grown rapidly over the past decades, due to the unprecedented high standards of living. Important to note is that new, fast modes of transport also play a role in the increase in the tourism sector. Tourism transport is worldwide deemed to be highly unsustainable due to high emissions (Peeters & Dubois, 2010). Also the building of new infrastructure for tourism has its impact on the environment, as are extension of airports and the development of new roads. Agricultural land is lost and noise pollution increases (Travis, 1982).

Humans and the natural environment are indissoluble connected with each other. People are dependent on the earth's resources for their living, while pressure on the environment is rising. Tourism as well as daily life activities have an unprecedented high impact. Thus, human lifestyles impact nature enormously, by behavior that cannot be reversed anymore.

1.3: Activating people for nature conservation

Looking after the natural world around us, is not something humans have done all their lives. In The Netherlands, the first nature protection organization "Natuurmonumenten" only came into existence in 1905 (Natuurmonumenten, 2012). Nowadays, nature conservation is a hot topic. Awareness has risen among people that something needs to be done about the changes we make to our natural environment. However, awareness on its own is not enough when it comes to actual intentions to perform nature-protective behavior. A lot of research has been done on the relationship between socio-demographic factors and people's intentions to conserve nature (Berenguer *et al.*, 2005; Rosalino & Rosalino, 2012; Torkar *et al.*, 2010; Van den Berg *et al.*, 2007). In contrary to this, little research has been done on the relationship between emotions and people's intentions to conserve nature.

In the field of nature conservation, the role of the social sciences is increasingly recognized (Saunders, 2003). It is nowadays acknowledged that biological knowledge alone is not solving the problem of degradation of nature areas and the loss of biodiversity (Saunders *et al.*, 2006). Human behavior is the cause of this problem, but also the solution. Nature can be conceptualized as "everything that lives or organizes itself outside humans and human decisions" (de Groot & van den Born, 2003). However, people impact nature to generate benefits for their living. Nature cannot be called completely self-regulating anymore. It is self-regulating, while dealing with the impact that the interference of people causes. So only humans themselves can make changes in how we interact with our natural environment. However, since many threats to earth are only to be seen on the long-term and/or have a global character, creating intentions to conserve nature does not happen automatically in daily life (Saunders *et al.*, 2006). This is an important fact, while nature conservation is more likely to be successful when backed by personal intentions and public support (Rosalino & Rosalino, 2012).

Tourism has a twofold relationship with nature. Tourism needs nature, because that is exactly what the people attracts. However, tourism in nature areas is also the aspect that could cause (unintentional) negative impact (Coppock, 1982; Lim & McAleer, 2005). Nowadays, this double relationship is well-known and the source of new forms of tourism. The concept of *eco-tourism* catches all forms of tourism that aim at enjoyment and understanding of nature and culture, while at the same time enhancing local benefits and contributing towards conservation of the local environment visited (Lim & McAleer, 2005). Nowadays, more and more awareness has risen for environment-friendly forms of tourism. Mass tourism is increasingly criticized for its bad impact. So eventually, it is said, nature conservation can truly benefit from tourism (Lim & McAleer, 2005).

One of the few studies that conducted research in the emotions-nature conservation gap states an interesting argument: Kals *et al.* (Kals *et al.*, 1999) suggest that emotional affinity toward nature is a powerful predictor of nature-protective behavior. It is not only rational arguments that motivate people for nature conservation, but positive emotions might highly contribute in one's intentions to conserve nature (DiEnno & Thompson, 2012). As said before, the more direct experiences one has with nature, the stronger the emotional bonds are likely to be (Kals *et al.*, 1999). Next to this direct emotional effect, I hypothesize there must be other, indirect factors that have an effect on the emotional bond with nature. Everything that makes one get in touch with nature, direct or indirect, might have an emotional effect.

The media could be very useful in this case. Mass media is all around us and used for a whole range of functions, like news provision, educational programs, entertainment or advertisements. Media are able to provide visual experiences of things that are actually far away (Schulz, 2004). In this light, media sources could also provide nature experiences. Everyone with a television, for example, can watch a documentary about elephants in the African savanna. Watching this documentary might cause positive emotions about elephants. Those positive emotions might influence one's attitude towards the conservation of the elephant population on earth. Also nature magazines provide texts and pictures of nature issues. Especially pictures are known to be very well able to evoke the same emotional responses as the real objects (Bradley & Lang, 2007). From this we can reason that the more pictures depicting natural scenes one sees, the more emotions about natural scenes one might have had. These emotions, thus evoked by indirect experiences of nature, could possibly strengthen one's emotional bond with nature.

Literature suggests two things in the emotions-nature conservation gap. 1) The more direct experiences one has with nature, the stronger one's emotional bond with nature is likely to be. And 2) the stronger one's emotional bond with nature, the more intentions for nature conservation someone is likely to have (Kals *et al.*, 1999). Link this with the fact that pictures might be able to elicit the real emotions, there is a possible connection. Seeing more pictures of, for example, forests could lead to more emotions about forests and thus a stronger emotional bond with real forests. Exactly here it is, where pictures might lead to a stronger emotional bond and therefore an increased willingness to conserve nature.

1.4: Purpose and preliminary problem statement

There is an urging question that arises: whether pictures have an effect on one's intentions to conserve nature. In general, this study focuses on the relationship between emotions and people's intentions to conserve nature. Emotions will be represented by pictures, so pictures will be the mediating factor. The **overall purpose of this study** is: *to examine what impact pictures have on people's intentions to conserve nature.*

The variable on which this study aims to draw conclusions, is *people's intentions to conserve nature*. Following this, pictures depicting natural scenes are most interesting. Probably, when people perceive the depicted landscapes as beautiful, this will elicit a positive emotional reaction. Logical reasoning will tell you that watching beautiful pictures automatically brings you in a good mood, because of the positive emotions. People in a good mood, are more likely to be positive in subsequent tasks (Klauer, 1997). Here, such a task is answering questions about intentions for nature conservation.

The line of reasoning presented above leads up to the **preliminary problem statement**: *Do pictures have an effect on people's intentions to conserve nature?*

1.5: Outline of subsequent chapters

In the next chapter, the literature review and theoretical framework are presented. All relevant concepts and theories are discussed. At the end of the 2nd chapter, the research questions and corresponding hypotheses are formulated. The 3rd chapter elaborates on the used methods. It is explained how the empirical research is developed. In the 4th chapter the acquainted results are presented. Statistical analyses are carried out and the consequences for the hypotheses are given. Next chapter discusses the results. An actual debate is introduced in the 5th chapter and it is elaborated on differences between this study and other research in the same field. Last chapter provides the conclusion. Also suggestions for future research are given.

Chapter 2: Literature review and theoretical framework

2.1: Preface

To refine the problem statement and gain knowledge for further study, a sound understanding of relevant concepts and theories is necessary. This chapter starts with 2 wider theoretic paragraphs on the human-nature relationship. Aim of those paragraphs is to place this study in a broader literature field. First paragraph elaborates on people's preference for nature, by which the psychological aspects of nature are emphasized (2.2). Nature conservation is a concept that does not have a single definition, so the paragraph also demarcates the perspective that will be used in this study. Natural environments and human health is the topic of the subsequent paragraph (2.3). A few health benefits of the presence of green spaces come past, where after a theory to analyze intentions is introduced (2.4). Intentions are the antecedents of behavior and therefore it is useful to gain some more insight in how intentions and behavior relate with each other. Next paragraph deals with some widespread, well-known perspectives on emotions (2.5). It is explained which view on emotions is used in this study, with some extra in-depth information on this view. Last theoretical paragraph deals with the affective priming paradigm (2.6). The development of this paradigm is described, just like the way it can be used for research. Eventually, it is explained how the discussed concepts and theories relate with each other (2.7). Also the final problem statement is introduced, with corresponding research questions and hypotheses. Taking together all the theoretical knowledge gained, a conceptual model is drawn. The conceptual model guides the empirical part of this study.

2.2: People's preference for nature

Writing about people's intentions to conserve nature, makes us wonder what nature conservation actually is. The classical way of nature conservation has always been the establishment of nature reserves (Swart *et al.*, 2001). Relatively new is the fact that also ecological restoration is considered as being conservation. According to the Society of Ecological Restoration, restoration can be defined as "the process of assisting the recovery and management of ecological integrity" (Swart *et al.*, 2001). Talking about nature conservation usually also gives rise to the concepts of environment and sustainability. When the term environment is used in this thesis, the total living environment is meant. This concerns everything around us, natural or urban (Vlek & Steg, 2007). Sustainability is a 'hot topic' in science, as well as in the media. To have a working definition of sustainability, this study uses the classical one: "to meet the needs of the present without compromising the ability of future generations to meet their own needs (World Commission on Environment and Development, 1987). So nature conservation is an activity that belongs to sustainable development.

Among others, Kals *et al.* and Van den Berg *et al.* (Kals *et al.*, 1999; Van den Berg *et al.*, 2007) state that humans are born with a preference for natural surroundings over built surroundings, because of evolutionary reasons. Wilson (Wilson, 1984) was the first researcher to address the need of humans to affiliate with nature. He developed the *biophilia hypothesis*, which states that people's psychological well-being depends on their relationship with the surrounding natural world. It is said that this *biophilia* accounts for the current high levels of nature-friendliness in Western countries (Van den Born *et al.*, 2001). Moreover, Van den Born *et al.* (Van den Born *et al.*, 2001) state that Western culture has moved from the domination and exploitation of nature, towards a so-called *new biophilia*. This *new biophilia* can be characterized by people's acknowledgement of the intrinsic value

of nature and a broad range of types of nature that are recognized. Important to note here, is that non-Western countries have different prevailing views on nature and nature conservation (Van den Born *et al.*, 2001). Especially the research domain that focuses on images of nature is a Dutch traditional domain. In this study, when writing about nature and nature conservation, Western views will dominate.

Moving towards a psychological view on nature conservation, we get to the point that nature is valuable and worthy of protection (Swart *et al.*, 2001). This statement is related to classical psychological questions; what is true, what is right and what is beautiful? Arguments that are taken into account are, for example, that humans need to respect the intrinsic value of nature (certain species, specific ecosystems). Another reason why Swart *et al.* (Swart *et al.*, 2001) claim that nature should be protected, is because of aesthetic reasons, which are the base for modern outdoor recreation and tourism. Nature provides the desired spaces for social contacts and exercise (Van den Berg *et al.*, 2007). Nevertheless, nature's biodiversity is sometimes negatively impacted by visitors, unintentionally by recreationists and tourists who come to enjoy nature. However, this outdoor recreation and tourism could also give rise to the protection of species. Ecosystems and species that were formerly relatively unknown get attention because of visitors, which possibly increases the attention for local conservation issues (Van der Duim & Caalders 2002).

The aesthetic evaluation of nature varies per person (Van den Berg & Koole, 2006). Consequently, it is a disputed subject what kind of nature is worthy of conservation. In general, three types of nature are distinguished here, following Swart *et al.* (Swart *et al.*, 2001). 1) *Functional nature* denotes all nature, made by and for people, like agricultural landscapes. 2) *Arcadian nature* describes semi-natural settings. Humans do interfere in such landscapes, however not for their own purposes, but to improve the quality of the Arcadian setting. 3) Last but not least, there is the *wild nature*. This type of nature can be characterized as facing no human influence. It could be subject of a passive management strategy, in which conservationists just let the nature develop itself (Van den Berg & Koole, 2006). This is also called the *wilderness perspective*, where humans like to think about nature as large, untouched areas (Swart *et al.*, 2001). According to Swart *et al.*, Van den Born *et al.*, De Groot and Van den Born and Van den Berg and Koole (de Groot & van den Born, 2003; Swart *et al.*, 2001; Van den Berg & Koole, 2006; Van den Born *et al.*, 2001), people in the Netherlands have a clear preference for wild nature, like seas and mountain ranges.

2.3: Natural environments and human health

Literature suggests humans prefer natural environments over built environments (Kals *et al.*, 1999; Van den Berg *et al.*, 2007). Another line of theories deals with the health effects that nature can have on people. Velarde *et al.* (Velarde *et al.*, 2007) distinguish three main types of effects. The first type includes short term recovery from stress or mental fatigue. Thus, this type is about psychological well-being, which touches on Wilson's *biophilia hypothesis*. Secondly, natural environments are deemed to promote the physical recovery from an illness and stimulate a reduced frequency of physical incidence. The last type of effects concerns long-term behavioral change and overall improvement in well-being (Velarde, *et al.*, 2007).

Short term recovery from stress or mental fatigue is stimulated by visiting natural environments. An explanation for this comes from the Attention Restoration Theory (ART), first developed by Kaplan (Kaplan, 1995). ART argues that someone who stays in natural surroundings, has no need to direct his/her attention towards a specific item. In daily life, especially the working life, one's attention is always directed. When one's attention is used intensely, mental fatigue will occur after a while (Berto, 2005). Nature offers the opportunity to recover the possibility to direct attention. This can help to prevent or reduce stress (Kaplan, 1995; Van den Berg *et al.*, 2007). Important to note is that research states urban environments are not able to function as restorative environments (Berto, 2005). Mental fatigue will only disappear when experiencing natural environments.

Considering the second type of health effects, faster physical recovery from illness and a reduced frequency of physical illness, Ulrich has developed a well-known theory called the Stress Recovery Theory (Ulrich, 1991; Ulrich, 1984). While the first type of effects only takes psychological health effects into account, now physical effects are also considered. Ulrich (Ulrich, 1984) studied the post-operative stays of patients in a hospital. Results of his study suggested that patients who viewed a natural scene out of their window needed a shorter recovery stay than patients (who had undergone the same treatment) who viewed a brick wall out of their window (Ulrich, 1984). Further research confirmed the differences in recovery time between patients with nature views and patients with urban views, which resulted in the Stress Recovery Theory (SRT) (Ulrich, 1991; Velarde *et al.*, 2007; Joye & van den Berg, 2011). Ulrich states that evolutionary reasons are the base of mankind's attachment to nature, which might explain the beneficial psychological and physical health effects of natural environments. However, Joye & Van den Berg (Joye & van den Berg, 2011) doubt if our evolutionary history accounts for people's connectedness to nature. Nevertheless, they argue that the SRT is still highly relevant nowadays (Joye & van den Berg, 2011).

As third and last type of beneficial health effects of natural environments, Velarde *et al.* distinguish long-term behavioral change and an overall improvement in well-being (Velarde *et al.*, 2007). Kaplan (Kaplan, 1993) studied the role of nature in workplaces, like the view out of workers windows and the presence of green spaces to spend breaks in. Results suggest that the visibility of nature through the window affects one's life satisfaction positively. The availability of nature in the view also leads to less frustration, more patience, higher enthusiasm as well as an overall increase in health (Kaplan, 1993). Maas *et al.* (Maas *et al.*, 2006) confirm the findings of Kaplan (Kaplan, 1993), by revealing that the percent of green space in a person's living environment is positively related with someone's perceived general health. Moreover, people who have more green space available in a radius of 3 km around the house are said to be better able to cope with stressful life events (Van den Berg *et al.*, 2010). Less health complaints and a better perceived general health are also suggested to be the result of the presence of more green space in one's living environment (Van den Berg *et al.*, 2010).

It has become clear that literature suggests people are attached to nature. Aesthetic values, evolutionary reasons and positive health effects all seem to account for this. The essential resources for human living are provided by the natural environment. People seem to have good arguments to put effort in nature conservation. Social sciences play a role in this as well, because nature conservations needs support to be put in practice. Conservation is more likely to be successful when backed by personal intentions and public support (Rosalino & Rosalino, 2012).

2.4: Intentions

Intentions to conserve nature is one of the highly relevant concepts in this study. Intentions are seen as indicators of how hard people are trying to actually perform behavior (Ajzen, 1991). For a wider theoretic understanding of intentions it is useful to gain some knowledge about theories that emphasize on intentions. By this a better understanding of the determinants and consequences of intentions is gained. All human behavior is said to be preceded by intentions (Ajzen, 1991). Human behavior forms a domain of research on its own, because of its highly complex nature and broad range of perspectives that can be used. Studying the theorization of behavior is not the aim; this paragraph's purpose is to gain more insight in intentions. Therefore only one perspective on behavior and intentions is explained.

Intentions are explained from the *Theory of Planned Behavior* (TPB) (Ajzen, 1991) and the *Model of Goal-directed Behavior* (MGB) (Perugini & Bagozzi, 2001), which is an extension of the first theory. The TPB is chosen because it is well-established and has already showed to be successful in the domain of ecological behavior (Carrus *et al.*, 2008). What makes the MGB that interesting to describe in this study, is that it also incorporates emotions.

A logical relationship that the Theory of Planned Behavior assumes, is that the stronger one's intentions are, the more likely that person is to really show the behavior. So according to the TPB, intentions are the core of how we act. Of course, intentions do not come out of nowhere, but are assumed to be the result of 3 determinants. The relationships between all concepts of the model, are graphically represented in figure 1.

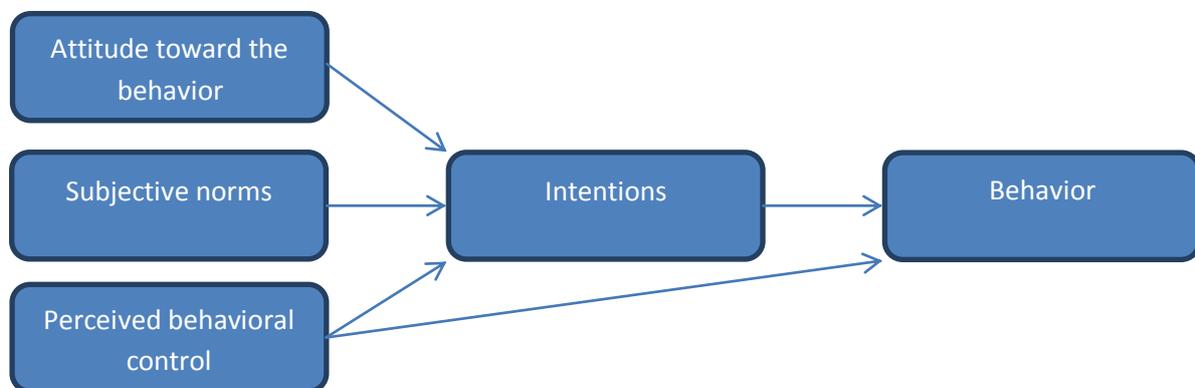


Figure 1: The Theory of Planned Behavior

As can be seen from the figure, *perceived behavioral control* is also deemed to directly influence behavior. This perceived behavioral control can be described as one's confidence in the ability to actually perform the behavior. Herewith, people's ability is formed by factors like time, money, consequences of behavior and other opportunities available. Perceived behavioral control also influences people's intentions, together with the determinants *subjective norms* and *attitude toward the behavior* (Ajzen, 1991). Subjective norms deal with the perceived social pressure, about performing or not performing a certain behavior. Last determinant influencing one's intentions is attitude, which means if the possible behavior is evaluated as favorable or unfavorable by the person

himself. Altogether, Ajzen (Ajzen, 1991) states that when someone faces no problems of control, behavior can be predicted from intentions with considerable accuracy.

The Model of Goal-directed Behavior (MGB) was developed as an extension of the TPB (Perugini & Bagozzi, 2001). Newly included in this model are the concepts *anticipated emotions*, *desires* and *past behavior*. Since the relationship between emotions and intentions to conserve nature has been researched only scarcely, this model is an interesting one to have a closer look at (Carrus *et al.*, 2008). A graphical representation of the MGB can be found in figure 2.

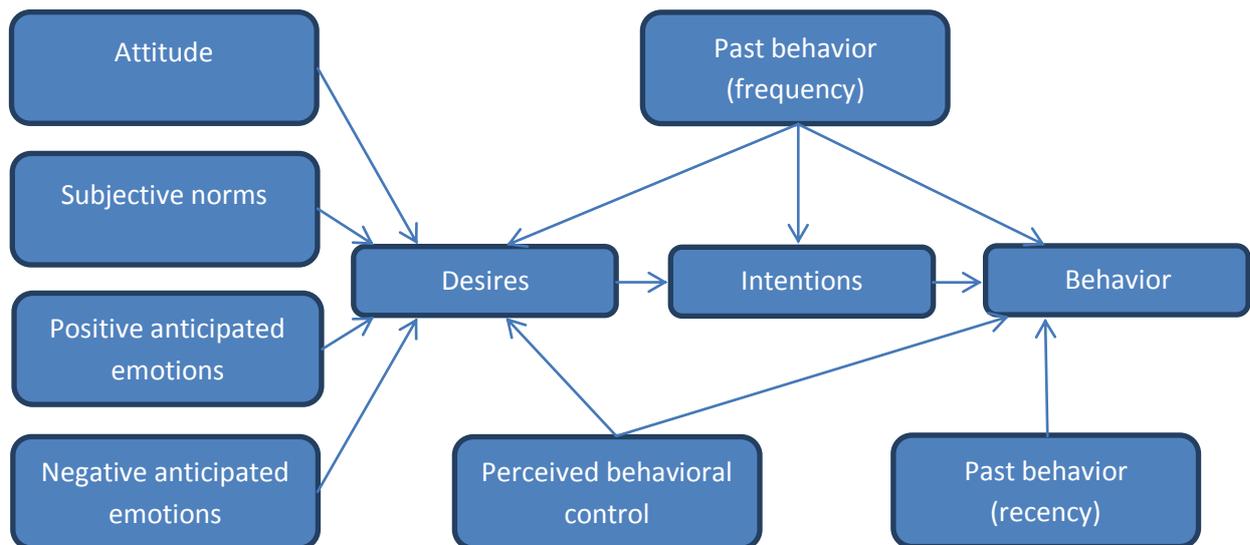


Figure 2: The Model of Goal-directed Behavior

Intentions still form the key concept of the model, but are preceded by desires. A desire can be described as a motivational state of mind, whereby someone translates different sources of appraisal (e.g. emotional, social and evaluative) into a motivation to act (Perugini & Bagozzi, 2001). An intention to act is the logical follow up of a desire. The difference between desires and intentions is that desires are less feasible and less linked to a final outcome as intentions (Carrus *et al.*, 2008). Furthermore, the inclusion of anticipated emotions as a determinant of desires, and thus indirect as a determinant of intentions, is new in the MGB. Last addition to this model is past behavior, which reflects automatic aspects and habits from past behavior that could influence future behavior (Perugini & Bagozzi, 2001).

Both the Theory of Planned Behavior and the Model of Goal-Directed Behavior suggest intentions are the antecedents of all human behavior. Behavioral changes can thus be best measured by the strength of someone's intentions to perform a new behavior. When trying to impact people's intentions, the determinants should be bored in mind. The concept *intentions to conserve nature* can thus be very well used to predict people's pro-conservation behavior. The TPB as well as the MGB state that when there are no problems of control, behavior can even be predicted with considerable accuracy.

2.5: Emotions

The core of this study is formed by examining the relationship between viewing pictures and people's intentions to conserve nature. Pictures are used to elicit the emotions people face at that certain moment. But what are emotions, actually? A complex factor in studying emotions, is how to define them. A lot of researchers have tried to capture the concept, resulting in a long list of definitions.

One universal thing upon which most emotion researchers agree, is that during emotional responses, the body acts (Bradley & Lang, 2006). Think about smiles, frowns and less visible reactions like an increased heartbeat. In general, emotion theorists distinguish four different aspects in emotional responses: 1) physiological responses (e.g. increased heart beat), 2) patterns of neural activity (e.g. increased activity in certain brain regions), 3) behavioral reactions (e.g. smiling) and 4) subjective experiences (e.g. feeling afraid) (Jacobs, 2012). Often, emotions are confused with feelings. These two concepts are related, but they are not the same. Feelings are mental experiences, that could be caused by emotions. The word emotion comes from the Latin words *ex* and *movere*, which means to move outward. This is based on the fact that when emotions are intense, people express them, or in other words, the body acts outwards. The word motivation also comes from the same Latin words, since a motive is literally 'something that moves one' (Bradley & Lang, 2006).

A way to approach emotions is the so-called biphasic emotion theory (Bradley & Lang, 2006; Lang, 1990). This theory states that emotional reactions can be classified into two categories, namely *appetitive* and *defensive*. Appetitive reactions are those that move people towards something, it is about attraction towards food, shelter etc. Defensive reactions do exactly the opposite, they move people away from something, for example flee and avoidance reactions (Bradley & Lang, 2006). Another way to approach emotions is in terms of a set of discrete emotions. Different emotion researchers have made lists of 'basic emotions'. Contemporary lists of basic emotions often include surprise, enjoyment, disgust and anger (Bradley & Lang, 2006).

There are two main perspectives on the nature of emotions, covering most emotion theories. On the one hand, there is the discrete perspective, including all theories that deal with specific emotional states. According to the perspective, either you experience an emotion (i.e. surprise) or you don't experience it at all. Mostly, theories considering basic emotions tap into the discrete perspective. On the other hand, the dimensional perspective focuses on theories that deal with general dimensions. The appetitive-defensive spectrum is such a dimension (Bradley & Lang, 2006). Another general dimension often used in emotion research, is pleasant-unpleasant, resulting in the term valence. This so-called *hedonic valence* can be expressed on a continuous scale, which indicates how pleasurable someone finds an object (Bradley & Lang, 2007).

Bear in mind, that valence and pleasantness are used to denote the same scale and therefore get mixed up sometimes (Barrett, 1998; Russell, 2003). It ranges from a very negative end (i.e. very unpleasant) towards a positive end (i.e. very pleasant). The usefulness from the scale comes from its simplicity and universality. Barret (Barrett, 1998) suggests that valence ratings can be used across cultures and for research with children. A famous representation of the scale is the self-assessment manikin (SAM) (Bradley & Lang, 1994). SAM is a figure with pictures, varying from a very unhappy looking figure at one end, towards a very happy looking figure at the other end. Research subjects

can easily put a cross somewhere along the line with figures, according to their emotional response. It is a so-called self-report measure, which is used to measure subjective experiences (Jacobs, 2012). Valence is a subjective experience (of pleasantness) and such information is only accessible by research subjects themselves. This fact highlights the importance of research methods like the SAM.

Another well-known dimension of emotions is *arousal*. Most researchers agree upon the fact that emotional affect has at least two dimensions; valence and arousal (Barrett, 1998; Bradley & Lang, 2007; Russell, 2003). The arousal scale is used to indicate a range from very deactivated towards very activated (Barrett, 1998). It is about the energy someone experiences. According to Russell (Russell, 2003), a combination of valence and arousal forms the base of everyone's emotions. He calls this combination *core affect*. Also Bradley & Lang (Bradley & Lang, 2007) suggest that valence and arousal together explain best the emotional state of people. In their research, they developed the concept of *affective space*. This is a graphical representation of both valence and arousal and is basically the same as Russell's core affect. Advantage of the affective space is, that the relationship between arousal and valence is easy to check. Two facts are well-established in this relationship. The more unpleasant or pleasant an emotional event is, the more arousing it is. Secondly, emotional events that are evaluated as neutral, also tend to be neutral in arousal (Bradley & Lang, 2007). Although this relationship, it is suggested that valence itself plays the most fundamental role in emotions (Bradley & Lang, 2007). Keeping the relationship with arousal in mind, valence will be the leading concept in this study's perspective on emotions.

2.6: The affective priming paradigm

Affective priming is a mechanism that can be detected in people in general. People in a good mood are more likely to be positive in subsequent tasks (Klauer, 1997). A good mood could come from anything, like watching a movie, visiting friends or practicing sports. Anything that evokes pleasurable emotions can work as a trigger for a good mood. When pleasant emotions cause people to react or behave different in succeeding tasks, it is said there was a *priming effect* (Bargh *et al.*, 1996). Presumably viewing *affective pictures* might influence people's intentions to conserve nature via this priming mechanism. The term affective pictures is used when pictures are used to elicit emotional responses by the viewers (Bradley & Lang, 2007).

Affective priming involves so-called *primes* and *targets*. Primes are the 'things' used to evoke an emotional response, which can be anything in theory. Here we mostly refer to pictures as being primes, or sometimes to words. When pictures or words are used in a priming situation, they are often referred to as being *stimuli* (Klauer, 1997). Of course, this naming comes from the purpose of primes, to *stimulate* an emotional response by the people who view the so-called stimuli. The targets are formed by the 'things', on which the research aims to draw conclusions. So affective priming is basically about the evaluative response towards something that is used as a prime. Whether or not this evaluation affects the processing of a following stimulus is regarded as the possible priming effect (Klauer, 1997). Priming deals with a spontaneous effect that happens rather involuntarily and automatically activates knowledge structures (Bargh *et al.*, 1996).

The affective priming paradigm is first developed by Fazio *et al.* (Fazio *et al.*, 1986) based on a study that used affective words as primes and as targets. In the early priming studies, targets were mostly

also words or pictures (Klauer, 1997). General aim of the study of Fazio *et al.* (Fazio *et al.*, 1986) was to discover if attitudes can be activated automatically from an individual's memory. It is argued that if one has a strong association (may it be positive or negative) with an object, the affect towards that object is activated automatically (Fazio *et al.*, 1986). The affective priming effect is in Fazio *et al.*'s (Fazio *et al.*, 1986) study defined as the facilitation process, that occurs when the presented prime and target have the same valence. Facilitation means that people react faster and in line with the valence of the prime, when the target is congruent.

The affective evaluations of pictures have found to represent those of the real objects (Bradley & Lang, 2007; Van den Berg & Koole, 2006). Emotional responses toward pictures have been expressed, for example, in Positive Affect and Negative Affect (Bernat *et al.*, 2006). The self-assessment manikin (SAM) can also be used to express emotions toward pictures. Next to the use of affective pictures, also studies with affective words have been undertaken (Fazio *et al.*, 1986). However, the use of affective pictures leads to stronger emotional responses than the use of affective words (Duley *et al.*, 2005). Since pictures are thus able to represent the real objects better, this study will make use of pictures to elicit emotions.

Frings & Wentura (Frings & Wentura, 2008) discovered that congruency is an important factor influencing the priming effect. They suggest that, when carrying out different evaluation tasks on a row, affective priming is stronger when using primes with the same valence after each other. This also means, that the priming effect is less strong when a next prime has a different valence. Note that the theory of Frings & Wentura (Frings & Wentura, 2008) only concerns valence height and not the specific content (of a word or picture). That is why in this study, a research question will focus on the differences in picture content, while valence remains the same. Bernat *et al.* (Bernat *et al.*, 2006) state that specific categories of scenes displayed in the pictures may be more able to activate emotional systems than other categories of scenes.

The affective priming paradigm will be an important concept in the rest of this study. Affective priming colors opinions and has already been used to show racial stereotypes and social biases (Klauer, 1997). Relative new is the fact priming is also used to inspect influences on behavior (Bargh *et al.*, 1996; Wheeler & DeMarree, 2009). Since intentions form the antecedents of behavior, this study also aims at showing a priming effect on behavior. It is assumed that priming people with affective pictures alters people's intentions to conserve nature.

2.7: Final problem statement

Although all concepts and theories are treated and discussed on their own, this does not mean that the concepts and theories are not related with each other. Intentions are explained from the *Model of Goal-directed Behavior* (MGB), which is an extension of *the Theory of Planned Behavior* (TPB). In the MGB, *emotions* form an indirect determinant of behavior, by mediating the desires and therefore the intentions to perform a certain behavior. The experimental part of this study will try to impact emotions, by letting people view different sorts of *pictures* (e.g. neutral and positive). This will be guided from the *affective priming paradigm*. The relationship between viewing pictures and intentions to conserve nature will be examined. People claim to be attached to nature which results

in a wide-spread *nature-friendliness*, which has been explained here from the *biophilia hypothesis*, the *positive health effects* and *aesthetic reasons*.

Since the theoretical framework has given us a deeper understanding of the theories and concepts under study, we can sharpen the problem statement now. The affective priming paradigm predicts that viewing pleasurable pictures, will bring people in a positive mood and that people will thus be more positive in subsequent tasks (Klauer, 1997). Therefore, there is reason to assume a priming effect on people's intentions to conserve nature. We are especially interested in the priming effect of pictures of natural scenes. The problem statement is adjusted with this new knowledge, resulting in: *Do specific affective stimuli have a priming effect on people's intentions to conserve nature?*

Conceptual model

The conceptual model is a graphical representation of the problem statement. Affective pictures will be used to elicit emotional responses in people. These emotions are suggested to prime people. Result will be that people react different to a subsequent stimulus; i.e. intentions to conserve nature are suggested to be stronger because of the affective pictures. Whether the drawn relationship is true or not, will be examined during the empirical part of this study. A division will be made between affective pictures and affective pictures with a specific content.

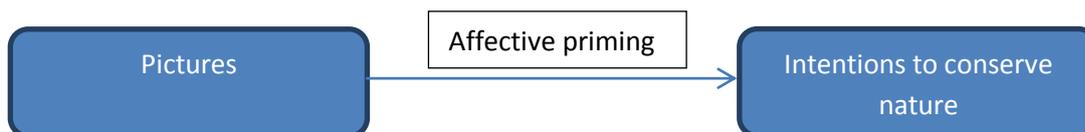


Figure 3: Conceptual model

Research questions

- Is there a priming effect of viewing affective stimuli on people's intentions to conserve nature?
- Do specific, nature related, affective pictures have a stronger priming effect on people's intentions to conserve nature than non-specific affective stimuli?

Hypotheses

- Viewing affective stimuli has a priming effect on people's intentions to conserve nature.
- Viewing specific, nature related, affective pictures has a stronger priming effect than viewing non-specific affective pictures.

The exact methods that are applied to examine whether the hypotheses are true or not are described in the next chapter. Results concerning the hypotheses are presented in the 4th chapter.

Chapter 3: Methods

3.1: Preface

In this chapter, the applied methods for data gathering are presented. The type of research is explained (3.2), as well as the construction of the independent variable (3.3) and the dependent variable (3.4). Further, the development of the experiment as a whole is described (3.5) and the implementation (3.6). Problems encountered in doing the research are discussed (3.7). Subsequently the processing of the gathered data is explained (3.8). Last paragraph deals with the employed strategy for the data analysis (3.9)

3.2: The experiment

To test whether the hypotheses are true, it is needed to examine a causal relationship. Because of the causal relationship, an experiment is the most appropriate way of addressing the hypotheses. Qualitative data methods, like interviews, are not suitable to gather causal data. An experiment involves an independent variable, that can be manipulated by the researcher, and a dependent variable, which concerns the phenomenon under study. Here, the dependent variable is *people's intentions to conserve nature*. This study aims to show a priming effect on those intentions, by varying the pictures a subject sees. Thus, the independent variable is formed by the pictures that are used as stimuli. Participants in the experiment get to watch pictures where after their intentions to conserve nature are measured.

Pictures with different content, evoke different emotions (Bernat, et al., 2006). Although we are especially interested in pictures of natural scenes, it is necessary to conduct this experiment with different kinds of pictures. Without different sorts of pictures, results would not be comparable and would thus not be useful to draw conclusions upon. It is realistic to assume that other sorts of pictures are also able to generate positive emotions. This is taken into account, by using pictures with differences in pleasurable content. In this way, it is possible to detect content related influences. In the table down here you can see which different conditions are set up in the experiment. The numbers 1-6 represent the combination of valence height and picture content. During the rest of this report, the numbers are used to indicate which condition is meant.

Table 1: Experimental conditions

	High Valence (HV)	Neutral Valence (LV)	Low Valence (LV)
Nature related	1	2	3
Non-nature related	4	5	6

3.3: Independent variable

Since a database of affective pictures already exists, this study makes use of that database. Bradley & Lang (Bradley & Lang, 2007) concluded that researchers needed standards to get a better understanding of the mechanisms that regulate our emotions. Therefore they started the challenge of collecting pictures that depict all sorts of things from human daily life. The pictures are used as affective stimuli, by letting people rate them in experimental settings. This system of pictures is called the International Affective Picture System and is being improved every day (Bradley & Lang,

2007). Since this database is especially designed for stimulating further research, the pictures are available with valence, arousal and dominance ratings and the corresponding standard deviations. Those available ratings of the pictures are secondary data, upon which new research is conducted. The experiment gathers primary, quantitative data.

Each experimental condition contains 10 pictures. Frings and Wentura (Frings & Wentura, 2008) state that priming effects are stronger, the more congruent primes a person sees after each other. This is the reason that a number of 10 pictures is chosen here. Since the IAPS database contains around 1200 pictures, sound selection criteria are needed for the pictures in the experimental conditions. The valence ratings in the IAPS database are given on a scale from 1 to 9, based on the use of the self-assessment manikin (SAM). In the figure down here, you can see the SAM scale used in the IAPS studies and used in this experiment. The left end represents a very pleasant state, which is denoted by number 9, whereas the right end represents a very unpleasant state, denoted by the number 1. All grey circles in between denote the intermediary numbers.

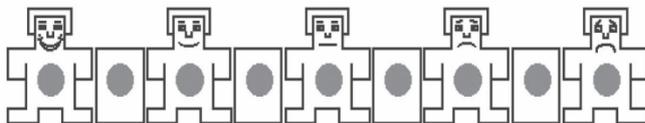


Figure 4: SAM valence scale

To ascribe numbers to the 3 valence categories mentioned in table 1, a start is made from the neutral condition. An average valence of 5 is exactly in the middle of the scale. All numbers above 5 represent a strength of pleasantness and all numbers lower than 5 a strength of unpleasantness. For the high valence conditions, an average of 7 is chosen and for the low conditions an average of 3. Since most pictures do not have an absolute number, a margin of 0.2 higher and lower is taken into account. In this research, dominance is not taken into account, because Bradley & Lang and Russell (Bradley & Lang, 2007; Russell, 2003) deem that valence and arousal are the base of everyone’s emotions.

In the selection of the pictures, the standard deviation for valence is set to a maximum of 2. The reason for this is that this experiment needs pictures that resemble the average rate as best as possible. The higher a standard deviation, the more variation there is around the average rate. For the IAPS pictures, most standard deviations lie in between 1.5 and 2. Under the neutral and low valence conditions, there is no limit set on the arousal ratings. Under high valence, there is a rate set (maximum is 6, higher than 6 gives erotic pictures and some sports pictures). In table 2 you can see how many pictures of the total database remained after applying the mentioned selection criteria.

Table 2: Number of pictures per condition after selection

	High Valence 6.8-7.2	Neutral Valence 4.8-5.2	Low Valence 2.8-3.2
Nature related	20	8	6
Non-nature related	58	91	55

From table 2 it becomes clear that only few pictures remain in the conditions 2 and 3. To solve this, the average valence criteria are expanded to 4.5-5.5 and 2.5-3.5. Enough pictures remain to select 10 of them for the conditions 2 and 3 now. In table 3 you can see the new number of pictures.

Table 3: Number of pictures after expanded selection

	High Valence	Neutral Valence	Low Valence
Nature related	20	291 ¹	18 ²
Non-nature related	58	91	55

¹ Based on the expanded selection criteria 4.5-5.5

² Based on the expanded selection criteria 2.5-3.5

For each condition, 10 pictures are selected from the remaining ones after applying the criteria. This is done by starting from the average (so either 3, 5 or 7) and then selecting the ones the closest to the average. However, sometimes some pictures farther from the average valence rating are selected, because the content is otherwise more or less the same. This accounts especially for condition 2, in which a lot of pictures depicting mushrooms can be seen. To avoid having 5 pictures of a mushroom, some pictures farther away from valence 5 are selected. An overview of the pictures used in the experiment can be found in appendix 1. It is not allowed to show the actual IAPS pictures in this report. Publication would decrease the usefulness of the pictures for research, since there exists a chance that future participants are already familiar with the pictures then.

3.4: Dependent variable

As has become clear from paragraph 2.4, intentions are the antecedents of all human behavior. In 2.4 it is said that human behavior is a complex field of study and that a broad range of perspectives on behavior exists. Of course, this also accounts for intentions. There does not exist a one and only way to measure someone's intentions. You could simply ask someone "how high are your intentions to conserve nature?" on a scale ranging from 1 to 9. However, the reliability and validity of a question like this is low. For a person, it is easy to give a socially desirable answer. Further, it also disputable if you really measure someone's intentions. With a simple question like that, you cannot be sure if someone really answers according to his intentions, or just indicates that he likes nature to be conserved.

It must be clear, that intentions need to be measured in a more justified way. Of course, academic researchers have developed several methods to capture people's intentions. One method is the General Ecological Behavior scale (GEB), developed by Kaiser *et al.* (Kaiser *et al.*, 1999). This scales suggests that responsibility feelings, environmental knowledge and environmental values are the 3 determinates of Ecological Behavior Intentions. Kaiser *et al.* (Kaiser *et al.*, 1999) argue that these Ecological Behavior Intentions are good predictors of GEB. Further research on this GEB scale has been conducted by Kaiser & Wilson (Kaiser & Wilson, 2000), which stated that the scale is an unidimensional, reliable, valid and cross-culturally applicable measure. However, since the GEB scale consists over 50 items, it is too large to use in this priming experiment.

Kaiser & Wilson (Kaiser & Wilson, 2004) extended the research on the GEB scale and suggested that the measurement of Ecological Behavior Intentions can be either done in a general or in a specific

way. Using the specific way, a researcher distinguishes a few behaviors and corresponding items to measure the specific behavior (for example, the reduction of waste). In this way, you develop a scale like the GEB (Kaiser & Wilson, 2004). If research aims to capture Ecological Behavioral Intentions in a more general way, intentions must not be formulated in specific behaviors, but in more general statements. Moreover, Kaiser & Wilson (Kaiser & Wilson, 2004) state that it is important to never try to capture intentions by measuring only one single act.

Kafyri *et al.* (Kafyri *et al.*, 2012) measured pro-environmental intentions of visitors on islands that belong to a Natura 2000 site. In their research, intentions were divided into 3 main elements, namely willingness to receive information, willingness to accept pro-environmental limitations on recreational activities and willingness to pay an extra environmental conservation tax (Kafyri *et al.*, 2012). Among others, Davis *et al.* (Davis *et al.*, 2011) paid attention to the concept of willingness to sacrifice for the environment. This willingness is conceptualized in 5 statements, for example “I am willing to give things up that I like doing if they harm the natural environment”. Willingness to sacrifice for the environment is used by Davis *et al.* (Davis *et al.*, 2011) to predict people’s pro-environmental behavior.

Based on the literature about the measurement of intentions, the dependent variable intentions to conserve nature is constructed. Since the aim of this study is to examine if viewing pictures has an effect on people’s intentions to conserve nature, the measurement instrument for intentions must not be too long. If the measurement instrument is too long, the possible priming effect of the pictures will disappear (Bradley & Lang, 2007). Therefore, a format like the GEB scale is not an option here. The more general measurement methods, like those used by Kafyri *et al.* (Kafyri *et al.*, 2012) and Davis *et al.* (Davis *et al.*, 2011) are more appropriate. Based on the discussed research in this paragraph, intentions to conserve nature are conceptualized by 3 main items in this study. These items are 1) limitation on recreational activities, 2) paying extra for nature and 3) the respect for the intrinsic value of nature (also based on paragraph 2.2). Each main item is formulated in 2 different ways, both positive as well as negative. So, all together, intentions to conserve nature are in the experiment measured by 6 statements. For the exact statements, see table 4.

Table 4: Statements about nature conservation

Number	Statement
Statement 1	I am willing to accept limitations on recreational activities for the conservation of nature areas
Statement 2	Paying an entrance fee for national parks is a good way of raising money to protect nature areas
Statement 3	I am NOT willing to give up things that I like doing although they harm the natural environment
Statement 4	I think humans are obliged to protect earth’s nature
Statement 5	People should have the right to visit all nature for free
Statement 6	The natural environment is made to fulfill the needs of people

Answers to the statements could be given on a 7-point Likert scale. Matell & Jacoby (Matell & Jacoby, 1972) discuss in their study if there is an optimal number of answer options for a Likert scale. Conclusion of their study is that 3- and 5-point scales result in relative more neutral answers. From 7-

to 19-point answer options, the neutral answer option is used less often (Matell & Jacoby, 1972). To reduce the number of answer options, but to keep the number of neutral answers as low as possible, I have chosen for 7 answer options for the intentions to conserve nature variable. The options ranged from strongly disagree (quantified by -3) to strongly agree (quantified by 3).

3.5: Development of the experiment

By now, we know how the independent and dependent variable in the experiment are constructed. Combining both variables in an academic experiment format is the next step. Since the independent variable consists of 6 separate groups of pictures, each experimental condition needs to be separated from the others. For each experimental condition, a PowerPoint Presentation and an answer form is created. The experiment is introduced as 'memory research', to keep the real purpose of the research hidden.

The pictures are put in a PowerPoint Presentation per condition. To distract research subjects from the real purpose of the study, the experiment starts with questions about the content of the picture. This is presented as 'Part 1'. A person sees each picture for 3 seconds, after which a question appears. This can be a question like "What kind of animals did you see?" or "Which event did you see on the picture?". On the answer form, a multiple choice answer possibility with 3 options is provided. The content questions and answers are kept very simple, so people get distracted, but do not need to worry if they have given the right answer or not. A research subject has 10 seconds to pick the right box in the multiple choice question, after which a next picture appears automatically. In this way, all 10 pictures from a condition come past.

In 'Part 2', research subjects are asked to indicate to what extent they agree to 6 statements about nature. Of course, this is the dependent variable and is constructed as described in 3.3. This 'Part 2' is the same in every research condition and people can use as much time as they prefer to answer to the statements. Subsequently, 'Part 3' follows, which involves the 10 pictures of each condition again. Each picture comes past for 3 seconds again, in the same order as before. After each picture, people are asked to rate the picture according to valence, in the SAM scale explained in 3.2. Subjects have 6 seconds time to put a cross in the SAM figure, after which a next picture appears automatically. The acquired valence ratings will be used for a comparison with the valence ratings available in the IAPS database. In 'Part 4', the last part, some basic socio-demographic questions are asked. Those questions are the same in all conditions and will be used to analyze the sample of participants.

3.6: Implementation

From paragraph 3.2, it becomes clear that there are 3 research groups (the groups that see the nature related pictures) and 3 control groups (the groups that see non-nature related pictures). It is not possible to make 2 groups of people, from which one group sees all pictures in the nature related conditions and the other group sees all pictures from non-nature related conditions. You can only measure intentions once per person. Thus, 6 groups of people are needed. There are 20 people in each experimental condition. This number of people per condition is chosen because it must not be too few (i.e. 5 per condition), but should also not be too large (i.e. 50), because that would not be

achievable given the time for a master thesis. So 20 persons per condition is a suitable number of participants.

The experiment took place in the FORUM building of Wageningen University. A closed room was used, with just white walls, 3 computers on a row (with 1,5 meter in between) and a large table in it. Students were recruited with little flyers, that were spread in the halls of all floors of FORUM. For an example of the flyer, see appendix 3. Participants could walk in whenever they wanted, with 1, 2 or 3 at a moment. When entering the room, I invited them to take a seat behind a computer and pick a number from a box. This box contained the numbers 1 to 6 and decided which condition of the experiment a student got to do. Having picked a number, I gave the corresponding answer form to the student and started the PowerPoint presentation. A little explanation about the procedure of all 4 parts was given and then it was up to the participants.

When someone finished the experiment, I always made sure I received the answer form personally. I asked if everything was clear and if the participant still had questions. A little chocolate snack was the reward for participation in the experiment. The research was spread out over 4 mornings and 7 afternoons. When one condition had met the requirement of 20 participants, I removed the concerning number from the box.

3.7: Problems

After designing the experiment, it also had to be implemented. First idea was to let all participants come by personally in a small room in GAIA. Everyone would be alone when doing the experiment. Therefore it would be ideal to reduce distraction as much as possible. I would personally also sit outside the room. I tried to recruit participants via teachers of the GEO chair group, via Wageningen students websites and by asking via via. However, I only managed to recruit around 15 people via those channels. This made me decide to change the plan and move the experiment to a room in the FORUM and recruit participants by spreading flyers all over the building. In the results, there are 15 participants who have therefore completed the experiment in a surrounding other than the remaining 105.

Furthermore, it was important that I did not know the participants personally. Reason for that was that if people from my personal network would have participated, the risk of giving socially desirable answers would have increased. Also, it could have been the case that I had talked to them about the content of my research. On the promotion flyer, I had put my name and study, which attracted some people I knew a bit. However, these people did not know anything about the content of my research and were only shallow friends.

For the generalizability of the gathered data, it is beneficial if the sample is representative for the population. However, Wageningen students were the easiest to reach. The whole sample consists of Wageningen students, which is a limitation of the generalizability. In 'Part 4', questions about socio-demographic characteristics were asked, which are used to analyze the sample. It is possible to replicate the experiment exactly. Pictures from the IAPS database are available for free for academic purposes (Bradley & Lang, 2007). Together with the 6 PowerPoint Presentations and the answer

forms, anyone can conduct the experiment. It would be interesting to execute the experiment with other samples and make a comparison of the results.

3.8: Data processing

After the collection of all 120 answer forms, the gathered information needed to be processed into meaningful data. SPSS version 19 was used to this end. All answer forms were numbered randomly from 1 to 120, so possible mistakes or deviating answers found in the data file could be looked up in the original answer form. A variable was inserted for the experimental conditions, with possible values 1-6 classified as a nominal variable, categorizing participants in one of the 6 groups.

The research questions are set up to examine differences in intentions to conserve nature between 1) affective and non-affective pictures (i.e. pleasurable and neutral) and 2) specific, nature related affective pictures and non-specific, affective pictures. To be able to answer these questions, more categorizing variables were needed. Therefore a variable accounting for the content differences was created, which either attributed a 1 or a 2 to a participant. A 1 indicates that the participant fulfilled a condition with nature related pictures (also condition 1,2 or 3; see table 1). When a 2 was attributed, the participant fulfilled a condition in which he viewed non-specific pictures (also condition 4,5 or 6; see table 1). This content variable enabled us to analyze the data depending on the content of the pictures.

Another variable was developed to categorize participants according to valence level. Since I opted for 3 different valence categories, as described in paragraph 3.2, this variable attributed a 1 (high valence), a 2 (neutral valence) or a 3 (low valence) to a participant. This valence variable provided the ability to make data analyzes based on the extent to which a picture is rated as affective. Moreover, the combination between the content and valence variable enabled us to analyze the data directly aimed at answering the research questions.

'Part 1' is not used at all in the data analysis, so this information remains on paper available only. The dependent variable in the experiment is constructed by the statements in 'Part 2'. As said in paragraph 3.3, answers to those statements are given on a Likert scale ranging from -3 to 3. Each statement was transcribed as a separate scale variable (in literature usually called interval variable (Field, 2005)). The corresponding numbers from the Likert scale are literally transcribed. Variable names range from statement 1 to statement 6.

In 'Part 3', the pictures that constitute the independent variable come past another time. To compare the results from this experiment with the IAPS studies available, participants are asked to rate the pictures in the valence SAM scale. To be able to answer the research questions, comparing the SAM scale with the international available data is not strictly necessary. However, comparing valence ratings gives an interesting insight in how the results relate to international data. This, in turn, also indicates how the used sample might differ from the international sample.

Paragraph 3.3 explains the SAM valence scale used. The answers given in the SAM figure are transcribed in the SPSS file by the numbers 1-9. Each picture from a condition was given a separate

variable, named picture 1 to picture 10. These 10 variables are again scale variables. To see which picture is exactly meant by, for example, picture 5 in condition 2, see appendix 1.

In 'Part 4', participants filled out some socio-demographic questions. First question concerns age, which was transcribed in SPSS as a nominal variable with an unrestricted answer option. From the original age variable, a categorizing and ordinal age variable was constructed. It uses the classes 0, 1, 2, 3 and 4, which respectively represent the ages 17/18/19, 20/21, 22/23, 24/25 and 26+. Next up is the question about sex, in which participants simply had to tick the box before male or female. This question was transcribed as a nominal variable and 0 represents male and 1 represents female.

Further, the nationality of the participants was also asked. From this question, a nominal nationality variable was constructed with an unrestricted answer option. To use nationality in the data analyses, a transformed variable with nationality categories was developed, which has the values 0 (Dutch) and 1 (from abroad). The following question in 'Part 4' concerned education, in which participants had to indicate whether they were *currently* doing an university bachelor, university master or something else. This question was transcribed as an ordinal variable, with the previous named answer options translated in 0, 1 and 2. Last socio-demographic question deals with the size of the town a participant grew up in. This question was processed as an ordinal variable with the value options 0, 1, 2, 3 and 4. Each number represents a certain category of inhabitants, which can be found in appendix 2.

To conclude this paragraph, an overview of the just mentioned variables is given. In table 5 you can also find the corresponding levels of measurement and the answer options.

Table 5: Overview of inserted variables

Variable name	Level of measurement	Answer options
Experimental condition	Nominal	1,2,3,4,5,6
Content	Nominal	1,2
Valence	Nominal	1,2,3
Statement 1	Scale	-3,-2,-1,0,1,2,3
Statement 2	Scale	-3,-2,-1,0,1,2,3
Statement 3	Scale	-3,-2,-1,0,1,2,3
Statement 4	Scale	-3,-2,-1,0,1,2,3
Statement 5	Scale	-3,-2,-1,0,1,2,3
Statement 6	Scale	-3,-2,-1,0,1,2,3
Picture 1	Scale	1,2,3,4,5,6,7,8,9
Picture 2	Scale	1,2,3,4,5,6,7,8,9
Picture 3	Scale	1,2,3,4,5,6,7,8,9
Picture 4	Scale	1,2,3,4,5,6,7,8,9
Picture 5	Scale	1,2,3,4,5,6,7,8,9
Picture 6	Scale	1,2,3,4,5,6,7,8,9
Picture 7	Scale	1,2,3,4,5,6,7,8,9
Picture 8	Scale	1,2,3,4,5,6,7,8,9
Picture 9	Scale	1,2,3,4,5,6,7,8,9
Picture 10	Scale	1,2,3,4,5,6,7,8,9
Age	Nominal	Unrestricted
Age class	Ordinal	0,1,2,3,4
Sex	Nominal	0,1
Nationality	Nominal	Unrestricted
Nationality group	Nominal	0,1
Education	Ordinal	0,1,2
Town size childhood	Ordinal	0,1,2,3,4

3.9: Strategy for data analysis

To generate meaningful results out of the acquainted data, statistical tests were needed. First of all a data exploration was employed to analyse the sample of students. Participant's valence ratings of the pictures were put in a reliability analysis (Cronbach's Alphas). A mean valence per participant was computed, which was used as input for several Independent Samples T-tests. Aim of these tests was to compare the IAPS valence ratings and the experiment valence ratings. ANOVAs were used to test if the experimental conditions can indeed be distinguished from each other by valence. Chosen post-hoc test is Tukey HSD.

For the answers to the statements the Cronbach's Alpha reliability analysis was also employed. Subsequently correlation coefficients (Paerson correlation) were computed for the statement themes. An intentions index was computed, which was put as dependent variable in an ANOVA for valence and intentions. 2 separated ANOVAs were carried out for only the nature as well as the non-nature conditions. Correlation coefficients (Paerson correlation) were computer for valence and intentions, again also separated for nature and non-nature content. Subsequently a T-test for content (nature and non-nature) and the intentions index was done.

Next up was the examination of the possible influences of valence and content together. An Univariate Analysis of Variances for valence and content and as dependent variable the intentions index was carried out. Then 6 separate Univariate Analysis of Variances were employed with the same independent variables, but with 1 of the 6 statements as the dependent variable each time. Significant results for content were further examined with a T-test and an ANOVA with a Games-Howell post-hoc test. Last part of the data analysis concentrated on the possible influences of the socio-demographic characteristics. The relationship between each socio-demographic issue and the intentions index was studied with several ANOVAs. Hochberg's GT2 post-hoc test was employed. Same strategy was carried out for analysing the possible influence on the statements on their own. Last analysis aimed at studying the influence of each socio-demographic variable on all 6 statements together, done by a MANOVA analysis.

Chapter 4: Results

4.1: Preface

In chapter 4, the results of the data analysis are presented. To this end the variables constructed in paragraph 3.8 are used. First of all, the used sample of participants is analysed (4.2) and the acquainted valence ratings are compared with the valence ratings from the IAPS database (4.3). Subsequently, the dependent variable intentions to conserve nature is analysed (4.4). Then the relationship between the 6 experimental conditions and intentions to conserve nature is examined (4.5). The influence of valence on intentions is studied (4.6), as well as the influence of content on intentions (4.7). Next paragraph takes the influence of valence and content together into account (4.8). Further, the combined influence of valence and content on the nature statements is discussed (4.9). Then the relationship between the socio-demographic characteristics of the sample and the intentions index is examined (4.10), as well as the nature statements on their own (4.11). Eventually a paragraph is attributed to determining whether or not the hypotheses are true (4.12).

4.2: Analysis of the sample

120 participants took part in the experiment, equally divided among the 6 conditions. 64 participants were male and 56 female. Mean age in the sample is 22.29 years ($sd \approx 4.18$), with the youngest being 17 and the oldest being 46. From these 120 people, 73 participants were bachelor students, 45 master students and 2 indicated they are currently doing another education. Mainly Dutch students took part in the experiment; 93 participants had the Dutch nationality, whereas 26 came from abroad and 1 person did not fill in his nationality. Considering the size of the town the participants grew up in, a slight majority grew up in either a very small village or a big city (together 61 participants). The other participants are divided among the subcategories of towns. Although the sample is clearly not representative for a population larger than students of Wageningen University, it should not necessarily be a problem. The aim is not to describe a certain trend or phenomenon in a population. Instead, the relationship between 2 variables is examined, based on affective priming. Affective priming is a mechanism that works in people, no matter if a participant is student or not.

4.3: Scale analysis of valence

Having carried out the experiment, we are now provided with loads of valence scores. Since the pictures were used to elicit emotions, the valence ratings are the quantified representation of emotions. Therefore, valence could be a suitable independent variable. Before deciding on this, some more insight in the valence scores is useful. A reliability analysis was carried out for the pictures in each experimental condition. See table 6 for the resulting Cronbach's Alphas.

Table 6: Cronbach's Alphas for valence ratings per condition

Experimental condition	Cronbach's Alpha
1: High Valence-Nature	0.777
2: Neutral Valence-Nature	0.735
3: Low Valence-Nature	0.750
4: High Valence-Non-Nature	0.384
5: Neutral Valence-Non-Nature	0.244
6: Low Valence-Non-Nature	0.462

Remarkable thing that immediately becomes clear from table 6, is the difference between the alphas for the conditions 1-3 and for the conditions 4-6. For the nature categories the Cronbach's Alphas are classified as acceptable, while for the non-nature categories the Cronbach's Alphas are classified as unacceptable (Field, 2005). Despite of the fact that the reliability of the non-nature pictures is bad, an average valence per participant is calculated. The experiment was not about providing a set of pictures that needed to be reliable all together, but about presenting a bunch of affect. So calculating a valence mean for all pictures per participant (thus a continuous variable) is still a good measure. See appendix 4 for the normality check of this valence variable.

To compare the sample of 120 participants with other international, mainly American, samples used, the valence ratings acquired in the experiment and the valence ratings available in the IAPS database (N≈1600) were compared. For this purpose, a mean valence per condition needed to be computed. In table 7 you can see the means for the IAPS data and the data from the current experiment. To compare the means per condition, Independent Samples T-tests were carried out. The results for the T-tests are also visible in table 7. Note that results are picked from the line where equal variances are not assumed, because Levene's tests are significant.

Table 7: Comparison valence means per condition for the experiment data and the IAPS data

Experimental condition	Mean valence IAPS database²	Mean valence current study²	Mean difference	Test statistic (t-value)	Significance (p-value)
1: High Valence-Nature	7.050	6.310	0.740	4.750	0.001
2: Neutral Valence-Nature	5.137	5.640	-0.503	-2.603	0.026
3: Low Valence-Nature	3.011	3.855	-0.844	-3.695	0.003
4: High Valence-Non-Nature ¹	7.027	6.280	0.747	3.495	0.003
5: Neutral Valence-Non-Nature	5.016	5.475	-0.459	-3.252	0.010
6: Low Valence-Non-Nature	3.033	3.605	-0.572	-3.563	0.006

¹ Levene's test for the equality of variances is not significant

² Coded on a scale from 1 (Low Valence) to 9 (High Valence)

From table 7 we can conclude that all tests are significant. In other words it comes down to the fact that there is reason to assume that our sample is drawn from another population than the samples

used for the IAPS database. This is not a surprise, because in 4.2 it is already stated that results from the experiment are not generalizable for populations other than Wageningen students. The t-tests presented in table 6 confirm this statement. Note that the differences between the valence levels are smaller in the current experiment, while they show the same pattern as the valence levels in the IAPS data.

In general, pictures were selected based on 3 general valence levels (high, neutral and low). If the experimental conditions can indeed be distinguished by valence, can be seen in table 8. One test was carried out for the nature conditions and valence. Another test was carried out for the non-nature conditions and valence.

Table 8: ANOVA for the experimental conditions and the continuous valence measure as dependent variable

Experimental condition	Degrees of freedom	Test statistic (F-value)	Significance (p-value)
Nature (1,2,3)	2/57	27.151	0.000
Non Nature (4,5,6)	2/57	84.006	0.000

As becomes clear, the conditions can indeed be distinguished from each other by valence. However, table 8 does not provide us with information if all nature conditions can be distinguished from each other. Also it does not provide us with information if all non-nature conditions can be distinguished from each other too. To get to know this, supplementary tests needed to be done. In table 9 you can see the subsequent comparisons of pairs of experimental conditions.

Table 9: Post-hoc tests (Tukey HSD) for nature conditions as well as non-nature conditions

Experimental condition	Experimental condition	Mean difference	Significance (p-value)
1: High Valence-Nature	2: Neutral Valence-Nature	0.670	0.135
1: High Valence-Nature	3: Low Valence-Nature	2.455	0.000
2: Neutral Valence-Nature	3: Low Valence-Nature	1.785	0.000
4: High Valence-Non-Nature	5: Neutral Valence-Non-Nature	0.805	0.001
4: High Valence-Non-Nature	6: Low Valence-Non-Nature	2.675	0.000
5: Neutral Valence-Non-Nature	6: Low Valence-Non-Nature	1.870	0.000

In table 9 we can see that almost all compared conditions can be distinguished from each other without problems. Only exception is the comparison between high- and neutral valence for nature. It seems that valence is not a significant differentiator for those 2 conditions. Nevertheless I decide that it is valid to take the valence scores of participants as independent variable. Reasoning behind this is that we have seen in table 6 that all our valence ratings differ from the IAPS ratings in all experimental conditions. We can conclude that the anticipated differences in valence are generally present. Bear in mind that only the difference between high- and neutral valence for nature is not proved to be true here.

4.4: Analysis of intentions to conserve nature

In the previous paragraph we have examined valence as independent variable. Now we move on to the dependent variable, which is intentions to conserve nature. 6 statements have been proposed to the participants, which were put in a reliability analysis. In table 10 you find the results of the analysis

Table 10: Item statistics for Cronbach's Alpha reliability analysis of the statements

Statements	Corrected item-total correlation	Cronbach's Alpha if item deleted
1: limitations on activities for conservation	0.312	0.300
2: entrance fee to raise money for protection	0.250	0.308
3: not give up activities that harm environment ¹	0.138	0.383
4: humans are obliged to protect nature	0.242	0.332
5: right to visit all nature for free ¹	0.318	0.258
6: natural environment is made for needs of people ¹	-0.019	0.510

¹ Item reverse coded prior to analysis

The general Cronbach's Alpha for the statements turned out to be 0.395, which is defined as unacceptable (Field, 2005). As you can tell from the column 'Cronbach's Alpha if item deleted', the Alpha is higher when the sixth statement would be left out. However, an Alpha of 0.510 is still classified as poor (Field, 2005). To make a general analysis possible of the relationship between valence and intentions, an intentions index was computed. The sixth statement is left out in the index, since it seems that it would only lower a participant's intentions. All other scores are summed up for each participant. See appendix 4 for the normality check of the intentions index. Since the intentions index is not very reliable, analyses between valence and picture content and dependent variable intentions to conserve nature will also be carried out per statement.

Table 11 provides us with some more detailed information about the statements. It does show another deviant characteristic for the theme where statement 6 belongs to. The original coding was used, so the pairs of statements should have a negative correlation.

Table 11: Correlation coefficients per statement theme

Statement themes	Number of items	Pearson Correlation	Significance (p-value)
1 Limitation on recreational activities	119	-0.267	0.003
2 Paying for nature	120	-0.323	0.000
3 Intrinsic value	120	0.031	0.737

As can be seen in table 11, the theme where the 6th statement belongs to has a very small positive correlation coefficient. Next to that, it is also not significant. For the other 2 themes, the expected direction appears and the effect size can be considered as medium (Field, 2005). Since the statements within a theme are not strongly correlated, I decided not to apply subsequent analyses on the themes as dependent variables. The relationship between valence and content and the themes is thus not a subject for further study. Analyses will be concentrated on the intentions index and the statements on their own.

4.5 Relationship between the experimental conditions and intentions to conserve nature

The 6 experimental conditions in this study present combinations of valence levels (high, neutral and low) and content (nature and non-nature) inherent in the pictures. ANOVA was used to test if the experimental groups differ in intentions to conserve nature (the overall intention index was used in this test). The test reveals that intentions to conserve nature do not differ across the experimental conditions ($F=1.136$, with $df=5, 113$ and $p=0.346$). This does not necessarily implicate that neither valence nor content has an influence separately. The next sections will address the separate influences of valence and content.

4.6: Influence of valence on intentions to conserve nature

This paragraph deals with the fact whether or not valence on its own has an influence on intentions to conserve nature. In other words this influence can also be described as the possible priming effect on intentions. ANOVA was used again to see if the intentions index differs per valence level. The tests are also carried out for only the nature conditions on the one hand and the non-nature conditions on the other hand. In table 12 you can see the results of the tests.

Table 12: ANOVA results for valence and intentions, separated for nature conditions and non-nature conditions

Dependent variable by independent variable	Degrees of freedom	Test statistic (F-value)	Significance (p-value)
Intentions index by valence	2/116	1.462	0.236
Intentions index by valence for nature	2/57	0.552	0.579
Intentions index by valence for non-nature	2/56	1.636	0.204

Intentions to conserve nature do not differ across the 3 valence levels. This accounts for only the nature conditions and only the non-nature conditions as well. To further examine the relationship between valence and the intentions index, correlation coefficients were computed. Again, separate analyses were carried out for nature conditions and non-nature conditions.

Table 13: Correlation coefficients for valence and intentions, separated for nature conditions and non-nature conditions

Variables	Number of items	Pearson Correlation	Significance (p-value)
Valence and intentions index	119	-0.013	0.892
Valence and intentions index for nature	60	-0.069	0.599
Valence and intentions index for non-nature	59	0.035	0.793

From table 13 it becomes clear that valence and the intentions index are not correlated. This result suggests again that valence has no influence on the height of a participant's intentions to conserve nature. Last way of testing if there really is no influence of valence, was computing the correlation coefficients between valence and the statements on their own. The results can be found in table 14.

Table 14: Correlation coefficients for valence and all intentions measures

Name	Number of items	Pearson Correlation	Significance (p -value)
Intentions index	119	-0.013	0.892
1: limitations on activities for conservation	119	-0.079	0.396
2: entrance fee to raise money for protection	120	0.028	0.764
3: not give up activities that harm environment ¹	120	0.102	0.270
4: humans are obliged to protect nature	120	-0.111	0.228
5: right to visit all nature for free ¹	120	-0.020	0.831
6: natural environment is made for needs of people ¹	120	-0.125	0.175

¹ Item reverse coded prior to analysis

So we can conclude that valence is also not correlated with the statements on their own. It does not matter in which way you address the intentions and to which groups (i.e. nature or non-nature) you limit your analysis. All analyses carried out in this paragraph lead up to one single conclusion: no priming effect of valence on participant's intentions to conserve nature was found.

4.7: Influence of content (nature versus non-nature) on intentions to conserve nature

In 4.5 it was stated that the overall intentions to conserve nature do not differ per experimental group. After having researched the influence of valence separately, it is now time to examine the possible influence of content. Two content groups are distinguished, which were put in an Independent Samples T-test. The results are presented in table 15.

Table 15: T-test for content (nature versus non-nature) and dependent variable intentions index

Variables	Mean nature	Mean non-nature	Mean difference	Test statistic (t-value)	Significance (p -value) ¹
Intentions index by content	5.9500	5.1525	0.79746	1.072	0.286

¹ Equal variances assumed

It was hypothesized that specific, nature related, pictures have a stronger priming effect on intentions than non-specific pictures. Table 15 reveals us that whether a participant has seen nature or non-nature pictures does not influence the intentions index at all. Therefore nature related pictures do not have a stronger priming effect on intentions to conserve nature than do other, non-nature related, pictures.

4.8: Influence of valence and content on intentions to conserve nature

In the previous sections, the influence of either valence or content on intentions to conserve nature was examined. The tests that were carried out do not allow to inspect the interaction effect between the two independent variables. An Univariate Analysis of Variance was employed to determine the influence of valence and content in a single test that allows to determine the interaction effect as well. Valence with three levels (high, neutral and low) and content with two categories (nature and non-nature) were included, and the interaction between valence and content. In table 16 you find the results of this test.

Table 16: Univariate Analysis of Variances for the intentions index by valence and content

Independent variables	Degrees of freedom	Test statistic (F-value)	Significance (p-value)
Valence	2	1.477	0.233
Content	1	1.200	0.276
Interaction valence and content	2	0.797	0.453

Valence, content and the interaction between both did not have a significant effect on intentions. So the sum of a participant's intentions to conserve nature is not dependent upon picture content or pleasantness, or by the interaction between both. This is in line with the findings in the previous paragraphs.

4.9: Influence of valence and content on the nature statements

Now we know that the general intentions index is not impacted by picture content and/or valence level, it might be useful to have a closer look on the results on the statements on their own. This was done by carrying out 6 separate Univariate Analyses of Variances. Valence and content were included in the same way as in the previous paragraph, whereas the dependent variable is one of the 6 statements per test. Results reveal that the statements are not influenced by valence height, content or the interaction effect between both. However, there is one exception. The 3rd statement (originally: "I am not willing to give up things that I like doing although they harm the natural environment") turns out to be influenced by picture content. See table 17 for the exact results of the corresponding Univariate Analysis of Variances.

Table 17: Univariate Analysis of Variances for statement 3 by valence and content

Independent variables	Degrees of freedom	Test statistic (F-value)	Significance (p-value)
Valence	2	0.634	0.532
Content	1	4.497	0.036
Interaction valence and content	2	0.891	0.413

Exclusively content seems to have an effect on the 3rd statement. To examine this effect in more detail, an Independent Samples T-test was carried out. In table 18 the results of this test are presented.

Table 18: T-test for content (nature versus non-nature) and statement 3 as dependent variable

Variables	Mean nature	Mean non-nature	Mean difference	Test statistic (t-value)	Significance (p-value)²
3: not give up activities that harm environment ¹ by content	1.07	0.50	0.567	2.129	0.035

¹ Item reverse coded prior to analysis

² Equal variances not assumed

As can be concluded from table 18, participants who viewed nature pictures score higher on the 3rd statement than participants who viewed non-nature pictures. In other words, participants who viewed nature related pictures are more willing to give up activities that harm the natural environment than participants who viewed non-nature related pictures.

Having discovered the just mentioned effect of picture content, it is interesting to see if it also can be found when comparing nature and non-nature pictures within one valence level. To do this, post-hoc tests needed to be carried out. Before doing this, an ANOVA was done with the 3rd statement as dependent variable and the experimental conditions as factor. Results reveal that the different experimental conditions do not lead to significant different scores on the 3rd statement ($F=1.509$, with $df=5$ and $p=0.192$). Looking to the post-hoc tests, it is not surprising that comparing nature and non-nature pictures within one valence level does not lead to significant results. Used post-hoc test is the Games-Howell test, because this test is most suitable when the equality of variances among groups is doubtful (Field, 2005).

The results of the ANOVA and corresponding post hoc tests gives us the following insight: the content of the pictures a participant has seen only leads up to different results when comparing all nature conditions together against all non-nature conditions. So looking within one valence level, either looking at nature related pictures or non-nature pictures does not result in different scores. The previously detected relationship between nature and scores on the 3rd statement is caused by a combination of all nature pictures compared to all non-nature pictures.

4.10: Relationship between socio-demographic characteristics and the intentions index

Until now, the results section has only focused on the influences of picture characteristics and intentions. During the closing part of the experiment, some socio-demographic questions were asked. Although the socio-demographic characteristics are not the main issue of study, it is worth examining if they might have caused differences in participant's intentions to conserve nature. In this way, you might be able to detect relationships that otherwise remain unknown or unexplainable.

Several ANOVAs were used to study the influence of each socio-demographic issue on the intentions index. Results reveal that almost no variable leads up to significant different results on the intentions index, with participant's town size during childhood as an exception. The size of a town a participant grew up in seems to have an influence on intentions to conserve nature ($F=2.994$ with $df=4$ and $p=0.022$). Although we discovered a significant result, it does not tell which category of town size does exactly differ from which other category of town size. 5 different categories of town sizes were distinguished and to see which categories exactly differ, post-hoc tests were carried out (Hochberg's GT2, because of the very different group sizes (Field, 2005)).

The post-hoc tests reveal that only the category with more than 100.000 inhabitants compared to the category with 5000 to 15000 is significant ($p=0.010$). This means that participants that belong to one of these categories have indeed different scores on the intentions index. Participants that belong to one of the other categories of town sizes, do not have different scores on the intentions index compared to each other. Note that participants from the 100.000 inhabitants category have a mean

score of 7.03 and participants that belong to the 5000-15000 inhabitants category have a mean score of 3.29.

4.11: Relationship between socio-demographic characteristics and the nature statements

It is still unclear if there exists a relationship between the 6 statements on their own and the socio-demographic characteristics. To have a closer look at this, several ANOVAs were carried out. Combining the socio-demographic variables and the statements, reveals only one result. The sex of a participant seems to lead up to significant different results on the 6th statement (F=5.261 with df=1 and p=0.024). To examine this influence of sex in more detail, an Independent Samples T-test was carried out. Results of this test can be found in table 19.

Table 19: T-test for sex (males versus females) and statement 6 as dependent variable

Variables	Mean males	Mean females	Mean difference	Test statistic (t-value)	Significance (p-value) ²
6: natural environment is made for needs of people ¹ by sex	-0.11	0.64	-0.752	-2.294	0.024

¹ Statement 6 reverse coded prior to analysis

² Equal variances assumed

Table 19 provides us with the mean score for males and females on the 6th statement (originally: The natural environment is made to fulfil the needs of people”). By now we can conclude that females score significant higher on the statement than males. In other words, females agree stronger upon the statement that the natural environment is not made to fulfil the needs of people than males.

For the other socio-demographic characteristics age, nationality, education and town size during childhood, there is no relationship found with any statement that is significant on the $\alpha \leq 0.05$ level. What has been left out of consideration for the statements, are some MANOVA analyses. Before finishing this paragraph about socio-demographic issues and intentions, 5 MANOVAs were carried out with one of the socio-demographic variables each time and all the statements.

Remarkable thing to note is, that for the variable sex all 4 MANOVA test statistics have exactly the same value and are significant (F=2.589 with hypothesis df=6, error df=112 and p=0.022). This result suggests that the combination of all 6 statements is influenced by the sex of a participant. Since the test statistics have exactly the same value, there must be one underlying variate, according to Field (Field, 2005). As a follow-up of a MANOVA, carrying out ANOVAs on the separated dependent variables is most common. That was already done in this paragraph and remember that only sex and the 6th statement were related. Although slight differences can be found, all tests yield the same conclusion.

The other tests do not reveal interesting significant results. Age and town size during childhood do result in one significant test statistic (Roy’s Largest Root: respectively F=2.782 with df=6/111 and p=0.015 and F=2.344 with df=6/112 and p=0.036). Looking to the other output in the concerning tests, no significant results for more detailed relationships can be found. Age and town size during

childhood are therefore not further considered. For nationality and education no results were found at all.

Considering the relationships between the socio-demographic characteristics of the sample and the statements, we have discovered that only statement 6 is influenced. Females tend to score higher on the 6th statement. In practice, this means that females tend to agree stronger than males that the natural environment is not made to fulfil the needs of people.

4.12: Conclusion

The results suggest there is no priming effect of viewing affective pictures on people's intentions to conserve nature. Next to that, nature related pictures do not have a stronger priming effect on intentions to conserve nature than do other, non-nature related, pictures. Consequently, both hypotheses are rejected. The results will be discussed more elaborately in the next chapter.

Chapter 5: Discussion

5.1: Preface

The 5th chapter discusses the used methods and acquainted results. First of all, insight is given in the currently ongoing debate in the research field of priming (5.2). Subsequently the possible priming flaws in the experiment are discussed (5.3). Next paragraph elaborates on the differences in the rating of pictures between the IAPS studies compared to this experiment (5.4). The following paragraph deals with the validity of the measurement of intentions to conserve nature (5.5). Lastly, the possible limitations of the sample because of the socio-demographic features are explained (5.6).

5.2: Priming debate

In the theoretical framework (2.6 and 2.7) it has been made clear that this study would be carried out from the perspective of the affective priming paradigm. Currently, the priming domain is entangled in a heavy debate about the relevance of priming. Whereas early priming studies mainly concerned the automatic activation of attitudes (Fazio *et al.*, 1986; Klauer, 1997), Bargh *et al.* (Bargh *et al.*, 1996) changed the field by researching the effect of priming on behavior. Since then, more and more studies have been carried out to detect influences of priming on people's behavior (Cameron *et al.*, 2012; Cesario *et al.*, 2006; Wheeler & DeMarree, 2009).

However, the priming domain has to suffer from fraud cases and 'old studies' that were put in replication attempts and did not show the suggested effects (Bartlett, 2012). A meanwhile famous fraud case is that of Diederik Stapel, a Dutch researcher in priming, that made up data for his experiments and got caught in November 2011 (Yong, 2012). Since then the debate among priming researchers about their field of study has got heavier and heavier. One states that effects on behavior that were previously ascribed to be the result of priming, do not exist when carefully replicating experiments. The found effects might then be due to situational circumstances and unnoticed cues (Bower, 2012). Others give an overview of all replications that were successful and that has been published, but did not gain that much attention as the ones that failed to replicate the results (Bargh, 2012). Take-home message of the debate seems to be that when replicating priming studies, researchers should act independently and make deliberate decisions on the methods they will use (Bartlett, 2012). If the used methods are not the same as in the original study, results should not be compared unthinkingly with the original results.

5.3: Priming in the current experiment

Here, the affective priming experiment concerns an original study. So the debate over the existence of results does only apply for this study. If the experiment will be replicated, a more in-depth debate about the differences in methods and results would be valuable. For the participants, the priming aim was kept secret, to strive for an unconscious priming effect. To do this, content related questions were asked after each picture that came past. Affective reactions on pictures are said to only be present during or shortly after viewing and disappearing thereafter (Bradley & Lang, 2007). It might thus have been the case, because of the content related questions, that the priming effect had already disappeared when measuring the participant's intentions to conserve nature.

There are plenty of methodical differences that can be found between this experiment and the IAPS studies carried out by Bradley & Lang (Bradley & Lang, 1994, 2006, 2007). Pictures were visible for only 3 seconds here, while in the IAPS studies pictures were visible for 6 seconds. However, after those 6 seconds, participants had to fill in SAM scales for valence, arousal and dominance. In this study's experiment the viewing time was thus only the half, but only the SAM valence scale needed to be filled in. Also in the part with the content questions, the viewing time was 3 seconds. In studies specifically aimed at priming the participants, viewing times are usually even shorter. Fazio *et al.* showed the primes for 200 ms (Fazio *et al.*, 1986), Frings & Wentura varied the viewing time between 63 ms and 188 ms (Frings & Wentura, 2008) and the studies discussed by Klauer have a viewing time between -100 ms until 1200 ms (Klauer, 1997). A negative viewing time means that the target variable is visible first and the prime thereafter.

As must be clear, viewing times are way shorter in the priming studies than in the experiment that was carried out here. The viewing time of 3 seconds per picture was a deliberate choice. Argumentation behind the 3 seconds is that it is just enough to absorb the content for the content related questions, but shorter than the original 6 seconds. As the aim was to prime the participants for influencing their intentions to conserve nature, priming should occur fast and unconscious. The longest viewing time discussed by Klauer is around 1200 ms (Klauer, 1997). To make the experiment fall more in line with other priming studies, a shorter viewing time would thus have been better. However, after having experimented with the viewing time, 3 seconds was the best option to make participants able to answer all questions.

Consequence of the chosen viewing time might have been that participants were primed too conscious. When giving answers to the statements about nature conservation, participants probably did remember very well what kind of pictures they had seen. Also, because the content related questions were posed as being crucial and the central issue of study, participants might have been distracted too much. Result of this distraction might have been that it overruled the priming effect, through which there was no unconscious effect present. Participants could have very well filled in their answers to the statements as they would have done otherwise, without viewing pictures and outside of the experiment. Moreover, bear in mind that Bradley & Lang (Bradley & Lang, 2007) suggest affective reactions on pictures only last during the viewing or until shortly after. Since there was 1 content question and a short explanation text between the last picture and the statements about nature conservation, it might have been the case that the priming effect had already disappeared.

5.4: Rating pictures

Ratings were carried out immediately after viewing a picture for 3 seconds. Regarding the rating of the pictures, we get to another difference between the IAPS studies and the current experiment. In the IAPS studies, pictures were rated in groups varying between 8 and 25 people (Bradley & Lang, 2007). All persons rated the same picture at the same time. In this study's experiment, between 1-3 participants fulfilled the experiment at a time. On top of that, the experimental condition and thus the pictures they rated, was picked by chance. Sometimes participants were exactly doing the same condition and so seeing the same pictures. But during other times, the situation occurred that 3 different conditions were fulfilled at one time. The time participants had available for filling in the

SAM scale was 6 seconds. During the IAPS studies, participants had 15 seconds for filling in 3 SAM scales. That makes an average of 5 seconds per scale, which is slightly less than in the current experiment. Moreover, in between the rating time and the next picture, 5 seconds preparation time was built in (Bradley & Lang, 2007).

This study used printed answer forms, on which the SAM scales were printed and could be filled in by putting a cross in the figure of the participant's choice. In the IAPS studies, the first 6 studies used a paper-and-pencil version of the SAM. The newer studies that have been undertaken by the IAPS researchers used a computer version of the SAM. At the moment of writing of Bradley & Lang (Bradley & Lang, 2007), 9 studies using the computer SAM had been carried out. Concerning the format of the SAM scale, we can conclude now that most IAPS studies have been carried out using a computer SAM, while this experiment used the more old-fashioned paper-and-pencil version.

Another difference is that this experiment only consisted of 10 pictures per experimental condition. In IAPS studies, 60 pictures per study were rated. Before the actual rating started, 3 practice pictures were always shown (Bradley & Lang, 2007). Here, only 1 practice picture was shown. This practice picture was viewed right at the beginning of the experiment and accompanied by a practice content related question. Before the actual rating of the pictures in the SAM scale started, there was no practice picture shown. It was supposed that participants were familiar with the procedure by then.

In the rating studies of Bradley & Lang (Bradley & Lang, 2007) all kind of pictures were shown in one session of 60 pictures. So pictures could have all valence levels and all sorts of content. Participants could not know what kind of picture followed after the one they had just seen. In the experiment, the 10 pictures of a condition were always all nature related or always non-nature related. The valence level of the pictures was the same throughout a condition. If the selection of the pictures has had influence on the valence ratings is questionable. We can only say that in the IAPS studies, all sorts of pictures were mixed up and that the experiment deviates from this by making a content and valence selection beforehand. Bernat *et al.* (Bernat *et al.*, 2006) also used pictures from the IAPS in their experiment and argue that specific categories of scenes displayed in the pictures may be more able to activate the emotional systems. Based on this, it might be possible that participants rate pictures different when they are all from a certain category. Result may be that a single picture is rated different when rated among similar pictures compared to a mixed session of pictures.

In paragraph 4.3 it was concluded that the mean valence of pictures obtained in the experiment differs significantly from the mean valence for the same pictures in the IAPS database. As a consequence, I concluded that the sample used in this experiment was drawn from another population than the population from which the samples for the IAPS studies were drawn. This conclusion can be placed in a broader perspective now, while we have seen the differences in methods between the IAPS studies and the experiment. It might be the case that the different mean valence ratings are caused by the differences in practical execution of the experiment and the practical execution of the IAPS studies.

Such differences we just discussed add to the argumentation of Bartlett (Bartlett, 2012) , who states that interpreting results of priming studies should be done with the highest caution. Although the

rating of affective pictures on its own is not a priming study, it still accounts that you cannot compare the acquainted results with any other study that rated the same pictures. Watching the used methods carefully is of the highest priority. The fact that the acquainted mean valence ratings are significant different from those in the IAPS database remains. New is that we know it might not be because of the sample was drawn from a different population, but because of the use of other methods.

5.5: Measurement of intentions to conserve nature

As has become clear in the results section, the 6th statement is a bit of a misfit among the other statements. The question that arises is whether or not statement 6 is a valid measurement instrument for intentions. When looking at the reliability statistics for all the statements, Cronbach's Alpha turns out to be 0.395. Removing statement 6 from the analysis leads to an Alpha of 0.510. Looking at the correlation coefficients of the statement themes (see table 10), statement 4 and statement 6 show the opposite result of the others.

It must be clear that statement 6, originally formulated as "The natural environment is made to fulfill the needs of people", leads to answers that are not in line with the answers to the other statements. This has decreased the validity of the total measurement of intentions to conserve nature, since the psychological item seems to have not measured the same as the other 2 items. The statements concerning the intrinsic value of nature were included because it is suggested that Western culture has moved from the domination and exploitation of nature, towards a so-called *new-biophilia* (Van den Born *et al.*, 2001). Especially in the Netherlands, levels of nature-friendliness are said to be relatively high (de Groot & van den Born, 2003). Swart *et al.* (Swart *et al.*, 2001) even suggest that the intrinsic value of nature on its own is a reason for nature conservation. In the theoretical framework the psychological side of nature conservation has been discussed. Based on that theoretical research, the 6th statement was formulated.

All other statements were also based on previously done research, but that concerns more empirical research (see 3.4). Paying for nature and limitation of recreational activities have already been proven to be valid measurement instruments (Davis *et al.*, 2011; Kafyri *et al.*, 2012). As Kaiser & Wilson state (Kaiser & Wilson, 2004), it is important to never try to capture intentions by measuring only one single act. Nature conservation is a complex real-life problem which cannot be conceptualized as a clear whole by using only one single lens (Farley, 2010). An approach with different themes is necessary to understand the whole conservation issue. The economic aspect of nature conservation has been widely promoted as an effective and efficient way of addressing nature conservation (Hayes, 2012). Behavioral support is needed for the paying for nature mechanism, otherwise it is not able to function at all. Same accounts for the acceptance of limitations on the use of nature; people are encouraged to enjoy certain nature areas, but on the same time stimulated to keep out of others (Arnberger *et al.*, 2012).

A theme that has not been covered by the intentions measurement in this study, is the willingness to receive information. Possessing more knowledge about nature conservation issues, is said to lead to more pro-nature behavior (Kals *et al.*, 1999; Torkar *et al.*, 2010; Rosalino & Rosalino, 2012). So people that are willing to receive information, are more willing to increase their knowledge about nature

and nature conservation, which could possibly lead to expressing more pro-nature behavior intentions in the end (Kafyri *et al.*, 2012). In Kaiser *et al.*'s GEB (Kaiser *et al.*, 1999) environmental knowledge is also suggested to increase the ecological behavior intentions. For the validity of the measurement of intentions in this experiment, it might have been a better idea to include a willingness to receive information or an environmental knowledge theme. Such a theme could have been added as 4th theme or could have replaced the intrinsic value of nature theme.

Aim of this study was to examine if emotions, represented by pictures, have an effect on people's intentions to conserve nature. It was found that there is no effect on intentions to conserve nature (see paragraph 4.12: Conclusion). This is in contrary to other contemporary research, which has found an effect of emotions on the engagement in nature conservation. Kals *et al.* (Kals *et al.*, 1999) discovered that emotional affinity toward nature has the power to explain one's nature protective behavior. The research of DiEnno & Thompson (DiEnno & Thompson, 2012) adds to that, that a variety of emotions including self-blame, indignation and affinity toward nature, are motivating people to perform pro-nature conservation behavior.

Carrus *et al.* (Carrus *et al.*, 2008) suggest that some factors, like emotions, have not been sufficiently addressed by environment-behavior studies over the past years. They even state that the role of emotions has been largely ignored in most conservation studies. Result of the Carrus *et al.* research (Carrus *et al.*, 2008) was that negative anticipated emotions are significant predictors for pro-environmental behavior. Perkins (Perkins, 2010) developed a scale called Love and Care for Nature (LCN). She suggests that the scale is a better predictor for willingness to sacrifice for the environment (under which limitations on recreational activities can be considered), than more famous scales like the Connectedness to Nature Scale (CNS) and the Inclusion in Nature Scale (INS) (Perkins, 2010). In the study of Hinds & Sparks (Hinds & Sparks, 2008) it was discovered that one's affective connection with nature is a significant predictor for people's pro-environmental behavior.

Based on contemporary literature, the suggestion is generated that emotions do have an effect on people's intentions to conserve nature. However, this effect is clearly not found in the experiment carried out for this study. Why this effect is not found here, could be possibly ascribed to several factors. As discussed in this paragraph, it could be the cause of a partly invalid measurement instrument. However, 4 of the 6 statements have been proven to be valid instruments in several previous studies. So personally, I do not think that the measurement instrument is the cause of not finding an effect. Other reason could be the priming effect, which had possibly already disappeared by the time participants had to fill in the questions about nature conservation. Furthermore, the used methods were all self-report measurements. If participants really answered according to their intentions, is not controllable. It concerns information only participants themselves know and if they indicate more or less intentions than would be the case in real-life, cannot be found out.

5.6: Limitations of the sample caused by socio-demographic characteristics

In the results section it was stated that the student sample should not necessarily be a problem. Affective priming is a mechanism that can be seen in people in general. The socio-demographic characteristics of the sample should not alter the priming effect. Nevertheless, it might be the case that the socio-demographic characteristics did influence the results. No affective priming effect was

found in the experiment. This might have led to the activation of other factors during the completion of the experiment. So in the absence of the priming effect, an effect of participant's socio-demographic features might have been present. Therefore, the general trends of a population's socio-demographics in the field of pro-environmental behavior are discussed in this paragraph.

In the used sample, higher educated people are overrepresented, compared to the population of a whole (Western) country. Previously done research suggests that people who have more knowledge about nature and nature conservation, are more likely to show pro-nature behavior (Kals *et al.*, 1999; Torkar *et al.*, 2010; Rosalino & Rosalino, 2012). In the theoretical chapter, we have learnt that intentions are the antecedent of behavior. So the more knowledge one has about nature, the more intentions to conserve nature and thus the more pro-nature behavior someone is likely to show. So only based on the fact that the sample in this study is relatively highly educated, you would already expect relative high intentions to show behavior that supports nature conservation. Another result of the recruitment of participants on the university, is that the mean age of the population is relatively low, being 22.29 years. General concern for the environment tends to be higher among younger people, since it is suggested to be easier to make a change in behavior (Cottrell, 2003; Jones *et al.*, 1999).

Besides, Wageningen is an university for life sciences and most studies have a 'green' focus. This means that the sample of students is not even representative for the population of all students on universities in the Netherlands. Only students in the field of life sciences have participated in the experiment, which is likely to further increase the relatively high intentions to conserve nature. However, we cannot prove that the intentions measured in the experiment are higher than for other samples with only students or for other samples that are representative for the general population in the Netherlands. The experiment was especially designed for this thesis and was therefore carried out for the very first time. It would be interesting to discover if differences in intentions to conserve nature are present when another kind of sample is drawn. Considering the replicability of the experiment, it is possible to replicate it exactly. Pictures from the IAPS database are available for free for academic purposes (Bradley & Lang, 2007). Together with the 6 PowerPoint presentations and the answer forms, anyone can conduct the experiment.

When the experiment will be carried out another time in future, it is advisable to have more than 20 participants in each experimental condition. This study aimed at 20 participants per condition, because the time and opportunities were not sufficient for a large experiment with (for example) 100 participants per condition. Point of attention is the way you practically situate the participant(s) and the computer(s). Striving for more people in the experimental conditions highlights the need to have a sound procedure for dealing with more people at a time, without your participants being influenced by each other and/or information from other experimental conditions.

Among the concluding socio-demographic questions, was also a question about the size of the town a participant had spent his childhood in. Growing up in a rural context is suggested to lead to more nature experiences (Kals *et al.*, 1999; Berenguer *et al.*, 2005). These nature experiences are said to be meaningful for one's affective bond with nature, especially when undertaken with family members (Kals *et al.*, 1999). Experiencing more of nature in your childhood is suggested to lead to more

information about nature and the mimicking of one's parents concerning nature behavior (Rosalino & Rosalino, 2012). Urban populations were believed to have more concern for the natural environment around us and express more pro-environmental behavior compared to people living in a rural context (Jones *et al.*, 1999; Huddart-Kennedy *et al.*, 2009). Reason behind this was thought to be the opportunities to participate in more pro-environmental behavior; such opportunities were better available for people living in an urban context than for people living in a rural context (Huddart-Kennedy *et al.*, 2009). Recent research suggests that the difference between urban and rural populations is declining. Concern for the environment is getting more equal (Berenguer *et al.*, 2005; Jones *et al.*, 1999; Huddart-Kennedy *et al.*, 2009). Berenguer *et al.* (Berenguer *et al.*, 2005) even suggest that in their research, people from rural contexts express more pro-environmental behavioral intentions.

Considering the intentions to conserve nature measured in this study, participants from the category of town size with the most inhabitants (>100.000 inhabitants) have the highest score on the intentions index (mean≈7.03). In comparison with the mean score of the 5000-15000 inhabitants group (mean≈3.29), the result is even significant different (see paragraph 4.4). If the higher score of urban participants is due to the urban context they grew up in, is questionable. The experiment has not asked about the argumentation behind one's intentions to conserve nature. Also, the research just discussed suggests that the pro-environmental behavior gap is declining between urban and rural citizens (Berenguer *et al.*, 2005; Huddart-Kennedy *et al.*, 2009; Jones *et al.*, 1999). Nevertheless, the fact that the most urban grown up participants express the highest intentions to conserve nature, should be bored in mind when looking at the answers to the research questions.

In general, females are suggested to have higher concern for the environment (Larson *et al.*, 2011; Rosalino & Rosalino, 2012; Zelezny *et al.*, 2000). However, in the results of the experiment, this general fact is only slightly represented. Looking at the answers on the 6th statement for males and females separately, females have given significant higher answers. For all other statements, this was not the case. Concerning the nationality of the participants, no differences were found between Dutch participants and participants from abroad. This might be due to the low number of abroad participants (only 26) compared to the number of Dutch participants (93). Among the abroad participants, only few people had a non-Western origin. If different results would have been obtained when more participants from abroad and especially more participants from non-Western origin would have participated, is disputable. Known is that at least the SAM scale has been proven to be valid across cultures and age groups (Bradley & Lang, 2007; Barrett, 1998).

Chapter 6: Conclusion

6.1: Preface

In this last chapter, the answers to the research questions are summarized (6.2). Thereafter the practical application of the results is discussed (6.3). Last paragraph elaborates on suggestions for future research (6.4).

6.2: Research questions and hypotheses

This study has been carried out from the perspective of the affective priming paradigm. It was hypothesized that viewing affective pictures would influence people's intentions to conserve nature. Especially nature related pictures were suggested to have a stronger effect than non-nature related pictures. However, the experimental data did not reveal a priming effect of viewing affective pictures on people's intentions to conserve nature. Neither did nature pictures show a stronger priming effect on intentions than non-nature pictures. Both hypotheses are thus rejected.

6.3: Practical application of the results

Although both hypotheses are rejected, it does not automatically imply there is no practical application of the results possible. Some slight results were discovered of the viewing of pictures. Participants who viewed nature related pictures were more willing to give up activities that harm the natural environment than participants who viewed non-nature related pictures. Policy-makers and managers of natural areas could try to make use of this result. When new management is implied and motorized vehicles are for example restricted from a nature area, flyers with affective nature pictures could be used to create awareness amongst visitors. The results of this study indicate that people will then be more willing to adjust their behavior according to the policy and will leave their cars behind.

In the discussion section, it was stated that females have higher concern for the environment than males (Larson *et al.*, 2011; Rosalino & Rosalino, 2012; Zelezny *et al.*, 2000). The experimental data did not show a general difference in intentions to conserve nature for males and females. However, in the experiment, females agreed stronger upon the statement that the natural environment is not made to fulfil the needs of people than males. When aiming at stimulating pro-conservation behavior, it might be useful to employ different strategies for males and females. Because females have a higher environmental concern, they could possibly be easier convinced to adopt certain conservation strategies than males.

Although neither a general priming effect, nor a stronger priming effect of nature pictures was proved, it does not mean affective nature related pictures are not useful at all. A contrary priming effect was also not found. In other words, viewing nature pictures does not lead to a decrease in people's intentions to conserve nature. So the use of affective nature pictures is not harmful among information concerning nature conservation strategies. For example, when asking for park donations or volunteers for clean-up actions, illustrating the information with nature pictures is not a bad thing.

6.4: Suggestions for future research

Other contemporary research did find an influence of emotions on people's pro-conservation behavior. An important difference between these other studies (see 5.5) and this experiment is the way emotions are measured. None of the other studies used a priming experiment, so a detailed comparison is not appropriate. Similar to this and other studies is the fact that self-report measurements are used (Hinds & Sparks, 2008; Kals *et al.*, 1999; Perkins, 2010). However, other studies focused more on one's self noted affective bond with nature.

For future research, I would first of all suggest to carry out this experiment again. However, then the sample should be increased, to about 100 people per condition. During the IAPS ratings studies, each picture was rated by 100 participants (Bradley & Lang, 2007). A comparison between the acquainted valence ratings and the ones in the IAPS database will be more appropriate then. Further I would recommend to use a sample consisting of more subjects rather than only students; i.e. older people and people with other levels of education. If this same experiment is more replicated, results can be compared. If no priming effect is found, it can be said with some more certainty that viewing affective pictures has no influence on people's intentions to conserve nature.

In addition, it might be useful to employ another way of measuring emotions. Since the recognition of emotions as a determiner of pro-environmental behavior is relative new, a lot of research gaps are still present (Carrus *et al.*, 2008). Here, emotions were represented by participant's affective reactions toward pictures. Bradley & Lang (Bradley & Lang, 2006) put forward that, next to using pictures, the use of sounds, smells and the touching of objects can be used to represent affective reactions. So, for example, future research could also expose participants to nature sounds and non-nature sounds for creating a possible priming effect.

Concerning the measurement of intentions to conserve nature, I would suggest to replace the psychological statements with statements relating to knowledge about nature. The answers to the psychological theme seem not to be in line with the answers to both other themes. Also the use of complete different measurement methods could be useful. By using several methods to measure intentions to conserve nature, comparisons can be made and deviations caused by the measurement instrument could be detected.

Intentions are suggested to be the antecedents of all human behavior (Ajzen, 1991; Perugini & Bagozzi, 2001). Besides focusing on intentions to conserve nature, intentions for other pro-environmental behavior can also be measured. Future research might study the relationship between affective stimuli and intentions to save energy, intentions to limit waste etc. Pro-environmental behavior has several facets that all could be subject in a priming research.

By now, it should be clear that the relationship between emotions and pro-environmental behavior is a relative new field of study. More research is definitely needed; this concerns empirical research as well as theoretical research. People's affective bond with nature is said to increase people's intentions to act in a more nature conservational way (Hinds & Sparks, 2008; Kals *et al.*, 1999). It might be useful to study the mechanisms behind this emotional bond in more detail. Knowledge about the exact origin of this bond could be of value in studying the relationship between one's

affective bond and one's pro-environmental behavior. Empirical and theoretical research in the emotions-pro-environmental behavior gap should go hand in hand. Developing sound theories and concepts enhances the qualitative development of empirical research. On the other hand, empirical research provides new findings upon which theories and concepts can be based.

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Appendices

Appendix 1: Overview of used IAPS pictures

The picture numbers are given in the used order (first on top) per experimental condition.

Table 20: Overview of used IAPS pictures per condition

Condition 1	Condition 2	Condition 3	Condition 4	Condition 5	Condition 6
1410	5531	1111	1340	2214	2691
1604	1122	1202	5623	7035	3019
1731	1908	1274	7280	7179	6244
1812	1350	9941	7400	7041	7361
5010	5740	2981	7508	2484	9031
5199	1645	9145	4612	7000	9041
5611	1675	9180	5994	7003	9470
5725	5920	9561	7325	7056	9590
5781	1726	9927	7480	7161	9623
5814	5510	1525	8162	7255	9831

Appendix 2: Socio-demographic questions

PART 4: CONCLUDING QUESTIONS

What is your age?

.....

What is your sex?

Male

Female

What is your nationality?

.....

What is your level of education?

University Bachelor

University Master

Other:

What is the size of the town you grew up in?

0 – 5000 inhabitants

5000 – 15000 inhabitants

15000 – 50000 inhabitants

50000 – 100000 inhabitants

>100000 inhabitants

Appendix 3: Promotion flyer

In this appendix you see one of the promotion flyers used to recruit participants for the experiment. Flyers were printed on A6 format.

Wanted: participants for thesis research!

Are you a student? And willing to spend **5 - 10 minutes** of your time on participating in an academic research? You receive **a little snack** as reward and your help is highly appreciated. Only thing you need to do is watch some pictures and answer multiple choice questions about them.

Please come by:

Monday 08-10: in G501 from 12.30 – 17.30

Tuesday 09-10: in G501 from 12.30 – 17.30

Wednesday 10-10: in G501 from 12.30 – 17.30

Thursday 11-10: in G501 from 12.30 – 17.30

Friday 12-10: in G501 from 12.30 – 16.00

Thank you!!!

Irene de Jong

MSc student Leisure, Tourism & Environment

Appendix 4: Normality checks

The intentions index is explored to check whether a normal distribution is present or not. The Kolmogorov-Smirnov test reveals that the intentions index differs significantly from a normal distribution (test statistic=0.093, df=119, p=0.014), while on the contrary, the Shapiro-Wilk test suggests there is no reason to assume the distribution differs significantly from a normal one (test statistic=0.982, df=119, p=0.106). Looking at the histogram of the intentions index shows a fairly normally distributed variable, just like the Normal Q-Q plot. See respectively figure 5 and figure 6. Based on the information just mentioned, I decided to accept that the intentions index follows a normal distribution.

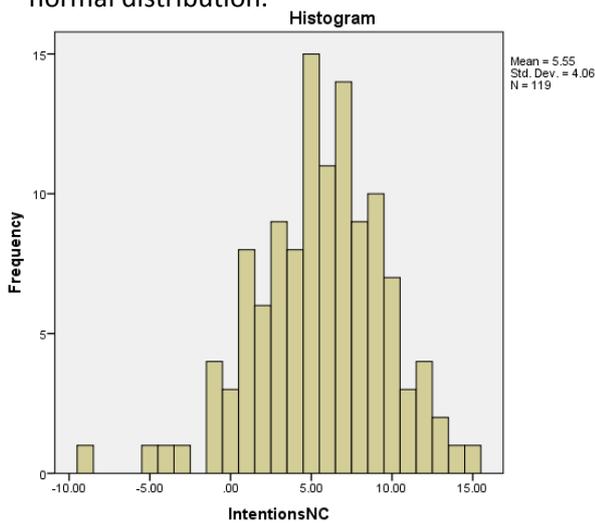


Figure 5: Histogram intentions index

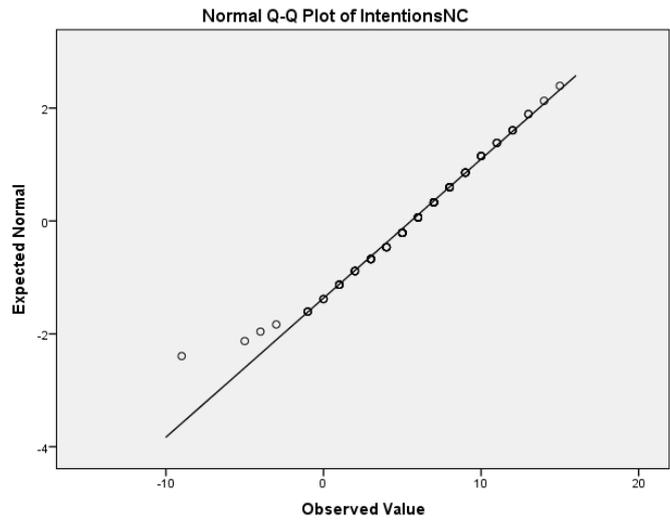


Figure 6: Q-Q plot intentions index

To check whether or not the continuous valence variable follows a normal distribution, an exploration is carried out. Both normality tests Kolmogorov-Smirnov and Shapiro-Wilk are just not significant, with the p-values respectively being 0.080 and 0.051. Looking at the histogram of valence (see figure 7) shows us the shape of a normally distributed variable. In figure 8 you can see the normal Q-Q plot of valence, which shows a bit of a snake shape, but the dots remain close to the straight line. Considering the just mentioned facts about the continuous valence variable, I accept that the variable follows a normal distribution.

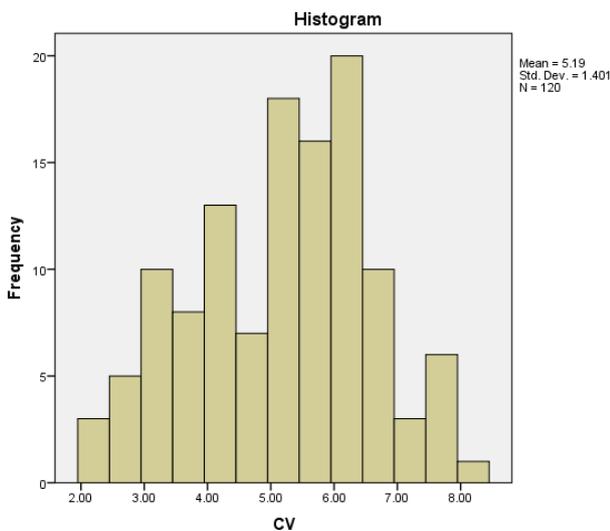


Figure 7: Histogram continuous valence

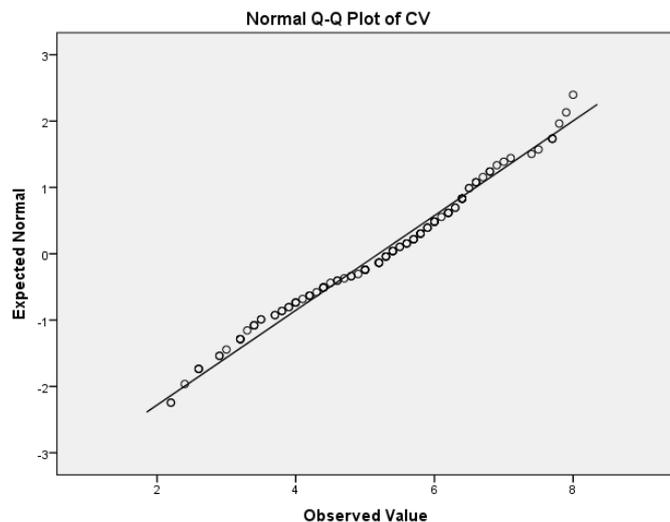


Figure 8: Q-Q plot continuous valence