# Games for Good

Research into the use of serious games to raise awareness for charitable organizations

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## Abstract

Charitable giving is the voluntary donation of money to charitable organisations which has nowadays fully been integrated in modern life. Despite that integration, charitable organisations are currently facing increased challenges to attract and retain donors. The gaming industry could offer a solution for these challenges in the form of serious games. Serious games are games used for training, advertising, simulation and education. The complicated processes charitable organisations face on a daily basis can be explained in a simplified manner via such games. In this way, a relation based on real-time information can be established between a charitable organisation and their supporters.

The problem statement that guides the research in this thesis is as follows: *How to raise awareness for charitable organisations through the use of serious games?*

In this research, a serious game has been developed in collaboration with World Wildlife Fund (WWF), the Netherlands. The WWF is one of the oldest international environmental charitable organisations established to defend endangered species from extinction. The organisation relies on private donations from more than five million members. On the basis of real-time documents provided by the WWF, the researcher designed a framework consisting of the four basic elements which play vital roles within projects of the WWF. This framework has been implemented resembling a neural network where a set of effects and connection weights is leading to certain outputs. This framework served as the basis of the serious game. The game has been developed within the Ren'Py environment, running on Python programming scripts.

After completion of the game, an experiment has been conducted where respondents either played the serious game or a regular game. Afterwards they filled in a questionnaire

measuring their degree of awareness of environmental issues. Whereas the several scales used proved to be successful predictors of the outcome variable ‘awareness’, no significant differences were found between the control group and the experimental group. The degree of awareness of environmental issues did not differ between these groups.

On the basis of these results, it may be concluded that the developed serious game did not significantly raised awareness among participants. A likely explanation is that people are already very much aware of environmental issues, and playing a game based on the role WWF plays in protecting the environment does not influence awareness in a significant way. Future work could consider measuring a different kind of awareness (i.e., awareness of a specific project of WWF or of the organisation itself) where other materials will be used than the ones that were applied within the current study. A second possible explanation is that the setting of the serious game was not familiar enough to the respondents and because of this, they were unable to identify with the subject of the game. In this light, future research could consider creating a different game where elements of Dutch environmental problems are included, which could make it more identifiable.

## Preface

Being a generous donor to charitable organisations myself for several years, their ways of working are of interest to me. Nowadays, there are many different charitable organisations, all vowing for a cause and trying to make the world a better place. I have always wanted to be part of that, to do one's bit, how small it may seem. Next to being a generous donor, I have been an avid gamer since I was a teenager. How great would it be to combine these two passions into the one thing that determines the rest of my future: my thesis?

During my educational career, I have been reading several articles about *serious games,* which are games designed for training and education. Most studies have been aimed at the use of serious games within health care, where research has examined the behavioural effects of these games. However, studies so far have not examined whether serious games have any effect on the awareness of charitable organisations among current and potential donors. This thesis is providing me a way to do one's bit, where I hope to provide useable insights in the use of serious games for charity.

I would like to express my gratitude to my supervisor, Dr. Pieter Spronck, for his guidance and help during the process of designing and writing my thesis. His advice and feedback helped me through all the struggles I experienced. Furthermore, I would to express my gratitude to Dr. Shahid Suleman, who expressed great interest in my thesis topic and was prepared to be the second reader. In addition, I would like to thank Jacob Bours, Harko Koster and Gunilla Kuperus of WWF for all their time, help and information during the process of designing the serious game.

As last, I would like to thank my friends, family and partner for all their support and help during my thesis. They gave me the strength to keep going on whenever I felt like giving up, and provided me with advice whenever I needed it.

Cindy van Miltenburg

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In the first chapter the background of this research is described. The background covers the motives for execution of this research, alongside with the motivation for the research topic. Furthermore, the problem statement and the according research questions are stated, followed by a description of the research methodology.

The second chapter covers the theoretical framework. Here, underlying information is given on charitable organizations and their characteristics, alongside with an explanation of peoples' behaviour of giving, their pro-environmental behaviours, and the role of awareness. In addition, a description of serious games and their features is given. At the end of the chapter a link will be created between the use of serious games and the raising of awareness, which will lead to the hypotheses supporting this research.

Within the third chapter, the methodology of this research is explained. The design and procedure of the experiment are described, alongside with the number of participants and their demographic characteristics. Furthermore, the scales used within the survey are touched upon along with the game stimuli used for the control group. The chapter concludes with a detailed description of the process of designing a serious game.

In the fourth chapter, the outcomes of the experiment are given. The results are presented in a numerical way along with an explanation of the used statistical tests.

The fifth chapter consists of the discussion, where the hypotheses of this study will be confirmed or rejected. Furthermore, theoretical and practical implications of the outcomes of this research are touched upon, alongside the limitations of the design of the experiment. In addition, recommendations for future research are given.

In the sixth chapter, the conclusion is given where the outcomes of this research are used in order to answer the research questions and problem statement.

# 1. Introduction

This chapter provides the context of this thesis. First, the difficult situations are sketched where charitable organisations are currently finding themselves in with regard to the raising of needed funds. Furthermore, serious games and their definitions are touched upon, and the link with creating and raising awareness is made. This chapter ends by presenting the overall problem statement within this research, and the research questions which will be answered in the rest of this thesis.

## *1.1 Research background*

In 2003, households in the Netherlands contributed over 1.9 billion euros to charitable organisations alone (Schuyt, Gouwenberg, Bekkers, Meijer & Wiepking, 2007). Charitable giving is the voluntary donation of money to charitable organisations, which mainly benefit those other than oneself and one's own family. Charitable organisations can be defined as private, non-profit, professional organisations, which are organised on a local, national or international level (Clarke, 1998). Charitable organisations have been facing increasing challenges to attract and retain donors while government support has been decreasing. According to Burke (2001), charitable giving in the U.S. has stagnated over the last thirty years, whereas Eikenberry (2005) claims that philanthropic institutions have found it increasingly difficult to raise needed funds from givers. In the past, this difficulty to acquire charitable funding has been observed in other countries as well. Research by Pharoah and Tanner (1997) showed that the amount UK households are giving to charity has reduced by five percent between 1974 and 1994. Merchant and Ford (2007) provide two reasons for the decrease in giving to charity. First, many current givers give only small amounts to charities compared to former generations. Second, there has been an increase in the number of charitable organisations. This raises the competitive intensity between more organisations that are all fighting for a share of the same limited pool of donor funds.

The key challenge for charitable organisations is to increase the amount of giving among current givers and/or to attract new and younger givers. According to Pharoah and Tanner (1997), the decline in the number of givers is greatest among younger households, who are less likely to give to charity than middle-aged households. Research by Schlegelmilch (1988) showed that demographic, socioeconomic, and psychographic variables influence charitable giving, and differentiate donors from non-donors. A distinction can also be made on the basis of extrinsic and intrinsic determinants. Extrinsic determinants represent demographic and socioeconomic variables (e.g. age, gender and education), whereas intrinsic determinants address the underlying psychographic and attitudinal variables such as awareness, sense of social responsibility, and empathy (Bennett, 2003; Radley & Kennedy, 1995; Sargeant, 1999). Furthermore, Bennett and Gabriel (2003) claimed that charity reputation, which can be described as whether a charity is regarded as 'well known' by respondents, exerts a strong influence on donor behaviour. Because of the increase in the number of charitable organisations, people are less aware of most charitable organisations which could result in a decrease in funding. Lee and Chang (2007) describe awareness as "having knowledge of charitable issues and charitable organisations". In this light, awareness can make charitable organisations a brand of their own with which they differentiate themselves from other charitable organisations. This will result in a stable relationship between the giver and a charitable organization resulting in a flow of donations (Haigh & Gilbert, 2005). However, little research is available on how charitable organisations can increase awareness among current and new givers.

New approaches to obtain new knowledge reveal a growth in the use of virtual environments and games. Game developers, such as Blitz Games, have been using game technologies to provide problem based training for medical school, where the games have been used to develop medical students' clinical knowledge (Burden & Slater, 2008). These

games are called *serious games*: games used for training, advertising, simulation, or education that are designed to run on personal computers or video game consoles (Susi, Johannesson & Backlund, 2007). Corti (2006) claims that serious games allow learners to experience situations that are impossible in the real world for reasons of safety, cost, and time. In this light, Zyda (2005) argues that serious games offer more than just story, art, and software. He claims that serious games are called serious because of the addition of *pedagogy*, which can be defined as activities that educate or instruct, and thereby impart knowledge or skill. Thus, serious games are used to impart knowledge, and these games might also be used to impart knowledge about charitable organisations. In this light, it can be argued that serious games can be used to raise awareness about charitable organisations as awareness is defined as having knowledge about charitable issues (Lee & Chang, 2007). Research on this subject is scarce. Given this background, the goal of this study is to examine if the use of a serious game by a charitable organisations can increase awareness among potential givers.

### *1.2 Problem statement and research questions*

For the purpose of this study, we collaborated with the World Wildlife Fund (WWF). The WWF is one of the oldest international environmental charitable organisations established to defend endangered species from extinction. This charitable trust relies on private donations from more than five million members, which fund around 60 percent of their activities (Wapner, 2012). Because of this, it is crucial for the WWF to continuously raise awareness for their causes in order to attract potential new givers. Therefore, the following **problem statement** will be addressed:

*How to raise awareness for charitable organisations through the use of serious games?*

To address this problem statement, we decided to run an experiment in which the effect on awareness of a serious game, designed around the activities of WWF, is measured. The following three research questions will be answered in this thesis:

1) *How can a specific project of WWF, with all the activities and expenditures included, be modelled?*
2) *How can this model be translated into a serious game?*
3) *To what extent does the serious game increase awareness for WWF?*

### *1.3 Research methodology*

In order to answer the four research questions, the following steps have to be taken. First, a thorough literature review is conducted to explore earlier research performed on awareness within charitable organisations. The focus of this literature review will be on the current funding problems of charitable organisations, the causes and effects of these problems, and which role awareness of charitable organisations plays. Furthermore, the advantages and possibilities of serious games are examined.

Exploration of earlier research on raising awareness for charitable organisations will lead to several methods to measure an increase of awareness. These studies provide scales on environmental attitude and awareness, suitable for measuring the awareness respondents have of environmental issues. This research investigates to what extent awareness can be increased for the WWF. To increase awareness of WWF, a serious game is designed in collaboration with employees of WWF the Netherlands. For the design of the serious game, real data and information is used. Therefore, multiple implementation models were created containing knowledge of an existing conservancy area. The models explained several causes and effects of issues threatening the existence of species of the conservancy area and the habitats they are living in.

After the design of the serious game was completed, an experiment was run with a control group and an experimental group to measure if awareness increases due to the use of the serious game. The serious game is deemed successful if it significantly increases awareness of environmental issues as compared to the awareness raised by a regular game.

## 2. Theoretical framework

This chapter provides an overview of previous research on charity, the behaviour of giving, pro-environmental behaviour and serious games. First, an insight is given into definitions of charity and the funding problems charitable organisations are currently dealing with. In addition, the motivations, attitudes and behaviours of giving to charity are touched upon. Furthermore, pro-environmental behaviours and corresponding models are described, followed by a description of serious gaming. The chapter concludes with a link between behavioural change and serious games, and the hypotheses of this research are presented.

### *2.1 A definition of charity*

Charity is the act of benefiting other individuals. The word charity comes from the Latin word *caritas*, which means love (Lichtenberg, 2009). One of charity's central features is the "norm of reciprocity", the idea that people should try to repay in kind for what others have provided them (Gouldner, 1960). Charity can take two major forms: volunteering and donations (Lee & Chang, 2007), which can be further divided into gifts of time, money or property. Charitable organisations have been around since the nineteenth century, with the foundation of the New York Association for Improving the Condition of the Poor (AICP) being founded in 1843. In 1939, the AICP merged with the Charity Organization Society, to become an umbrella organisation for a number of smaller charities. With the foundation of charitable organisations, which bundle the gifts of time, money and property from single individuals to aid the less fortunate, charity has gradually integrated into society.

Charitable organisations can be divided into four categories: (1) voluntary organisations, (2) independent sector organisations, (3) nonmarket institutions, and (4) nongovernmental organisations (NGOs). Voluntary organisations are those that receive contributions of time, below-cost goods or services, or money while independent sector organisations are hardly financially independent and rely on the state (Powell & Steinberg,

2006). Furthermore, nonmarket institutions include government agencies and consumer cooperatives while NGOs can be described as private, non-profit, professional organisations, which are organised on a local, national or international level, and focus on issues such as human rights, health, social welfare and the environment (Clarke, 1998; The UN, 2003). This literature review will only elaborate on NGOs because the purpose of this study is to measure awareness of the WWF, which is a nongovernmental organisation.

For the past few years, research has highlighted the need for charitable organisations to develop and build attractive brand personalities for their organisations as a way to differentiate themselves from other organisations as well as a means to attract and retain donators. As mentioned earlier, charitable giving has been decreasing over the past decades due to the rise of the number of charitable organisations in the world (Merchant & Ford, 2008). In this light, donators are experiencing increased difficulty in distinguishing between different charities. According to Haigh and Gilbert (2005), donators' financial and emotional commitment is greater with charitable organisations that are well known. Thus, it can be assumed that charitable organisations that make current and potential donators aware of their added value can influence donators' behaviour of giving.

*2.2 The behaviour of giving*

In general, charitable organisations receive donations and grants from individuals, governments, and foundations. While all are significant, individuals are the dominant source of giving, by giving over 183 billion dollars in the USA alone in 2002, which is 76 percent of the total dollars donated (Andreoni, 2006). However, charitable organisations have to compete against each other and consumer marketing organisations for a portion of the household income. A way for charitable organisations to facilitate donations is to develop an understanding of donators' motivations for giving. These relate to (a) personal motives (e.g. being altruistic); (b) the social norms governing the action; and (c) the situational conditions

that apply at the time donations are made (Radley & Kennedy, 1995). In this light, researchers have attempted to identify demographic, socioeconomic and psychographic variables that influence charitable giving and differentiate donators from non-donators. Alongside with these variables, charitable organizations also play a significant factor in the process of charitable giving. In his study, Glaser (1994) cited a study conducted by the Roper Organisation in 1988, in which the authors identified the variable "adequate amount spent per program" as the second most important factor cited by donators in their decision to donate. Furthermore, Harvey and McGrohan (1988) showed that charitable organisations who can confirm that sixty percent of donations is spent on charitable programs, achieve higher levels of donations.

The need to better understand the determinants of personal donation behaviour is increasing. Sargeant (1999) developed a theoretical model of giving behaviour (Figure 1), which states that a certain output (e.g., gifts of cash or time) is determined by (1) external inputs (e.g., charity brand, facts, images), (2) the perceptual reaction of the donator towards the message of the charitable organisation, and (3) processing determinants (e.g., past experience with giving). Moreover, the relation between these three variables and certain outputs is moderated by extrinsic determinants (e.g., age, gender, social class) and intrinsic determinants (e.g., need for self esteem, empathy, and sympathy).

The first extrinsic determinant is age. According to Van Liere and Dunlop (1980), younger people tend to be more concerned about environmental quality than older people because they are less integrated into the dominant social order, and regard solutions to environmental problems as less threatening. However, Andreoni (2006) claims that as people are getting older, they are more likely to give to charity, and to give a greater portion of their income. Younger generations are more consumption driven and like to spend their income on materialistic needs.

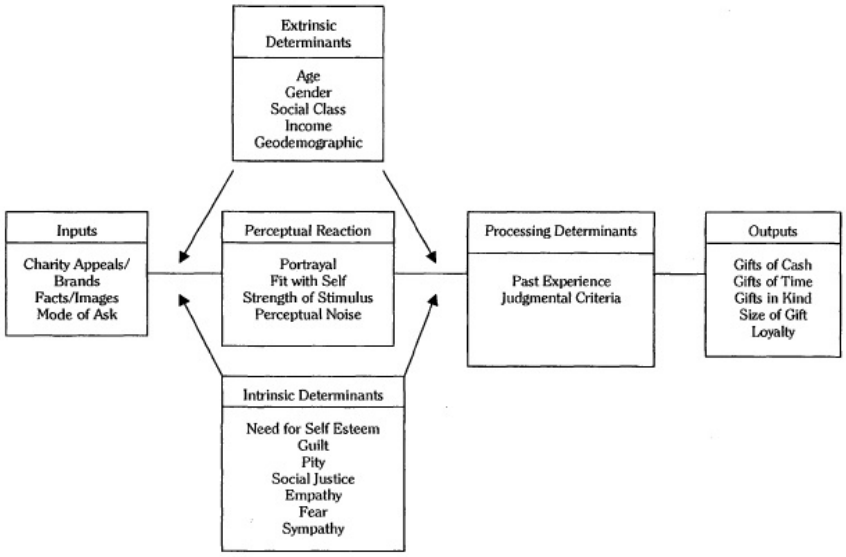



Figure 1: Theoretical Model of Giving Behaviour
Reprinted from "Charitable Giving: Towards a Model of Donator Behaviour
by A. Sargeant, 1999, *Journal of Marketing Management, 15,* p. 218

The second extrinsic determinant is gender. In general, it is argued that women have a 'different voice' in moral thinking than men, and therefore women are more likely to help others. However, this greater motivation to help others does not translate into more charitable giving. On average, women give more money than men but the difference is small and inconsistent across studies (Einolf, 2011). Furthermore, women want more information about how their donations are actually used. The third determinant is social class, where Andreoni (2006) claimed that educated people give more often, give more money and generally give a higher portion of their income. An explanation for this is that upper and middle classes are able to provide in their basic material needs, and therefore can focus more on social problems within society (Van Liere & Dunlap, 1980). Considering the last determinant income, Andreoni (2006) showed that household with higher incomes are more likely to give and also give more to charitable organisations, whereas Sargeant (1999) stated that the poor and extremely wealthy give a much higher proportion of their income than the middle class.

However, a shortcoming to extrinsic determinants is their failure to explain fully *why* people support charitable organisations with their donations. Psychographically defined

variables offer greater precision when defining the behaviour of giving. Sargeant (1999) refers to these variables as intrinsic determinants, which are the underlying individual motives for supporting a charitable organisation. These factors include empathy, sympathy, and emotions such as fear, guilt and pity (Sargeant, Ford & West, 2005). Empathy may be defined as an individual's emotional arousal elicited by the expression of emotion in another person, whereas sympathy is being viewed as a value expressive function, aiding individuals to conform to personally held norms (Sargeant, 1999). Furthermore, giving behaviour can also be motivated by a giver's self interest. In this light, donations might be seen as a way to compensate for sins in order to enhance feelings of self esteem. Moreover, Miller (1977) has argued from the perspective of the Social Justice Motivation Theory, that if people witness suffering, their beliefs in a 'just world' will be threatened, motivating them to restore their faith in justice (Lerner, 1975).

Taking the Social Justice Motivation Theory into account, one could say that awareness of injustice in the world could lead to actions resolving this injustice. According to Webb and Green (2000), there is a logical notion that knowledge of a charity increases monetary donations. Furthermore, donators' perceptions of the effectiveness and efficiency of a charitable organisation influence the behaviour of giving (Schlegelmilch, Diamantopoulos & Love, 1992). In this light, it can be argued that being aware of activities undertaken by charitable organisations and the positive consequences of these activities, has an effect on the behaviour of giving.

### *2.3 Pro-environmental behaviour*

To enact environmental change, a range of human behaviours conducted by a spectrum of societal actors (i.e., citizens, corporations, governments) is needed. A subsequent growth in pro-environmental behaviour research has resulted in the development of several behavioural models, where social-psychological constructs such as values, attitudes and beliefs are

employed to predict behaviour changes. According to Webb and Green (2000), attitudes are most often defined as "global and relatively enduring evaluations of objects, issues or persons". With regard to charitable organisations, Webb and Green (2000) distinguished a dimension called "attitudes towards charitable organisations (ACO)", which can be defined as the global and relatively enduring evaluations with regard to NGOs. In this light, the attitudes people have towards charitable organisations are based on a general set of values which determines their pro-environmental behaviour. In this light, Schlegelmilch (1988) found in his study that awareness variables, followed by attitude, lifestyle, and socioeconomic variables, are most suitable to distinguish between donors and nondonors.

An individual's behaviour towards the environment involves what the individual feels and thinks with respect to the environment and with respect to pro-environmental action. Ryan and Spash (2008) refer to this concept as 'environmental attitude behaviour', which can be defined as the motives individuals have for stimulating or preventing action. This can be related to the Theory of Planned Behaviour (Ajzen & Fishbein, 1980), which claims that the predictors of behaviours are behavioural intentions. In turn, these intentions are initiated by (a) the extent to which individuals hold a favourable attitude towards a behaviour, (b) individuals' perceptions of the norms and conventions regarding a behaviour, and (c) the extent to which the individual perceives the behaviour to be under his or her personal control. With reference to pro-environmental behaviour, the Theory of Planned Behaviour can be related to the Norm Activation Model of Altruism by Schwartz (1977). This model suggests that pro-environmental behaviour becomes more probable when an individual is aware of harmful consequences to others from a state of the environment. With regard to charitable organisations, awareness can be described as having knowledge of these organisations and the issues they are dealing with (Lee & Chang, 2007). Because of this awareness, the individual ascribes responsibility to herself or himself for taking action in order to change the

environmental condition. Therefore, it seems that the degree of awareness of harmful consequences can influence individuals' behavioural intentions towards pro-environmental behaviour, which in turn could lead to donations.

In addition, the Norm Activation Model of Altruism is the basis for the Theory of Movement Support by Stern, Dietz, Abel, Guagnano and Kalof (1999). According to this theory, movement support lies in a conjunction of values, beliefs and personal norms that motivate individuals to act in ways to help restore values and beliefs. On the basis of existing literature, Stern et al. (1999) propose that norm-based actions flow from three factors: acceptance of particular personal values, beliefs that things important to those values are under threat, and beliefs that actions initiated by the individual can help restore these values. These factors are integrated into a broader behavioural framework of environmental intentions, also called the Value-Belief-Norm (VBN) Theory. A schematic model is provided in Figure 2, showing the variables and their direct causal relationships.

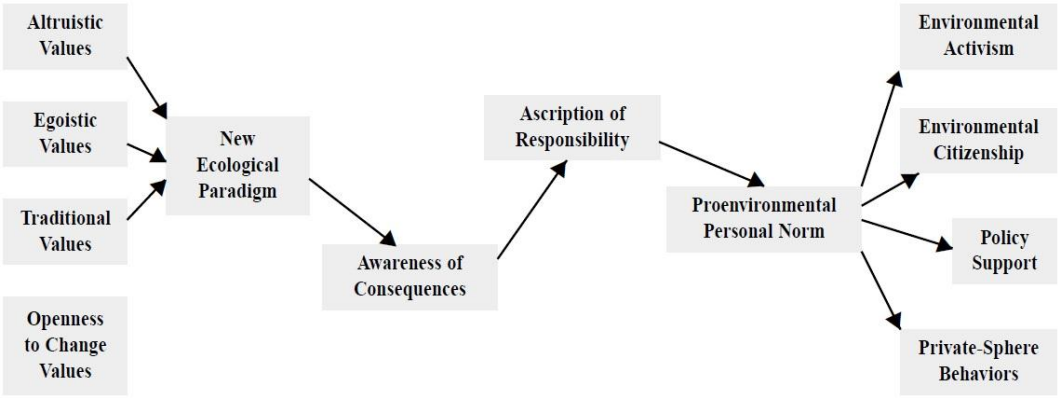



Figure 2: Schematic model of variables in the Value-Belief-Norm Theory
Reprinted from "A Value-Belief-Norm Theory of Support for Social Movements: The Case of Environmentalism" by P.C. Stern, T. Dietz, T. Abel, G.A. Guagnano & L. Kalof, 1999, *Human Ecology Review, 6* (2), p. 84

Within their theory, Stern et al. (1999) have constructed three concepts which determine social movement: awareness of consequences of a problem (AC), ascription of responsibility to oneself for action (AR), and activation of a personal norm for action (PN). In this light, Stern et al. (1999) hypothesised that underlying value orientations (i.e. altruistic, egoistic,

traditional, and openness to change values) can lead to pro-environmental behaviour change This relationship is moderated through the concepts of the New Ecological Paradigm (NEP), awareness of consequences (AC), ascription of responsibility (AR), and personal norm for action (PN). Taking these concepts and the above theories into account, it can be argued that increased awareness concerning threatened values will result into more actions trying to restore these values. In this light, awareness of charitable organisations and the environmental problems they have to cope with, could lead to a change in pro-environmental behaviour and even result in actions such as monetary donations.

*2.4 Serious gaming and behaviour change*

Research has been conducted to examine whether the design and creation of stories and video games can enhance the possibilities for behaviour change. In this way, games can provide extensive player involvement for large numbers of children and adults, and thereby provide a channel for delivering behaviour change experiences and messages in an engaging and entertaining format (Zyda, 2005). The usage of games for learning and behaviour change is not new. Other concepts, such as e-learning, edutainment, game-based learning, and digital game-based have emerged within the gaming industry. The concept which is relevant for current research is called serious games. There are many different definitions available with reference to serious games, and the concepts of serious gaming can be applied to a broad spectrum of application areas, such as the military, government, education, corporations, and health care. According to Michael and Chen (2006), serious games encompass all aspects of education, such as teaching, training, and informing, and are suitable for all ages. In addition, Corti (2006) claims that serious gaming is "all about leveraging the power of computer games to engage users for a specific purpose". In this research, serious games are defined as games for purposes other than mere entertainment. In this light, serious games could be used by charitable organisations to explain complex environmental knowledge.

Most studies with regard to behaviour change and serious gaming have been carried out in the healthcare domain, where games were designed to entertain players while attempting to modify some aspects of their attitudes towards healthy behaviour. Several outcomes show positive health-related behaviour changes after playing games (Baranowski, Buday, Thompson & Baranowski, 2008). It appears that gaining and maintaining a person's attention is the first step in promoting behaviour change. However, behaviour is seen as a complex, multistep process which is quite resistant to change. Therefore, behavioural scientists attempt to change mediators, which in turn may change behaviour (Figure 3) (Thompson et al, 2010).

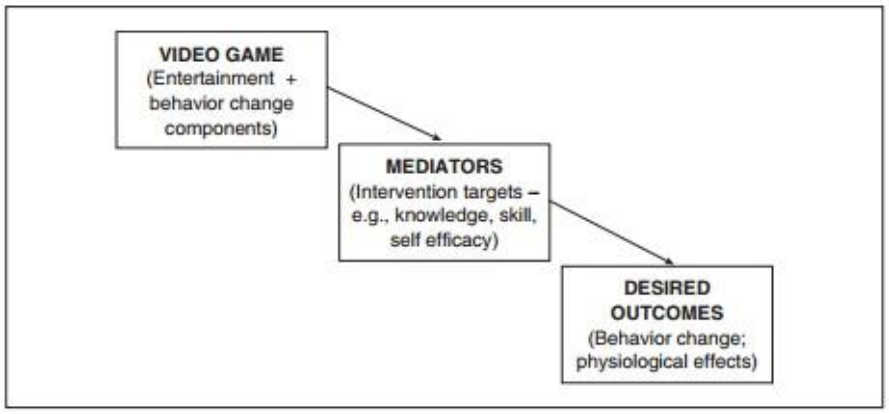



Figure 3: Behaviour Change Framework - Video Games Reprinted from "Serious Video Games for Health: How Behavioural Science Guided the Development of a Serious Video Game" by D. Thompson, T. Baranowski, R. Buday, J. Baranowski, V. Thompson, R. Jago, & M.J. Griffith, 2010, *Simulation and Gaming, 41* (4), p. 588

Examples of such mediators include immersion, attention, knowledge and skill development. Furthermore, Schwartz (1977) argues in this Norm Activation Model of Altruism that pro-environmental behaviour becomes more probable when an individual is aware of harmful actions to the environment. On the basis of Lee and Chang's (2007) definition of awareness as having knowledge of charitable organisations, one could argue that awareness of the environment and possible harmful actions to it could function as a mediator to behaviour change. In this way, games can provide a mean to identify and evaluate the consequences of organisational policies, where consequences of various environmental

solutions are shown. Therefore, it can be hypothesised that people who play a serious game gain more knowledge of a charitable organisation. This leads to the following hypothesis with respect to the serious game that is developed as part of this research:

*H1a: Individuals who played the serious game will be more aware of environmental issues than individuals who did not play the serious game.*

An essential part of serious games is entertainment, which can be used to enhance corporate training, education and health policies, and strategic communication objectives (Zyda, 2005). In this light, the main point of serious games is to get players to learn something and, at the same time, have fun doing it. Koster (2004) describes fun as a side effect of learning something new. Furthermore, research has indicated that experiencing pleasure can significantly increase an individual's likelihood of engaging in charitable behaviour (Cunningham, Steinberg & Grev, 1980; Forbes & TeVault, 1975; Isen & Levin, 1972). Moreover, Schlegelmilch (1988) argued that awareness differentiates donors from nondonors. Thus, donors are usually more aware of charitable organisations. In this light, it could be argued that individuals who play a serious game are more inclined to donate, leading to hypothesis 1b:

*H1b: Individuals who played the serious game about a charitable organisation will have a stronger intention to donate to that organisation than individuals who did not play the serious game.*

Apart from differences in intrinsic determinants such as awareness, the effect of serious gaming could also differ for extrinsic determinants such as gender. Research by Chou

and Tsai (2007) showed that males are strongly motivated to play games and also enjoy it more than females. Furthermore, females like to play non-aggressive games, where they can interact with familiar characters in familiar settings (Boyle, Connolly & Hainey, 2011). In addition, female players prefer thoughtful games over physically oriented games (Greenberg, Sherry, Lachlan, Lucas & Holmstrom, 2010). In this light, it can be expected that females are more engaged by serious games because of their familiar settings and less aggressive game play. This could lead to females becoming more aware of the knowledge presented in the game than males. Therefore, the second hypothesis is as follows:

*H2a: The degree of awareness of a charitable organisation will be higher for females who played the serious game about that organisation than for males who played the same game.*

Furthermore, research showed that women are more likely to help others in society and on average give more money than men (Einolf, 2011). In addition, they have a tendency to ask for more information about how their donations are used. Thus, by playing a serious game, women could get insight in this kind of information which may have an effect on their behaviour of giving, leading to hypothesis 2b:

*H2b: The intention to donate to a charitable organisation will be higher for females who played the serious game about that organisation than for males who played the same game.*

# 3. Method

In this chapter the method will be described which was employed during the design and execution of this research. The design of the experiment is explained alongside a description of the independent and dependent variables. Furthermore, the composition of the group of participants is given, as well as the used materials for the survey. In addition, the game stimuli are described next to a stepwise explanation of the set-up of the experiment.

## *3.1 Participants*

In the experiment, a total of 105 Dutch adolescents between the ages of 18 to 35 years participated. The mean age of the respondents was 23.48 years (*SD* = 3.79). The sample can be described as 30 percent male (N = 31) with an average age of 25.06 (*SD* = 4.42) and 70 percent female (N = 74) with an average age of 22.81 (*SD* = 3.68). Participants were recruited via the online recruiting system of Tilburg University, where students have the possibility to participate in several studies. However, the response rate of these participants was quite low. Therefore, the experiment and survey were also distributed online via social networking sites (i.e. Facebook, Twitter and LinkedIn), where participants were asked to participate via a provided link. Since the research is aimed at adolescents (i.e., 18 - 35 years), only respondents corresponding to these ages were asked to participate. Participants were randomly assigned to either the experimental condition (i.e., participants who played the serious game) or the control condition (i.e., participants who played a regular game). The experimental condition consisted of 51 participants (12 males and 39 females) with a mean age of 23.84 years (*SD* = 4.91), whereas the control condition consisted of 54 participants (19 males and 35 females) with a mean age of 23.09 years (*SD* = 2.88).

## *3.2 Design*

This study consisted of a between subject design, where the participants either played the

serious game or the control game. The study used a 2x2 design with two independent variables consisting of the serious game (playing vs. no playing) and gender (male vs. female). The dependent variable measured within this study is the degree of awareness of a charitable organisation.

### *3.3 Procedure*

Before starting the experiment, a small explanation informed the participants that they had to play a short online game and fill in an online questionnaire afterwards. No further instructions were given in order to prevent that respondents would unconsciously influence the outcomes of the experiment. The explanation also made clear that participants would remain anonymous and that they could terminate their participation at any moment during the experiment. All participants were asked if they agreed to these terms and gave their consent to participate.

The experiments were held in a secluded room, where several computers were provided. Participants were instructed to follow the seating arrangements made in advance, in order to prevent that they would influencing each other's outcomes. On average, the experiment lasted around thirty minutes, where each participant played the game for fifteen minutes and used fifteen minutes to fill in the questionnaire.

Within the online version, the participants between the ages of 18 to 35 were asked to participate via a provided link posted on several social networking sites. The first group of respondents received the explanation of the control game, where they were asked to play the game and fill in the questionnaire afterwards. The second group of participants was directed to the explanation of the serious game, where they were asked to download the game on their computer, play it independently and fill in the questionnaire after completing the game.

### *3.4 Materials*

To measure the degree of awareness, an online questionnaire was used. First, participants answered questions about their demographics (i.e., their age, sex, social class, and level of

education), and if they were already donor of a charitable organisation. Afterwards, multiple scales were combined to measure participants' attitude of environmental concern, their awareness of consequences (AC) of environmental conditions, and ascribed responsibility for environmental damage (AR). All scales were translated to Dutch, after which two native Dutch speakers pre-read the questionnaire. The English version of the questionnaire can be found in Appendix I whereas the Dutch version is provided in Appendix II.

**Environmental attitude.** To measure participants' attitude towards the environment, the environmental concern scale by Schultz (2000) was applied (α = .83). Participants were asked to rate twelve items on level of importance on a 7-point scale (1 = "not at all", 7 = "extremely"). Items one to four (e.g., plants, marine life, animals, and birds) measured biospheric concerns (α = .85), items five to eight determined egoistic concerns (α = .86), and items nine to twelve examined altruistic concerns (α = .83).

**Awareness of consequences.** Two scales were used to measure awareness of consequence (AC). First, the revised New Environmental Paradigm Scale (NEP) was used (Dunlap, Van Liere, Mertig & Jones, 2000). This scale is usually used as a measure of general pro-environmental attitudes (α = .74). However, work by Stern, Dietz and Guagnano (1995) has demonstrated that the NEP is an environmentally related measure of AC, where they reported a correlation of $r$ =.78 between the scores of the NEP and a general awareness of consequences scale. Examples of the scale items include "Humans are severely abusing the environment" and "Humans were meant to rule over the rest of nature". Participants responded to these questions on a 7-point Likert scale (1 = "totally disagree", 7 = "totally agree"). In addition, the awareness of consequence scale by Stern et al. (1999) was applied (α = .70). This scale consists of fifteen items based on three underlying value orientations, namely egoistic (i.e., items 1 to 5) (α = .65), altruistic (i.e., items 6 to 10) (α = .52) and biospheric (i.e., items 11 to 15) (α = .60). All items were rated on a 7-point Likert scale with 1

meaning “totally disagree” and 7 meaning “totally agree”.

**Ascribed responsibility.** Ascribed responsibility (AR) was measured by using a single Likert scale question. This question asked “How responsible are you for environmental problems?” where responses varied from extremely, moderately, slightly, or not at all responsible.

*3.5 Game stimuli*

The game stimuli for the control group was provided by the WWF. Their websites provides several short games with a reference to animals and nature. Participants in the control group played the “journey through the Panda Forest” game, where players have to guide a panda to his habitat, while avoiding obstacles such as traffic or rivers. Figure 4 shows a screenshot of the game. This game cannot be regarded as a serious game because it does not contain any references to the underlying motives and strategies of WWF and their activities. As stated by the WWF, this game is designed to provide “mere fun”, while playing with nature and animals. However, the game does have references to the environment and can therefore be used as a comparison to the serious game developed for this study.


Figure 4: Screenshot of WWF game "Journey through the Panda Forest"
Retrieved from: http://www.rangerclub.nl/nl/fun/games/spelen.cfm?id=25

*3.6 Model development*

In this section, the development of the models serving as a basis for the design of the serious game are discussed. First, the global model is presented, where textual information of WWF on Virunga National Park is converted into a first model. In addition, the second model is explained, which serves as a more detailed elaboration of the global model on the national park. The section concludes with the presentation of the implementation model, which described how the park will be presented in the serious game.

For the design of the serious game, a specific project of WWF, the Netherlands, needs to be modelled. According to Burgess (1995), one way to make business games more realistic is to use real-time data of the simulated company. To ensure this, a collaboration with employees of the WWF marketing department, and the WWF environmental services department has been established. In several meetings, real documents (i.e., Theories of Change) of WWF on their project in Virunga National Park have been discussed. The Theories of Change of WWF consists of four elements: targets (i.e., the habitats and species they want to protect), threats (i.e., main threats for the targets), factors of influence (i.e., causes of the threats), and strategies (i.e., solutions to prevent or counter the threats). This information led to the first model (e.g., the global model), where each element is presented in a different colour.

The model is functioning similar to a *neural network*, which can be defined as a network consisting of a standard set of effects and connection weights, leading to certain outputs (Stanley, Bryant & Miikkulainen, 2005). The model should be read from left to right, and shows the underlying threats and causes affecting the national park, and the strategies developed by WWF to prevent these threats (Figure 5). The global model serves as a representation of the reality of Virunga National Park. A detailed explanation of the model is provided in Appendix I.

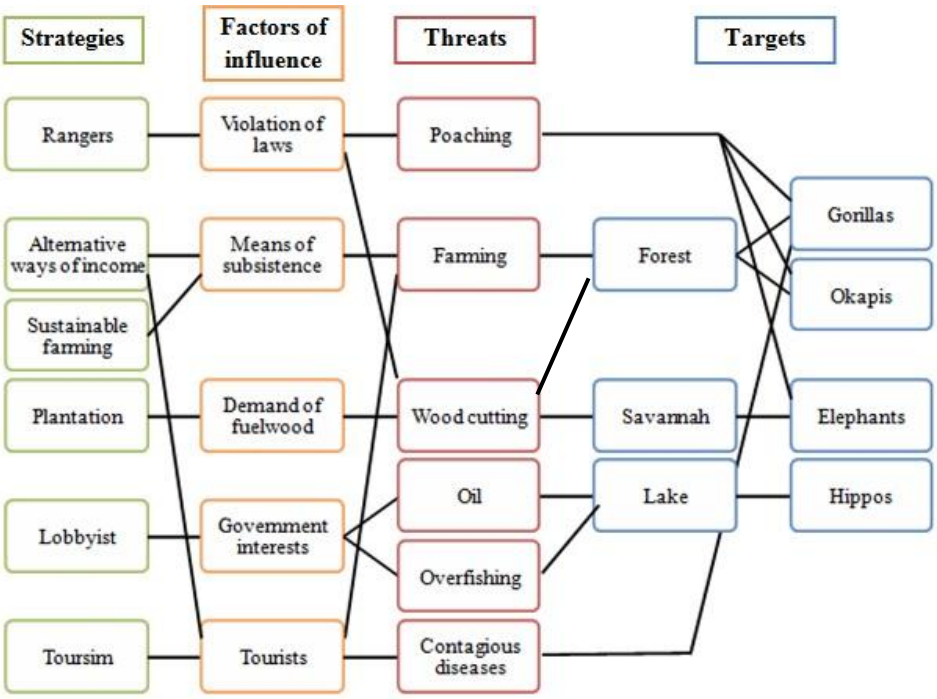



Figure 5: Conceptual Framework National Park (Global Model)
Developed in collaboration with WWF, the Netherlands

In order to make the model suitable to be used within the serious game, detailed information on each solution, threat and cause, and all the elements of the national park needed to be added. In collaboration with WWF the first model was extended into a second model as a representation of Virunga National Park. The second model, shown in Figure 6, contains the sizes of all habitats, with the according populations of the animals, their natural growth rate and the amount of living space needed per animal. The okapis have been left out because this animal group did not add any value to the game. In addition, detailed information has been added with regard to the costs of each solution together with the effect sizes these solutions will have on the different causes and threats. Because of this amount of information, the model is making clear what the ultimate impact is of each solution on the national park, the habitats and the animals. A detailed explanation of the model is provided in Appendix II.

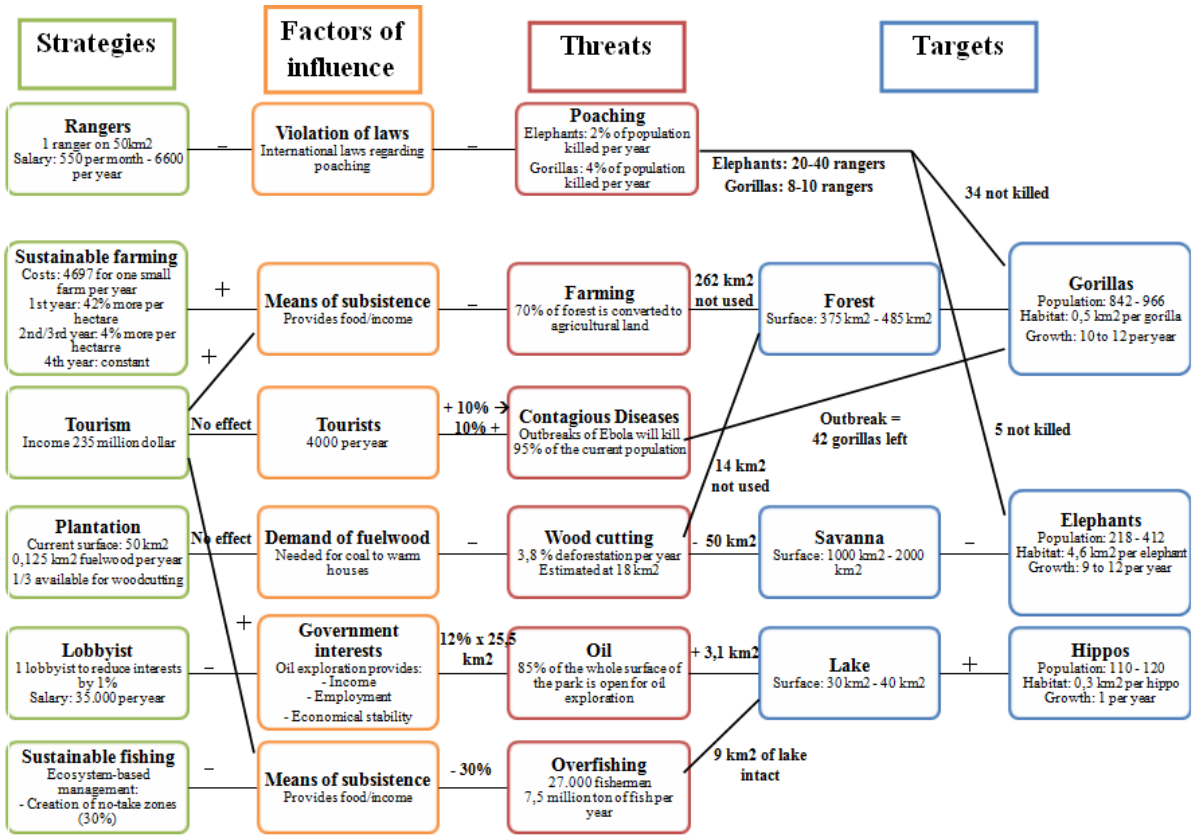



Figure 6: Conceptual Framework National Park (Second Model)
Developed in collaboration with WWF, The Netherlands

Although the second model contained most of the information needed, this could not serve as an implementation model for the serious game. The second model still includes all factors of influence (i.e., causes of the threats) but these are not relevant to the calculation of the effects of strategies and threats. These factors still play a vital role in the game itself but are only included within textual explanations. This resulted in the development of the third model (e.g., the implementation model), where the factors of influence have been left out (Figure 7). This model only shows the possible solutions with the effects on the direct threats, alongside the impacts of these threats on the habitats and the animals. Furthermore, additional information (i.e., costs and effect sizes) on the solution of the forest ranger, the lobbyist and sustainable fishing have been added. Moreover, common factors have been established between sustainable fishing and sustainable farming, and the effects of oil and overfishing on the lake. After the WWF made clear that they have no influence on the flow of tourism within

national parks, this solution was deleted. The implementation model serves as a representation of the global model which is suitable for implementation. A detailed explanation of the model is provided in Appendix III.

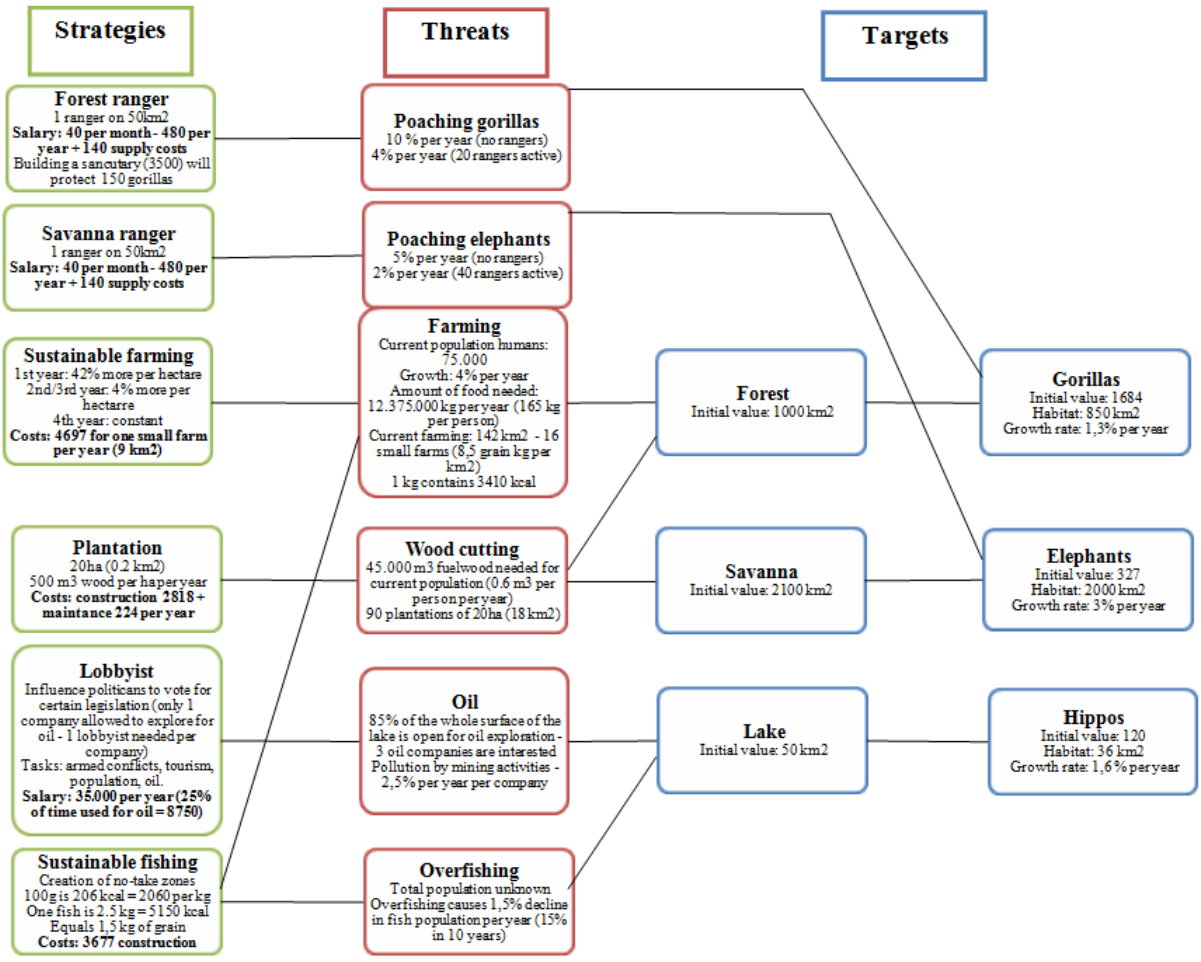



Figure 7: Implementation Model (Third Model)
Developed in collaboration with the WWF, the Netherlands

### *3.7 Serious game*

The game stimuli for the serious game was developed for the purpose of this experiment by the use of the Ren'Py environment. This environment allows the creation of an interactive game, where players directly see the effects of their choices. Furthermore, within Ren'Py it is possible to display images alongside added text, to make the serious game more appealing. Figure 8 shows a screenshot of the main menu of the game.

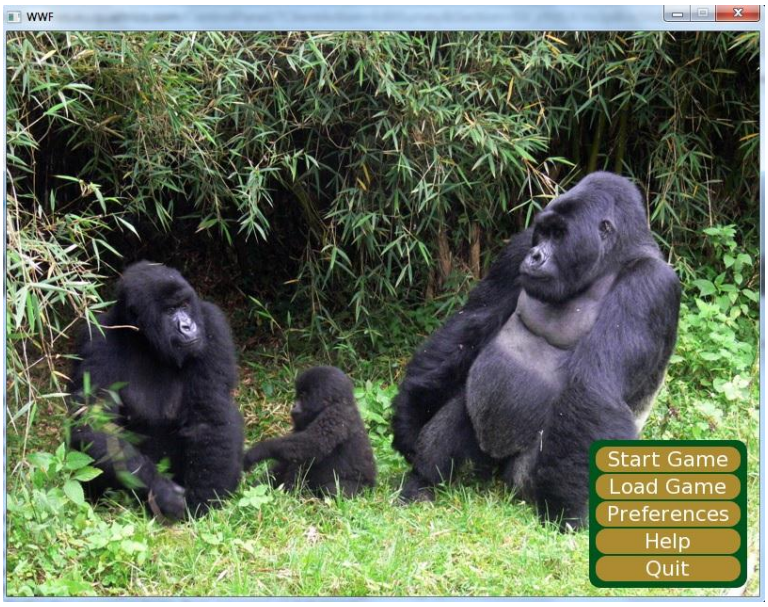



Figure 8: Screenshot of the "Ren Py" application running the “National Park” game

In the game, the player is hired as the new ‘Chief of Nature & Conservation’ by the WWF, where he or she is responsible for managing several funds of a national park. These funds have been made available for the preservation of the park. A screenshot of the textual explanation of the game is displayed in Figure 9.


Figure 9: Screenshot of the explanation of the game

The game consists of five relative years, where players can divide the funds to seven possible solutions to preserve the park. The player is free to divide the funds to their own

preferences per year. The game has three budget options: a casual budget (i.e., € 350.000), a normal budget (i.e., € 275.000) and a realistic budget (i.e., € 200.000). Figure 10 shows a screenshot of the budget choices. The budgets were made on request of the WWF, who would like to use the game in the future. In this case, the additional budgets will become available through external donations after one game is played.


Figure 10: Screenshot of the budget options

Within the experiment, the participants only played the realistic budget, which is based on current budgets available within the WWF for projects. After starting the game, the players received a short textual explanation of the purpose of the game and how it should be played. Each year, the same home screen was shown, consisting of seven possible solutions and an overview option. Figure 11 shows a screenshot of this screen. The solutions are (1) creating a protected area for the gorillas, (2) hiring forest rangers, (3) hiring savannah rangers, (4) creating sustainable farms, (5) creating sustainable plantations, (6) hiring lobbyists, and (7) creating sustainable fisheries. Figure 12 shows the choices a player has when considering hiring a forest ranger.


Figure 11: Screenshot of the home screen (first year)


Figure 12: Screenshots of the solution one "hiring a forest ranger"

After each year, a textual overview is given, showing participants what the effects were of their choices on the human population, the species and the habitats (Figure 13).


Figure 13: Screenshot of the textual overview at the end of each played year

After five years, the game is completed and the participants received a textual overview of their results. First, the current status of the national park is provided by displaying the current surfaces of the habitats and the current population of species. In addition, players are provided with an expectation of when species will become extinct (Figure 14). At the end of the game, each player is provided with a main score for their performance in the game (Figure 15).

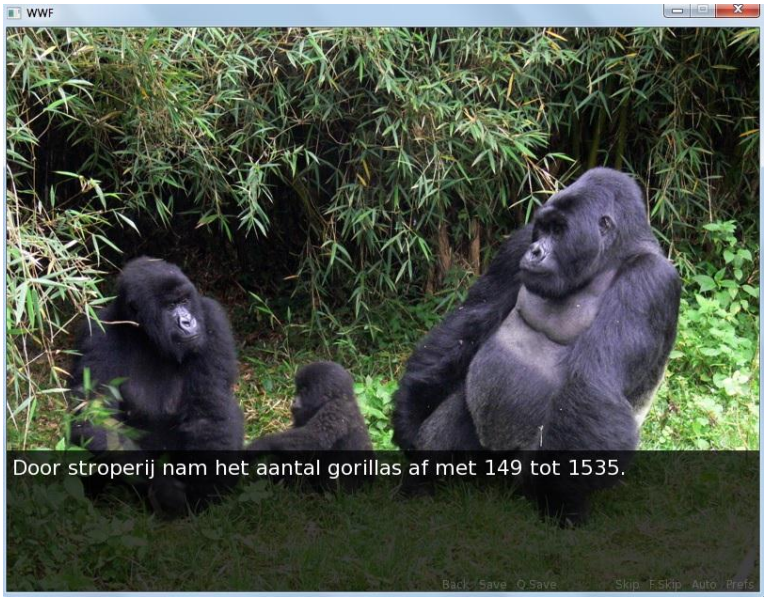



Figure 14: Screenshot of the decrease of species

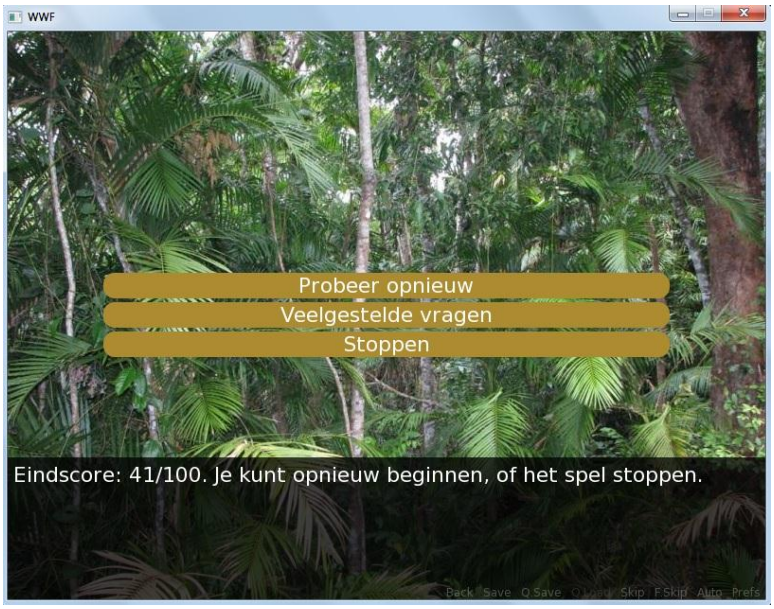



Figure 15: Screenshot of the end screen

This score expresses how well the park has been protected throughout the five years. In order to accomplish a high score, participants had to achieve certain objectives. These objectives are as follows: (1) the savannah should be at least 2098 km2, (2) the size of the forest may not be less than 950 km2, (3) the habitable surface of the lake must be at least 36 km2, (4) the population of gorillas may not be less than 1250, (5) the elephant population may not be less than 295, and (6) the hippo population must be at least 110. The objectives were determined in collaboration with the WWF, based on existing objectives within their Theories of Change.

The last screen provides players with the following options: (1) Try again, (2) Stop, and (3) frequently asked questions (e.g. FAQ). The FAQ provides more information on how habitats and species can be protected, and how each solution works out in the game.

# 4. Results

This chapter presents the results of the experiment. First, a regression is used to check whether the used scales are good predictors of awareness of environmental issues. In addition, a one-way ANOVA and several independent t-tests are executed to test whether the degree of awareness of participants differs between the control group and the experimental group. The chapter ends with a few results on possible changes in giving behaviour.

## *4.1 Predicting awareness*

Because all scales (i.e., environmental attitude, NEP and awareness of consequences) showed an internal consistency of .70 or higher, one variable was created for each scale. Furthermore, the outcome variable 'awareness' was created. Means, standard deviations and correlations for all scale items are presented in Table 1. These descriptions show that the predictor variables environmental attitude, new environmental paradigm, awareness of consequences and ascribed responsibility are highly correlated with the outcome variable awareness.

Table 1: Correlations between the Variables Predicting Awareness (N = 105)

| Variable | M | SD | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|---|
| 1. Awareness | 4.39 | .42 | - | .65*** | .48*** | .64*** | .72*** |
| 2. Environmental Attitude | 5.53 | .73 | .65*** | - | .04 | .32*** | .21* |
| 3. New Environmental Paradigm | 4.61 | .59 | .48*** | .04 | - | .11 | .16* |
| 4. Awareness of Consequences | 4.66 | .53 | .64*** | .32*** | .11 | - | .31*** |
| 5. Ascribed Responsibility | 2.74 | .78 | .72*** | .21* | .16* | .31*** | - |

Note: * p<.05, ** p<.01, *** p<.001

To check whether the used scales can be perceived as predictors for the outcome variable awareness, hierarchical multiple regression was employed within this research. This method requires researchers to specify the order of entry for successive blocks of independent variables according to their causal importance (Cohen & Cohen, 1983). The predictors of awareness are based on previous research and accordingly entered into blocks.

In the first step awareness was entered with environmental attitude ($F = 74.62$, $p = .001$) and explains 56 % of the variance. The scores on environmental attitude appear to be a good predictor of awareness ($\beta = .65$, $p = .001$). On average, it seems that respondents with a higher environmental attitude have a higher degree of awareness of environmental issues. In the second step new environmental paradigm was added to the regression. This model was an improvement to the first model ($F_{change} = 58.65$, $p = .001$) and explains 83 % of the variance. The scores on new environmental paradigm appear to be a good predictor of awareness ($\beta = .46$, $p = .001$). On average, this showed that respondents who scored high on the new environmental paradigm scale have a higher degree of awareness of environmental issues. The third step added awareness of consequences to the regression. This model was an improvement to the second model ($F_{change} = 91.35$, $p = .001$) and explains 100 % of the variance. The scores of awareness of consequences appear to be a good predictor of awareness ($\beta = .44$, $p = .001$). On average, respondents who have a higher awareness of consequences have a higher degree of awareness of environmental issues. In the fourth step ascribed responsibility was entered. This model was an improvement to the third model ($F_{change} = 21.77$, $p = .001$) and explains 100 % of the variance. The scores of ascribed responsibility appear to be a good predictor of awareness ($\beta = .47$, $p = .001$). On average, it seems that responded who ascribe more responsibility for the environmental to themselves, have a higher degree of awareness of environmental issues. A summary of these analyses is presented in Table 2. Upon checking all models, none of the assumptions were violated.

Table 2: Summary of Hierarchical Regression Analysis for Variables Predicting Awareness (N = 105)

| | *B* | *SE B* | *B* | $R^2$ |
|---|---|---|---|---|
| *Model 1* | | | | .42*** |
| Constant | 2.33 | 0.24 | | |
| Environmental Attitude | 0.37 | 0.04 | .65*** | |
| *Model 2* | | | | .63*** |
| Constant | 0.89 | 0.27 | | |
| Environmental Attitude | 0.36 | 0.04 | .63*** | |
| New Environmental Paradigm | 0.32 | 0.04 | .46*** | |
| *Model 3* | | | | .81*** |
| Constant | -0.14 | 0.22 | | |
| Environmental Attitude | 0.28 | 0.03 | .49*** | |
| New Environmental Paradigm | 0.29 | 0.03 | .42*** | |
| Awareness of Consequences | -0.35 | 0.04 | .44*** | |
| *Model 4* | | | | 1.00*** |
| Constant | 1.32 | 0.00 | | |
| Environmental Attitude | 0.25 | 0.00 | .44*** | |
| New Environmental Paradigm | 0.25 | 0.00 | .36*** | |
| Awareness of Consequences | 0.25 | 0.00 | .32*** | |
| Ascribed Responsibility | 0.25 | 0.00 | .47*** | |

Note: $R^2$ = *.42*** for Model 1,* $\Delta R^2$ = .63*** for Model 2, $\Delta R^2$ = .80*** for Model 3 (p < .005), $\Delta R^2$ = 1.00*** for Model 4. *** p<.001

### *4.2 The effect of game mode*

A one-way ANOVA has been conducted to measure effect sizes of the independent variable game mode (i.e., control game vs. serious game) on the dependent variable awareness. Means and standard deviations of the conditions are presented in Table 3. The ANOVA checked whether there were any differences in effect of game mode on awareness. There were no significant main effects found of game mode on awareness F(1,103) = .001, p = .97. It seemed that game mode did not make any differences in the degree of awareness of environmental issues participants have.

Furthermore, a separate ANOVA was conducted to check if effect sizes of game mode on awareness were different for males and females. Within the control group, females scored higher on awareness (*M* = 4.34, *SD* = 0.40) than males (*M* = 4.33, *SD* = 0.42). However, this effect was not significant F(1,52) = .45, p = .51. In addition, in the experimental group females scored higher on awareness (*M* = 4.40, SD = .46) than males (M = 4.34, *SD* = .31). Though, this effect was also not significant F(1,49) = .16, p = .69.

Table 3: Means on Awareness between conditions (control game vs. serious game) (N=105) (Standard Deviations between Brackets)

| | Awareness |
|---|---|
| Control Game (N = 54) | 4.39 (0.41) |
| Serious Game (N = 51) | 4.38 (0.43) |

Independent t-tests have been conducted to check whether results would be different per scale (i.e., environmental attitude, new environmental paradigm, awareness of consequences and ascribed responsibility). Reported means for the last scale (i.e., ascribed responsibility) are lower than the means of the other scales (i.e., environmental attitude, new environmental paradigm and awareness of consequences) due to the fact that the answers of the AR-scale have been measured on a 4-point scale instead on a 7-point scale.

The first t-test showed that participants playing the control game ($M$ = 5.56, $SD$ = 0.76) scored higher on environmental attitude than participants playing the serious game ($M$ = 5.51, $SD$ = .70). However, this effect was not significant t(103) = .34, p = .73. Furthermore, participants playing the serious game ($M$ = 4.66, $SD$ = 0.55) scored higher on new environmental paradigm than participants playing the control game ($M$ = 4.57, $SD$ = 0.63). Nevertheless, this result was not found significant t(103) = -.76, p = .45. In addition, independent t-tests were executed for awareness of consequences, where participants in the control group scored higher ($M$ = 4.70, $SD$ = 0.54) than participants in the experimental group ($M$ = 4.61, $SD$ = 0.53). This result was also not significant t(103) = .90, p = .37. Finally, ascribed responsibility was higher for respondents playing the serious game ($M$ = 2.76, $SD$ = 0.81) than respondents playing the control game ($M$ = 2.72, $SD$ = 0.76). However, this result was not found significant t(103) = -.28, p = .78. Means and standard deviations of the conditions on several subscales are presented in Table 4.

Table 3: Means on Environmental Attitude, New Environmental Paradigm, Awareness of Consequences and Ascribed Responsibility between conditions (control game vs. serious game) (N=105) (Standard Deviations between Brackets)

| | Environmental Attitude | New Environmental Paradigm | Awareness of Consequences | Ascribed Responsibility |
|---|---|---|---|---|
| Control Game (N = 54) | 5.56 (0.75) | 4.57 (0.63) | 4.70 (0.54) | 2.72 (0.76) |
| Serious Game (N = 51) | 5.51 (0.70) | 4.66 (0.55) | 4.61 (0.53) | 2.76 (0.81) |

*4.3 Giving behaviour*

Finally, an independent t-test checked whether respondents, who were nondonors during the experiment, would become a donor because of the game they played. Results showed that respondents playing the control game were more eager to become a donor ($M$ = 1.78, $SD$ = 0.42) than respondents who played the serious game ($M$ = 1.67, $SD$ = 0.48). However, this difference was not found significant t(68) = 1.00, p = .32.

Furthermore, a cross tabulation on game mode and becoming a donor was conducted to check whether the results would differ for gender. In both conditions, women were more eager to donate than men. However, this result was not significant $\chi^2(1) = 1.43$, $p = .23$.

# 5. Discussion

In this chapter the results of the experiment are interpreted. There are several questions left which cannot be answered by current results. Because of this, the chapter describes possible explanations for the absence of increase of awareness, and touches upon the purposes current serious game could fulfil in the future. Within these answers, recommendations for future work are given. This chapter concludes with practical and theoretical implications of this study.

## *5.1 Results*

This research examined whether playing a serious game could lead to more awareness of environmental issues. Awareness was measured through several scales (i.e., environmental attitude, new environmental paradigm, awareness of consequences and ascribed responsibility) which proved to be good predictors of awareness. Respondents who scored high on the subscales also have a high degree of awareness of environmental issues. Detailed information on these results is provided in section 4.1.

Results show that the degree of awareness did not significantly differ between both conditions. Game mode did not influence the degree of awareness. In addition, no significant effects were found on gender and degree of awareness (section 4.2). Moreover, both conditions did not significantly differ on participants' eagerness to donate, and no effects were found on gender and eagerness to donate.

A notable high mean was found between game mode and the environmental attitude scale (section 4.2, Table 3) in comparison to the other subscales. When reviewing the literature, it seems that respondents in general score high on this scale. A study by Schultz (2000) showed likewise results. In Schultz' study, Social Value Orientations were assessed with the scale, showing high means for prosocial ($M$ = 5.27), individualistic ($M$ = 6.04) and

competitive ($M$ = 6.18) types. These similar results could explain the high means found within this study.

*5.2 Absence of increased awareness*

The developed serious game used within this study did not significantly raise the degree of awareness of environmental issues in comparison to the control game. A possible explanation is that the serious game does not completely resemble the reality of a national park. Although the implementation model serving as the basis for the serious game has been approved as a correct representation of the reality by the experts of WWF, the model has not been tested in comparison with a real and existing national park. A follow-up study might consider this as an interesting research topic.

In addition, the possibility exists that the elements of the game were not familiar enough for the participants. Respondents might not have been able to feel a connection with the situation sketched by the game or identify with the role they play in it. According to Zyda (2005) games should be able to provide a high amount of player involvement in order to deliver behaviour change experiences. The serious game was based on real information of the WWF on Virunga National Park where the elements of the game resemble the current situation of this park in Central-Africa. In this way, the settings of the game might feel ‘far away from home’ which could have resulted in current outcomes. Screenshots of each game screen is provided in Appendix IV. Future research could consider creating another serious game where elements of Dutch environmental problems are added. In this way, participants might be more able to identify with the game. A pre-test could measure the degree of connectedness respondents feel with the game, followed by an experiment measuring the degree of awareness of environmental issues.

*5.3 The purpose of current serious game*

Despite the fact that the developed serious game of this study did not significantly raise awareness of environmental issues, this game can still serve some purposes. In this study, awareness of environmental issues was measured. However, in social sciences different kinds of awareness are defined, of which one is "having knowledge about things" (Lee & Chang, 2007). The possibility exists that the use of current serious game leads to a higher degree of awareness of WWF's projects because the elements of the game are based on their project in Virunga National Park. Furthermore, the general awareness of WWF could increase because players compete in the game as an employee of WWF. Future research should consider setting up an experiment where it is investigated whether the current game can be used to raise awareness of either WWF or of their projects. Furthermore, the WWF could use current game to impart knowledge of their projects to new employees. In this light, future work could consider measuring the increase of awareness of WWF's employees.

*5.4 Practical and theoretical implications*

The results of this research have some theoretical implications. Little research is available on the use of serious games to raise awareness. Most research is aimed at the use of serious games in medical schools, where medical students' clinical knowledge is measured (Burden & Slater, 2008). In addition, little research is available on how charitable organisations can increase awareness among current and new givers. The majority of research available discusses the use of marketing solutions, such as creating a charity reputation and a strong brand (Bennet & Gabriel, 2003; Haigh & Gilbert, 2005). In this light, current study, where the use of a serious game to raise awareness for a charitable organisation is researched, fills this gap in science. This study will be an addition to the available literature and provides several possibilities for future research.

Furthermore, this research leads to a few practical implications. For the purpose of this study, a serious game has been created for WWF, the Netherlands. As explained in the previous section, WWF could use this game in an experiment to impart knowledge about one of their projects to their followers, current and potential donors and volunteers. While the current study does not give reasons to assume that the game is successful at raising environmental awareness, it might be used to successfully impart information about certain projects of WWF.

# 6. Conclusion

This research examined whether a serious game could lead to a higher degree of awareness of a charitable organisation. For the purpose of this research, a collaboration with WWF, the Netherlands was established. This research consists of two parts. First, a serious game was created based on realistic data and information provided by the WWF. Second, an experiment was conducted to test whether playing a serious game would lead to more environmental awareness. In this chapter, the hypotheses which were presented in the theoretical framework will be confirmed or rejected according to the results of the experiment. Furthermore, the research questions which were presented in the introduction will be answered with the collected information available in this thesis.

## *6.1 Hypothetical analysis*

The first hypothesis assumed that playing a serious game could lead to more awareness of a charitable organisation. The foundation of this hypothesis was based on the definition of awareness as having knowledge (Lee & Chang, 2007), and the behavioural change outcomes of previous research on serious games (Baranowski, Buday, Thompson & Baranowski, 2008).

*Individuals who played the serious game will be more aware of environmental issues than individuals who did not play the serious game.*

However, the results of this study show that this hypothesis should be rejected. Participants who played the serious game did not score higher on awareness than participants who played the control game. These results are contradicting the results of previous research, which claims that playing serious games led to positive health-related behaviour changes (Baranowski et al., 2008). This study did not prove a similar outcome with regard to pro-environmental behavioural change.

The second hypothesis stated that playing a serious game could lead to stronger intentions to donate. An essential part of serious games is entertainment, and research indicated that individuals who experience pleasure are more inclined to engage in charitable behaviour (Cunningham, Steinberg & Grev, 1980; Forbes & TeVault, 1975; Isen & Levin, 1972).

*Individuals who played the serious game about a charitable organisation will have a stronger intention to donate to that organisation than individuals who did not play the serious game.*

Based on the results of this study, this hypothesis is also rejected. The results showed no significant difference between both groups and their eagerness to donate. In contrast to earlier research, it seems that entertainment and experiencing pleasure does not automatically lead to an increase in charitable behaviour. However, it might be that respondents playing the control game experienced more pleasure because this game was designed merely to provide fun. The respondents playing the serious game were mainly experiencing a learning process instead of experiencing pleasure, which might have resulted in less eagerness to donate.

The third hypothesis claimed that females would experience more awareness by playing a serious game than males. Research showed that females like to play non-aggressive games, where they can interact with familiar characters and settings (Chou & Tsai, 2007). By playing a familiar serious game, females would gain more awareness.

*The degree of awareness of a charitable organisation will be higher for females who played the serious game than for males who played the serious game.*

This hypothesis is rejected because the effects of gender on game mode and awareness were not found significant. In both conditions, women did score higher on awareness than men but these differences were not significant.

The fourth hypothesis supposed that women, who played a serious game, would have higher intentions to donate than men. On average, women give more money than men when donating (Einolf, 2011). In return, they would like to know how their donations are used.

*The intention to donate to a charitable organisation will be higher for females who played the serious game than for males who played the serious game.*

Results show that this hypothesis should be rejected. In both conditions, women were more eager to donate than men but these results were not significant. It could be that non-donor respondents have strong reasons for not being a donor, which cannot be changed by playing a serious game.

### *6.2 Answering the research questions*

The first research question provides more insight in the process of modelling a specific project of a charitable organisation in order to be used for the design of a serious game. In this study, the project of WWF in Virunga National Park is used.

*How can a specific project of WWF, with all the activities and expenditures included, be modelled?*

A specific project of WWF can be modelled by creating two models: a global model and an implementation model. The first model (i.e., the global model) was created on the basis of realistic information of Virunga National Park, provided by WWF. This model functions as a

framework for the WWF's Theories of Change and is constructed in collaboration with experts of WWF. The first model has been presented to the experts and was evaluated as a correct representation of reality. The global model has been translated in the implementation model, which has also been assessed by the experts and evaluated as an accurate representation of reality.

The second research question addresses the translation of the model into a serious game. The model should be converted into an implementation model in order to be used as basis for the serious game.

*How can this model be translated into a serious game?*

The models can be translated into a serious game by establishing multiple cause and effect relations of the given threats on both flora and fauna, and by determining the effect sizes of the strategies of WWF on these threats. In this way, a conjunction of strategies, threats and targets could be constructed. This has been displayed in a model resembling a neural network which served as the basis for the serious game.

The third research question is aimed at the results of the experiment conducted within this study. This experiment measured whether the designed serious game could raise more awareness of environmental issues, in comparison to a regular game.

*To what extent does the serious game increase awareness for WWF?*

The results did not show any significant differences between the awareness of respondents playing the serious game and respondents playing the control game. Furthermore, differences between both groups on several subscales were also not found significant. It seemed that

game mode did not make a difference in the degree of awareness of environmental issues participants had.

The problems statement of this research addresses the overarching problem leading to this thesis.

*How to raise awareness for charitable organisations through the use of serious games?*

This research has tried to raise the degree of awareness of environmental issues through the use of a developed serious game. This game was based on WWF's Theories of Change of Virunga National Park, where the effects of several threats on flora and fauna have been described. The serious game used within this research did not lead to a higher degree of awareness or more eagerness to donate. It could be that the use of this serious game leads to a higher degree of awareness of WWF's projects. However, the focus of this research was aimed at measuring awareness of environmental issues. There are no reasons to assume that another realistic serious game cannot lead to a higher degree of awareness or more eagerness to donate for charitable organisations.

## References


Ajzen, I., & Fishbein, M. (1980). *Understanding Attitudes and Predicting Social Behavior*. Englewood Cliffs, NJ: Prentice Hall.

Andreoni, J. (2006). Philanthropy. *Handbook of the economics of giving, altruism and reciprocity, 2*, pp. 1201 - 1269.

Baranowski, T., Buday, R., Thompson, D. I., & Baranowski, J. (2008). Playing for Real: Video Games and Stories for Health-Related Behavior Change. *American Journal of Preventive Medicine, 34* (1), pp. 74 - 82.

Bennett, R. (2003). Factors Underlying the Inclination to Donate to Particular Types of Charity. *International Journal of Nonprofit and Voluntary Sector Marketing, 8*, pp. 12 - 29.

Bennett, R., & Gabriel, H. (2003). Image and Reputational Characteristics of UK Charitable Organizations: An empirical study. *Corporate reputation review, 6* (3), pp. 276 - 289.

Boyle, E., Connolly, T. M., & Hainey, T. (2011). The Role of Psychology in Understanding the Impact of Computer Games. *Entertainment Computing, 2*(2), pp. 69-74.

Burke, C. B. (2001). Nonprofit History's New Numbers (and the need for more). *Nonprofit and Voluntary Sector Quarterly, 30* (2), pp. 174-203.

Clarke, G. (1998). Non-Governmental Organizations (NGOs) and Politics in the Developing World. *Political studies, 46* (1), pp. 36 - 52.

Chou, C., & Tsai, M. J. (2007). Gender Differences in Taiwan High School Students' Computer Game Playing. *Computers in Human Behavior, 23* (1), pp. 812 - 824.

Cohen, J., & Cohen. P. (1983). *Applied Multiple Regression/Correlation Analysis for the Behavioral Sciences.* Hillsdale, NJ: Lawrence Erlbaum Associates.

Corti, K. (2006) *Games-based Learning; a serious business application*. PIXELearning

Limited. Retrieved from: www.pixelearning.com/docs/games_basedlearning_ pixelearning.pdf

Cunningham, M. R., Steinberg, J., & Grev, R. (1980). Wanting to and Having to Help: Separate Motivations for Positive Mood and Guilt-Induced Helping. *Journal of Personality and Social Psychology*, *38* (2), p. 181.

Dunlap, R.E., & Van Liere, K.D. (1978). The New Environmental Paradigm: A Proposed Measuring Instrument and Preliminary Results. *Journal of Environmental Education 9*, pp. 10 - 19.

Dunlap, R. E., Van Liere, K. D., Mertig, A. G., & Jones, R. E. (2000). New Trends in Measuring Environmental Attitudes: Measuring Endorsement of the New Ecological Paradigm: a Revised NEP Scale. *Journal of Social Issues, 56* (3), pp. 425 - 442.

Eikenberry, A.M. (2005). Fundraising or Promoting Philanthropy? A Qualitative Study of the Massachusetts Catalogue for Philanthropy. *International Journal of Nonprofit and Voluntary Sector Marketing, 10* (3), pp. 137 - 149.

Einolf, C. J. (2011). Gender Differences in the Correlates of Volunteering and Charitable Giving. *Nonprofit and Voluntary Sector Quarterly*, *40* (6), pp. 1092 - 1112.

Forbes, G. B., & Tevault, R. K. (1975). The Facilitation of Anonymous Helpfulness by a Fortuitous Pleasant Event. *The Journal of Social Psychology*, *97* (2), pp. 299 - 300.

Glaser, J. S. (1994). *The United Way Scandal: An Insider's Account of What Went Wrong and Why*. New York: Wiley.

Greenberg, B. S., Sherry, J., Lachlan, K., Lucas, K., & Holmstrom, A. (2010). Orientations to Video Games among Gender and Age Groups. *Simulation & Gaming, 41*(2), pp. 238-259.

Gouldner, A. (1960). The Norm of Reciprocity, *American Sociological Review, 25*, pp. 161 - 178.

Haigh, D., & Gilbert, S. (2005). Valuing Not-for-profit and Charity Brands: Real Insight or just Smoke and Mirrors. *International Journal of Nonprofit and Voluntary Sector Marketing*, *10*(2), pp. 107 - 119.

Harvey, J. W., and McCrohan, K. F. (1988). Fund-Raising Costs: Societal Implications for Philanthropies and Their Supporters. *Business and Society, 27* (1), pp. 15 - 22

Isen, A. M., & Levin, P. F. (1972). Effect of Feeling Good on Helping: Cookies and Kindness. *Journal of Personality and Social Psychology*, *21* (3), p. 384.

Koster, R. (2004). *Theory of Fun for Game Design*. Scottsdale, AZ: Paraglyph Press.

Lee, Y. K., & Chang, C. T. (2007). Who Gives What to Charity? Characteristics Affecting Donation Behavior. *Social Behavior and Personality: an international journal*, *35*(9), pp. 1173 - 1180.

Lerner, M. J. (1975). The Justice Motive in Social Behavior: Introduction. *Journal of Social Issues*, *31* (3), pp. 1 - 19.

Lichtenberg, J. (2009). What Is Charity?. *Philosophy & Public Policy Quarterly*, *29* (3/4), pp. 16-20.

Matthews, B. & Ross, L. (2010). *Research Methods: A Practical Guide for Social Sciences.* Harlow, Essex: Pearson Education Limited.

Merchant, A., & Ford, J. (2008). Nostalgia and Giving to Charity: a Conceptual Framework for Discussion and Research. *International Journal of Nonprofit and Voluntary Sector Marketing*, *13* (1), pp. 13 - 30.

Michael, D. & Chen, S. (2006) *Serious Games: Games that Educate, Train, and Inform.* Boston, MA.: Thomson Course Technology.

Miller, D. T. (1977). Altruism and Threat to a Belief in a Just World. *Journal of Experimental Social Psychology*, *13* (2), pp. 113 - 124.

Pharoah, C., & Tanner, S. (1997). Trends in Charitable Giving. *Fiscal Studies*, *18* (4), pp.

427 - 443.

Powell, W. W., & Steinberg, R. (Eds.). (2006). *The Nonprofit Sector: A Research Handbook.* Yale University Press.

Radley, A., & Kennedy, M. (1995). Charity Giving by Individuals: A Study of Attitudes and Practice. *Human Relations, 48,* pp. 685 - 709.

Roberts, R. D. (1984). A positive Model of Private Charity and Public Transfers. *The Journal of Political Economy, 92* (1), pp. 136-148.

Ryan, A., & Spash, C. L. (2008). *Measuring Awareness of Environmental Consequences: Two Scales and Two Interpretations.* CSIRO Sustainable Ecosystems.

Sargeant, A. (1999). Charitable Giving: Towards a Model of Donor Behaviour. *Journal of Marketing Management, 15*, pp. 215 - 238.

Sargeant, A., Ford, J. B., & West, D. C. (2006). Perceptual Determinants of Nonprofit Giving Behavior. *Journal of Business Research*, *59* (2), pp. 155 - 165.

Schlegelmilch, B. B. (1988). Targeting of fund-raising appeals—How to identify donors. *European Journal of Marketing*, *22* (1), pp. 31 - 40.

Schlegelmilch, B. B., Diamantopoulos, A., & Love, A. (1992). Determinants of Charity Giving: an Interdisciplinary Review of the Literature and Suggestions for Future Research. *Marketing Theory and Applications*, *3*, pp. 507 - 516.

Schultz, P. W., & Zelezny, L. C. (1998). Values and Proenvironmental Behavior A Five-Country Survey. *Journal of Cross-Cultural Psychology*, *29* (4), pp. 540 - 558.

Schuyt, T. N., Gouwenberg, B. M., Bekkers, R. H. F. P., Meijer, M. M., & Wiepking, P. (2007). Geven in Nederland 2007: Giften, legaten, sponsoring en vrijwilligerswerk. Amsterdam, NL: Reed Business.

Schwartz, S. H. (1977). Normative Influences on Altruism. *Advances in Experimental Social Psychology*, *10*, pp. 221 - 279.

Stanley, K. O., Bryant, B. D., & Miikkulainen, R. (2005). Evolving Neural Network Agents in the NERO Video Game. *Proceedings of the IEEE*, pp. 182 - 189.

Stern, P. C., Dietz, T., Abel, T., Guagnano, G. A., & Kalof, L. (1999). A Value-Belief-Norm Theory of Support for Social Movements: The Case of Environmentalism. *Human ecology review*, *6* (2), pp. 81 - 98.

Stern, P. C., Dietz, T., & Guagnano, G. A. (1995). The New Ecological Paradigm in Social-Psychological Context. *Environment and Behavior*, *27* (6), pp. 723 - 743.

Susi, T., Johannesson, M., & Backlund, P. (2007). Serious games: An Overview. Technical Report HS- IKI -TR-07-001, School of Humanities and Informatics, University of Skövde, Sweden.

Thompson, D., Baranowski, T., Buday, R., Baranowski, J., Thompson, V., Jago, R., & Griffith, M. J. (2010). Serious Video Games for Health: How Behavioral Science Guided the Development of a Serious Video Game. *Simulation & Gaming*, *41* (4), pp. 587 - 606.

United Nations, (UN). (2003). NGO Committee Concludes 2002 Resumed Session, with Final Recommendations on Economic and Social Council Consultative Status. *UN Press Release NGO/494.* Available at http://www.un.org/News/Press/docs/2003/ ngo494.doc.htm

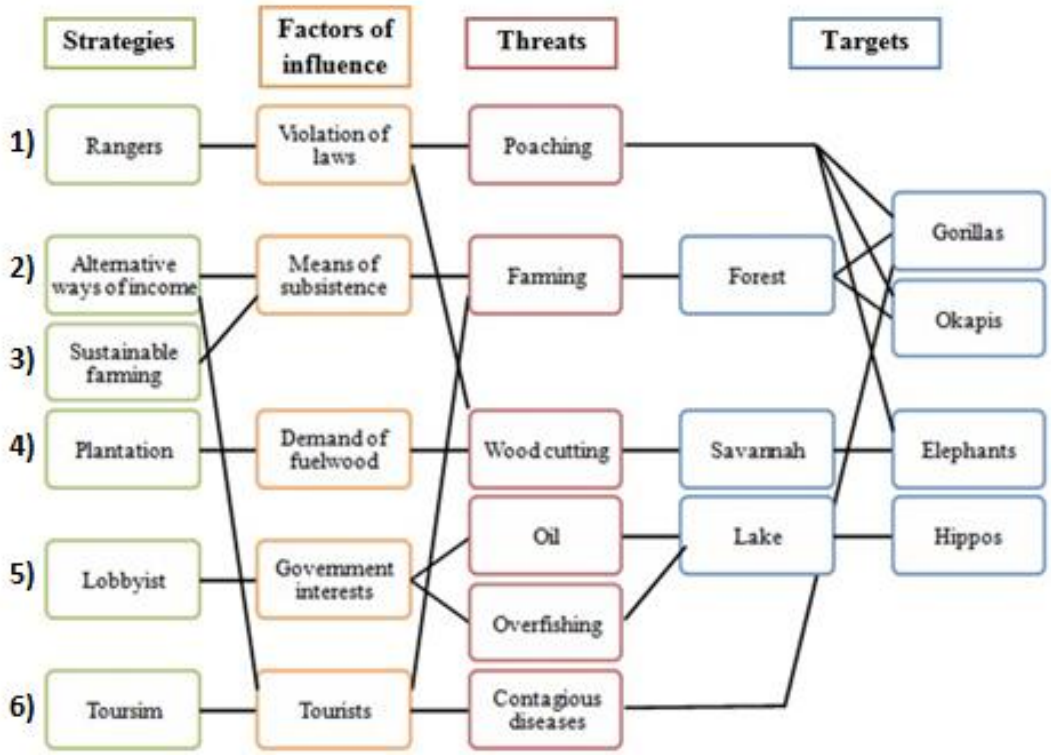
Van Liere, K. D., & Dunlap, R. E. (1980). The Social Bases of Environmental Concern: A Review of Hypotheses, Explanations and Empirical Evidence. *Public Opinion Quarterly*, *44* (2), pp. 181 - 197.

Wapner, P (2012). *World Wildlife Fund: The Wiley-Blackwell Encyclopedia of Globalization*. Oxford, UK: Blackwell Publishing.

Zyda, M. (2005) From Visual Simulation to Virtual Reality to Games. *Computer*, 38(9), pp. 25 - 32.

# Appendices

*Appendix I Global model*



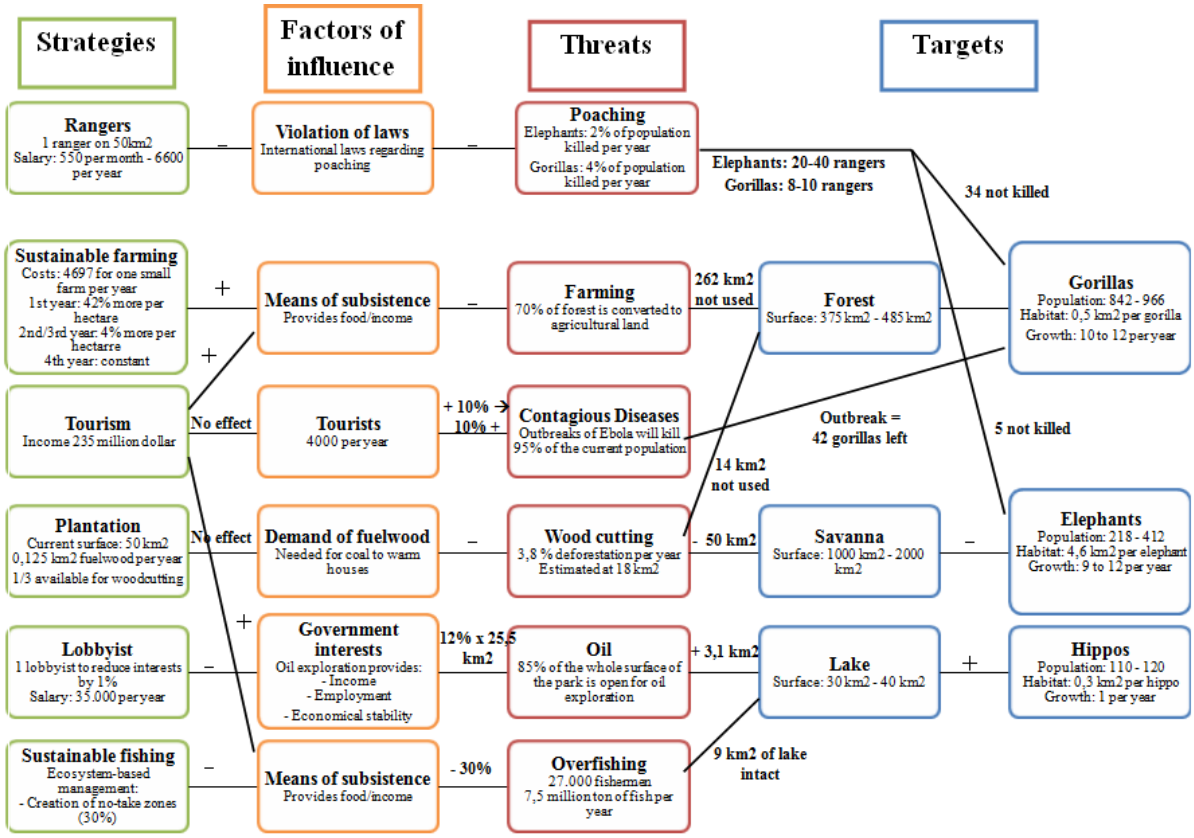

The global model is the first translation of the Theories of Change (ToCs) of WWF. The ToCs consists of four elements: targets (i.e., the habitats and species they want to protect), threats (i.e., main threats for the targets), factors of influence (i.e., causes of the threats), and strategies (i.e., solutions to prevent or counter the threats). The four elements are displayed from left to right and are each presented in a different colour (i.e., green, orange, red and blue). Furthermore, each element can be divided into several components which resulted in six conjunctions of strategies, threats and targets:

1) Poachers are threatening the existence of gorillas, okapis and elephants. These species are either poached for their meat and skin, or for ivory. A factor of influence of poaching is a violation of laws. In Virunga National Park, laws exists which make poaching of several species illegal. However, poachers are violating these laws. A strategy to prevent poaching is the deployment of rangers. Rangers patrol the area to prevent poachers from poaching which can result in the preservation of species.
2) When the populations finds alternative ways of income, there means of subsistence will change. In this way, less income out of farming is needed which reduces the pressure on the current farms. When fewer farms are needed to support the population, less forest will be affected.
3) One solution affecting the population's means of subsistence is sustainable farming, where less surface of farming is needed to produce the same amount of food. In this way, the pressure on current farms is reduced which will result in less decrease of the forest.
4) The populations needs fuel wood to warm their houses. The demand for fuel wood results in the cutting of wood of the forest. A way to reduce the cutting of wood, is the construction of wood plantations. On the one hand, this will result in less degradation of

the forest, while on the other hand surface of the savannah is needed for the construction of the plantations.

5) The lake in the national park seems to contain oil which aroused the interest of several oil companies and the government. Oil can be a huge source of income for a country and therefore, governments are usually interested in grants of oil companies. However, the drilling of oil can lead to the pollution of the lake which affects the living environment of the hippos. A lobbyist could be hired to reduce the interests of the government in oil drilling by showing the risks and dangers for the environment. When the government does not approve the drilling of oil, there will be no pollution of the lake.
6) Another alternative way of income is tourists. Tourists create employment and can boost the economy. However, tourists also bring contagious diseases which can affect the gorilla population.

*Appendix II Second model*

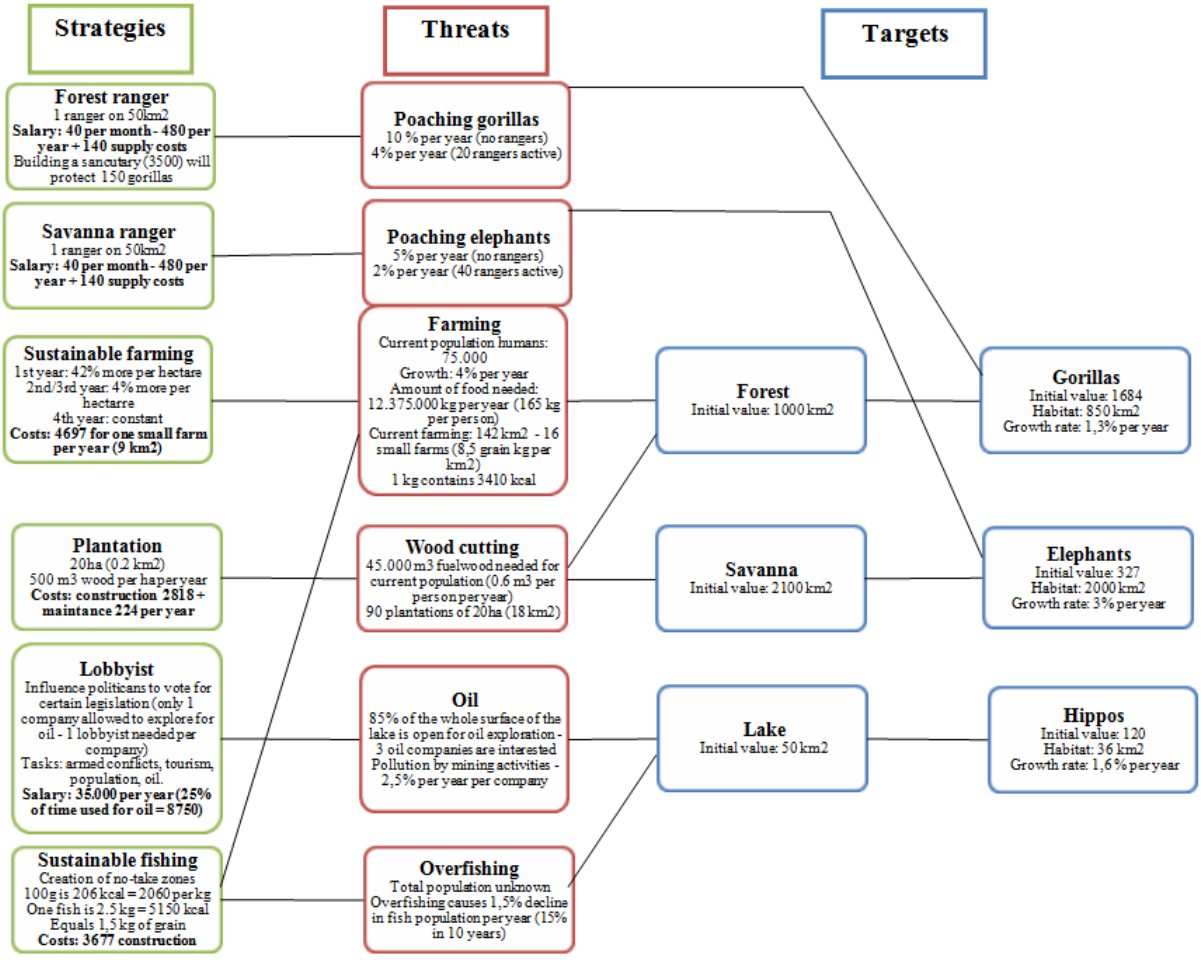



The second model is an extension of the first model where detailed information on all components has been added. Furthermore, the relations between the four elements have been expanded by the addition of numbers and symbols indicating an increase or decrease. All information in this model is based on knowledge of experts of WWF and the literature.

1) Forest rangers (protecting gorillas): The start population of gorillas is 1684, living in a forest of 1000 km2 and with a growth rate of 1.013 percent per year. One ranger can patrol 50 km2 of forest and will cause a decrease in the violation of laws and the poaching of animals. Because poaching cannot be stopped entirely, the percentage of gorillas killed will stay at four percent when twenty rangers are hired (ranger area > forest area). The costs of each ranger is € 550 per year (amount of rangers x € 550). After each year the amount of gorillas is determined via the following formula: (high protected gorillas + medium protected gorillas x poaching protected gorillas (0.96) + low protected gorillas x poaching gorillas (0.9)) * gorillas growth (1.013). Whenever the gorilla population reaches the minimum of 842 or the surface of the forest drops below the required 375 km2, the gorillas will become extinct.
   Savannah rangers (protecting elephants): The start population of elephants is 327, living on the savannah of 2000 km2 and with a growth rate of three percent per year. The percentage of elephants killed by poachers will stay at two percent when 40 rangers are active (ranger area > savannah area). The costs are the same (amount of rangers x € 550). After each year, the population of elephants is measured via: (medium protected elephants * poaching protected elephants (0.98) + low protected elephants * poaching elephants (0.965)) * elephant's growth (1.03). When the population of elephants falls below the minimum of 218, or the surface of the savannah is less than 1000 km2, the elephants will become extinct.

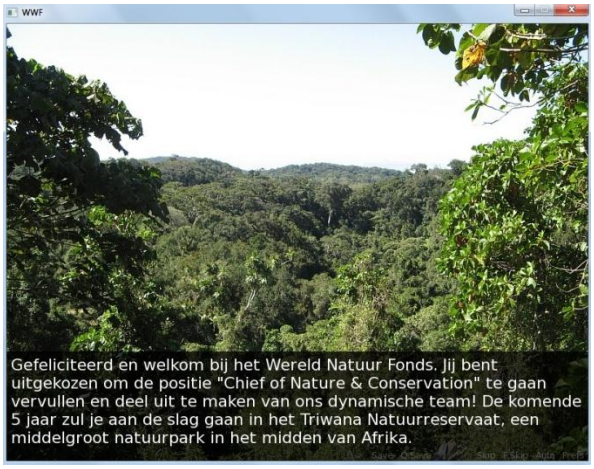
2) Sustainable farming: A sustainable farm leads to more food production (increase in means of subsistence) on the same amount of soil. After one year 42 percent more food is harvested per hectare (food production x 1.42), and this will increase by four percent in the second (food production x 1.46) and third year (food production x 1.50). After the fourth year, the amount of food harvested will stay the same. The costs of making a farm sustainable are € 4697 (amount of farms made sustainable x € 4697). When the population has more means of subsistence, less forest is needed to be converted in farm lands. In this way, the surface of the forest and the population of gorillas are maintained.
3) The WWF does not have any effect on the amount of tourists but an increase of tourists can lead to higher risks of contagious diseases. When the amount of tourists increases with ten percent, the chance of an outbreak of a contagious disease also increases with ten percent. Contagious diseases have an effect on the population of gorillas. For example, a possible outbreak of the Ebola virus can kill 95 percent of the populations which causes only 42 gorillas to remain alive. This number is far below the minimum population which will result in the extinction of the gorilla population.
4) Plantations do not have any effect on the demand of fuel wood. The population always needs an estimated amount of 0.6 m3 per person per year to warm their houses. However, the construction of plantations can lead to a decrease in wood cutting in the forest, which ensures that the forest is preserved. The construction of a plantation costs € 2818, alongside additional maintenance costs of € 224 per year (€ 2818 + (€ 224 * 5) = € 3938). The size of one plantation is 0.2 km2 and produces 500m3 fuel wood. New plantations will be constructed on the savannah which will lead to a decrease of this habitat. In this way, the elephants will be threatened because their minimal living environment is affected.
5) Hiring a lobbyist costs € 35.000 per year (amount of lobbyist x € 35.000). A lobbyist has multiple tasks (i.e., armed conflicts, tourism, population and oil). Because of this, the costs for lobbying against oil are only € 8750 (€ 35.000 / 4). The lobbyist can decrease government's interests in oil drilling and production which can provide the country with employment, income and economical stability. In the current situation, three oil companies are active in the lake area. Each company pollutes 1.2 km2 of the lake per year with their oil drilling activities. Because of the benefits of oil production for the government, a complete exclusion of all oil companies is not realistic. However, when a lobbyist is hired, the amount of oil companies active is reduced to one (oil companies with lobbyist (1) x oil area per company per year (1 x 1.2)). When there is no lobbyist hired, the three oil companies stay active within the area (oil companies without lobbyist (3) x oil area per company per year (3 x 1.2)). The decrease in the minimum liveable surface of the lake (36 km2) can cause the population of hippos to become extinct (lake area / area per hippo (0.33 km2)). The start population of hippos is 120, living in a lake of 45 km2 and with a growth rate of 1.02 percent per year.
6) Overfishing can cause a decrease in the liveable surface of the lake which can result in the extinction of hippos. A solution is sustainable fishing, where a no-take zone will be created (30 % of the surface = 13.5 km2). The costs of constructing a no-take zone are € 3677. Because of the no-take zone, 13.5 km2 of the lake remains liveable which benefits the hippo population. However, the no-take zone will lead to a decrease in means of subsistence (fish) which leads to a higher food demand from farms.

*Appendix III Implementation model*




The third model is the translation of the second model into an implementation model in order to be used as the basis for the serious game. Rangers have been divided between forest and savannah rangers because the use of rangers have different effects on gorillas (decrease of four percent) and elephants (decrease of two percent). Furthermore, the surface of the forest (1000 km2) and the savannah (2000 km2) are different which results in the requirement of different amount of rangers to protect the whole area. Furthermore, the amount of grain and fish needed per person per year should be different on the basis of kcal and energy levels. However, for the purpose of this game both sources have been simplified into the main term 'nutrition'. In this way, one formula has been used where one person needs 315 kg of nutrition per year (165 kg of grain and 100 kg of fish, 1 kg of grain equaling 1 kg of nutrition, and 1 kg of fish equaling 1.5 kg of nutrition). In addition, the current human population has been set at 75.000 with a growth rate of four percent per year. This is based on information found in the literature.

*Appendix IV  Game screens*



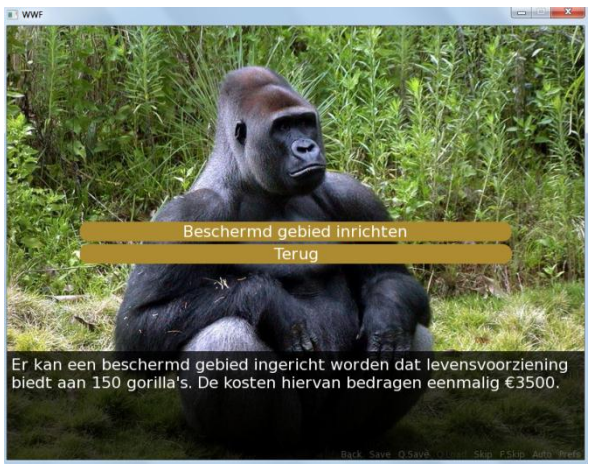



WWF
Overzicht
Beschermd gebied
Woud rangers
Savanne rangers
Duurzame landbouw
Houtplantages
Lobbyisten
Duurzame visserij
Klaar
Het jaar is 2014. Het resterende budget is €200000.


WWF
Het reservaat bestaat uit 1000,0 km² bos, 2100,0 km² savanne, en 45,0 km² leefbaar meer. Het huisvest 1684 gorilla's, 327 olifanten, en 120 nijlpaarden. De lokale bevolking telt 75000 personen. Er zijn 16 boerderijen, waarvan 0 duurzaam. Er zijn 90 plantages voor brandstofproductie.


WWF
Je doel is ervoor te zorgen dat er na 5 jaar minimaal 950,0 km² bos, 2098,0 km² savanne, en 36,0 km² leefbaar meer is, en dat het aantal gorillas, olifanten, en nijlpaarden respectievelijk minimaal 1250, 295, en 110 is.


WWF
Overzicht
Beschermd gebied
Woud rangers
Savanne rangers
Duurzame landbouw
Houtplantages
Lobbyisten
Duurzame visserij
Klaar
Het jaar is 2014. Het resterende budget is €200000.


WWF
Beschermd gebied inrichten
Terug
Er kan een beschermd gebied ingericht worden dat levensvoorziening biedt aan 150 gorilla's. De kosten hiervan bedragen eenmalig €3500.


WWF
Overzicht
Beschermd gebied
Woud rangers
Savanne rangers
Duurzame landbouw
Houtplantages
Lobbyisten
Duurzame visserij
Klaar
Het jaar is 2014. Het resterende budget is €200000.


WWF
Stel een nieuwe woudranger aan
Stel vijf nieuwe woudrangers aan
Ontsla een woudranger
Ontsla vijf woudrangers
Klaar
Het aantal woudrangers in dienst is 6. De jaarlijkse kosten van één woudranger zijn €620. Een woudranger kan 50 km² bos bewaken.


WWF
Overzicht
Beschermd gebied
Woud rangers
Savanne rangers
Duurzame landbouw
Houtplantages
Lobbyisten
Duurzame visserij
Klaar
Het jaar is 2014. Het resterende budget is €200000.


WWF
Stel een nieuwe savanneranger aan
Stel vijf nieuwe savanneranger aan
Ontsla een savanneranger
Ontsla vijf savanneranger
Klaar
Het aantal savannerangers in dienst is 6. De jaarlijkse kosten van één savanneranger zijn €620. Een savanneranger kan 50 km² savanne bewaken.


WWF
Overzicht
Beschermd gebied
Woud rangers
Savanne rangers
Duurzame landbouw
Houtplantages
Lobbyisten
Duurzame visserij
Klaar
Het jaar is 2014. Het resterende budget is €200000.


WWF
Maak één boerderij duurzaam
Maak één boerderij toch niet duurzaam
Klaar
Om de opbrengsten van landbouw te verbeteren, kan een boerderij worden geconverteerd naar duurzame landbouw. De kosten bedragen eenmalig €4697 per boerderij. Het aantal boerderijen is 16, waarvan 0 duurzaam. Het aantal dat komend jaar duurzaam wordt gemaakt is 1.


WWF
Overzicht
Beschermd gebied
Woud rangers
Savanne rangers
Duurzame landbouw
Houtplantages
Lobbyisten
Duurzame visserij
Klaar
Het jaar is 2014. Het resterende budget is €200000.


WWF
Leg één nieuwe plantage aan
Leg één plantage toch niet aan
Klaar
Voor brandstofvoorziening wordt brandhout gebruikt. Er zijn momenteel 90 plantages voor brandhout. Nieuwe plantages kunnen worden aangelegd op de savanne. Een nieuwe plantage kost €2818. Daarnaast kost een plantage €224 aan onderhoud per jaar, vooraf te voldoen voor de rest van de periode (dit jaar kost een plantage dus €3938). Het aantal nieuwe plantages dat komend jaar wordt aangelegd is 1.


WWF
Overzicht
Beschermd gebied
Woud rangers
Savanne rangers
Duurzame landbouw
Houtplantages
Lobbyisten
Duurzame visserij
Klaar
Het jaar is 2014. Het resterende budget is €200000.


WWF
Stel een lobbyist aan
Ontsla een lobbyist
Klaar
De regering staat oliemaatschappijen toe olieboringen in het meer te verrichten. Een lobbyist kan worden ingehuurd om de regering te bewegen het aantal olieboringen te verminderen. Een lobbyist kost jaarlijks €8750. Het aantal lobbyisten aangesteld voor komend jaar is 1.


WWF
Overzicht
Beschermd gebied
Woud rangers
Savanne rangers
Duurzame landbouw
Houtplantages
Lobbyisten
Duurzame visserij
Klaar
Het jaar is 2014. Het resterende budget is €200000.


WWF
'No take' zone inrichten
Terug
Er kan een 'no take' zone worden ingericht op het meer om de vispopulatie op peil te houden. De kosten hiervan bedragen eenmalig €3677, maar vermindert de opbrengst van visserij met 30%.


WWF
Jaar afsluiten
Toewijzing verder aanpassen
De totale kosten voor 2014 zijn €32.002. Het resterende budget is €200.000, wat voldoende is om de kosten te dragen.

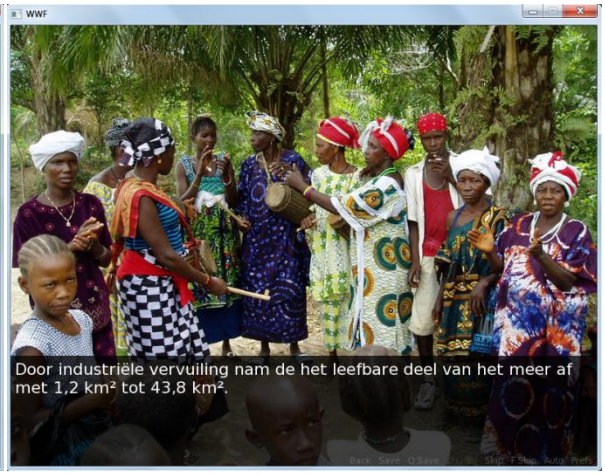

WWF
In 2014 werd nam de lokale bevolking toe tot 78.000 personen. Voor hen was er in 2014 behoefte aan 24.570.000 kg voedsel en 46.800 m³ brandstof.


WWF
Landbouw en visserij leverden in 2014 slechts 20.436.300 kg voedsel op. Om aan de voedselbehoefte te voldoen, werd het aantal boerderijen verhoogd met 6, ten koste van 54 km² bos.


WWF
De plantages voor duurzaam brandhout produceerden in 2014 slechts 45.500 m³ brandstof. Om aan de brandstofbehoefte te voldoen, werd er 0,1 km² bos gekapt.


WWF
De omvang van het bos is met 945,9 km² nu kleiner dan de streefomvang van minimaal 950,0 km².

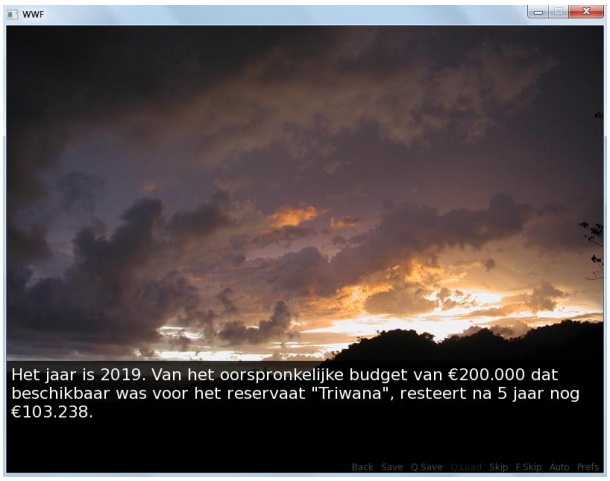

WWF
Door de aanleg van nieuwe plantages voor duurzaam brandhout name de omvang van de savanne af met 0,2 km² tot 2099,8 km².


WWF
Door industriële vervuiling nam de het leefbare deel van het meer af met 1,2 km² tot 43,8 km².


WWF
Door stroperij nam het aantal gorillas af met 149 tot 1535.

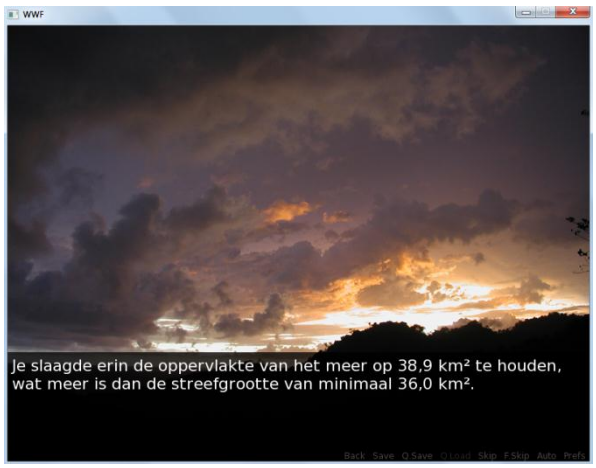

WWF
Door stroperij nam het aantal olifanten af met 6 tot 321.


WWF
Het aantal nijlpaarden nam toe met 2 tot 122.

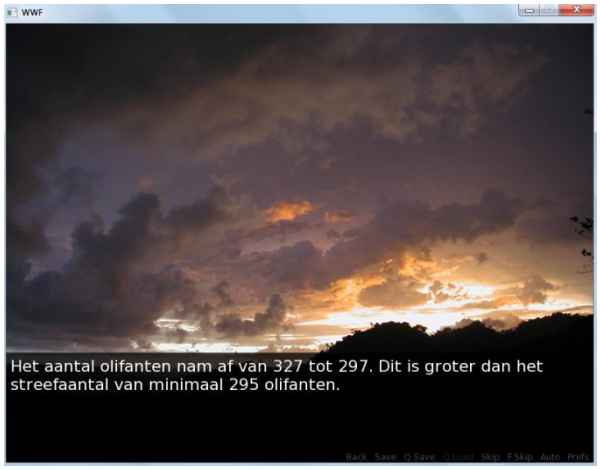

WWF
Het jaar is 2019. Van het oorspronkelijke budget van €200.000 dat beschikbaar was voor het reservaat "Triwana", resteert na 5 jaar nog €103.238.


WWF
De oppervlakte van het bos nam af van 1000,0 km² tot 897,8 km².


WWF
Je slaagde erin de oppervlakte van de savanne op 2099,8 km² te houden, wat meer is dan de streefgrootte van minimaal 2098,0 km².

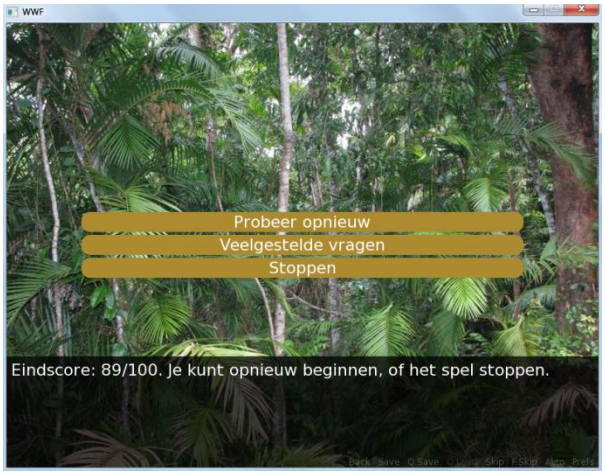

WWF
Je slaagde erin de oppervlakte van het meer op 38,9 km² te houden, wat meer is dan de streefgrootte van minimaal 36,0 km².


WWF
Het aantal gorilla's nam af van 1684 tot 1205. Dit aantal is lager dan het streefaantal van minimaal 1250 gorilla's.


WWF
Het aantal olifanten nam af van 327 tot 297. Dit is groter dan het streefaantal van minimaal 295 olifanten.


WWF
Het aantal nijlpaarden nam af van 120 tot 118. Dit is groter dan het streefaantal van minimaal 110 nijlpaarden.


WWF
Op een schaal van 0 tot 100 punten, wordt je prestatie beoordeeld met 89 punten.


WWF
Probeer opnieuw
Veelgestelde vragen
Stoppen
Eindscore: 89/100. Je kunt opnieuw beginnen, of het spel stoppen.

*Appendix V Questionnaire*

**Environmental attitude**

People around the world are generally concerned about environmental problems because of the consequences that result from harming nature. However, people differ in the consequences that concern them the most. Please rate each of the following items from 1 (not at all important) to 7 (extremely important) in response to the question:

I am concerned about environmental problems because of the consequences for:

1. Plants
2. Marine life
3. Birds
4. Animals
5. Me
6. My lifestyle
7. My health
8. My future
9. People in my country
10. All people
11. Children
12. Future generations

**Awareness of consequences**

NEP

Please rate the following statements from 1 (totally disagree) to 7 (totally agree):

1. We are approaching the limit of number of people the earth can support
2. Humans have the right to modify the natural environment to suit their needs
3. When humans interfere with nature it often produces disastrous consequences
4. Human ingenuity will ensure that we do not make the earth unliveable
5. Humans are severely abusing the environment
6. The earth has plenty of natural resources if we just learn how to develop them
7. Plants and animals have as much right as humans to exist
8. The balance of nature is strong enough to cope with the impacts of modern industrial nations
9. Despite our special abilities humans are still subject to the laws of nature
10. The so-called "ecological crisis" facing humankind has been greatly exaggerated
11. The earth is like a spaceship with very limited room and resources
12. Humans were meant to rule over the rest of nature
13. The balance of nature is very delicate and easily upset
14. Humans will eventually learn enough about how nature works to be able to control it
15. If things continue on their present course, we soon experience a major ecological catastrophe

Awareness of consequences scale

Please rate the following statements from 1 (totally disagree) to 7 (totally agree):

1. Environmental protection will provide a better world for me and my children
2. Environmental protection is beneficial to my health
3. Protecting the environment will threaten jobs for people like me
4. Laws to protect the environment limit my choice and personal freedoms
5. A clean environment provides me with better opportunities for recreation

6. Environmental protection benefits everyone
7. Environmental protection will help people have a better quality of life
8. We do not need to worry much about the environment because future generations will be better able to deal with these problems than we are
9. The effects of pollution on public health are worse than we realise
10. Pollution generated here harms people all over the earth
11. While some local plants and animals may have been harmed by environmental degradation, over the whole earth there has been little effect
12. Over the next several decades, thousands of species will become extinct
13. Claims that current levels of pollution are changing earth's climate are exaggerated
14. Tropical rain forests are essential to maintaining a healthy planet earth
15. Modern development threatens wildlife

**Ascribed responsibility**

How responsible are you for environmental problems?

Extremely Moderately Slightly Not at all responsible

**Demographics**

1. What is your gender?
   - Male
   - Female
2. What is your age?
3. What is your highest level of education?
   - WO-doctoral or master
   - HBO or WO bachelor
   - HBO or WO propedeuse
   - MBO
   - HAVO/VWO
   - MAVO/VMBO (theoretical and combined program)
   - Primary school/no education
   - Do not know/not specified
4. Relative to the people in your country, would you say that your family is?
   1 (lower class) - 10 (upper class)
5. Are you already donor to a charitable organisation?
   - Yes
   - No
6. If not, do you like to become a donor to a charitable organisation?
   - Yes
   - No

*Appendix VI  Questionnaire (Dutch version)*

**Over het algemeen maken mensen zich druk om milieuproblemen, aangezien de consequenties ervan schadelijk kunnen zijn voor de natuur. Echter, er bestaan wel verschillen tussen welke consequenties mensen het meest (en het minst) aangaan. Geef voor alle twaalf onderdelen aan hoe belangrijk (1 = helemaal niet belangrijk, 7 = uiterst belangrijk) u ze acht in relatie tot de gestelde vraag:**

Ik maak me druk om milieuproblemen omdat deze gevolgen kunnen hebben voor:

1. Planten
2. Oceanen
3. Vogels
4. Dieren
5. Mezelf
6. Mijn levensstijl
7. Mijn gezondheid
8. Mijn toekomst
9. Mensen in mijn omgeving
10. Alle mensen
11. Kinderen
12. Toekomstige generaties

**Geef aan in hoeverre u het eens bent met de volgende uitspraken (1 = helemaal mee oneens, 7= helemaal mee eens):**

1. We naderen het limiet van mensen dat de aarde aankan.
2. Mensen hebben het recht om de natuur aan te passen zodat deze voldoet aan hun behoeftes.
3. De bemoeienis van mensen met de natuur resulteert vaak in desastreuze gevolgen.
4. De vindingrijkheid van mensen zal er voor zorgen dat de aarde leefbaar blijft.
5. Mensen maken ernstig misbruik van het milieu.
6. De aarde biedt een groot aantal natuurlijke hulpbronnen zodra mensen leren hoe ze deze moeten ontwikkelen.
7. Planten en dieren hebben evenveel bestaansrechten als mensen.
8. De natuurlijke balans is sterk genoeg om met de gevolgen van moderne industriële landen om te gaan.
9. Ondanks onze speciale vaardigheden zijn mensen nog steeds onderworpen aan de wetten van de natuur.
10. De zogeheten “ecologische crisis”, waar de mensheid mee wordt geconfronteerd, is sterk overdreven.
11. De aarde lijkt op een ruimteschip met zeer beperkte ruimte en middelen.
12. Mensen zijn voorbestemd om te regeren over de rest van de natuur.
13. De natuurlijke balans is erg delicaat en snel aangetast.
14. Mensen zullen uiteindelijk leren hoe de natuur werkt zodat zij deze kunnen beheren.
15. Als dingen doorgaan volgens de huidige koers, zullen we binnenkort een ecologische catastrofe meemaken.
16. Het beschermen van de natuur zorgt voor een betere wereld voor mijzelf en mijn kinderen.
17. Het beschermen van de natuur is bevorderlijk voor mijn gezondheid.
18. Het beschermen van de natuur bedreigt banen voor mensen zoals ik.
19. Natuurbeschermingswetten limiteren mijn keuzes en persoonlijke vrijheden.
20. Een schoon milieu geeft mij meer recreatiemogelijkheden.

21. Het beschermen van de natuur heeft voordelen voor iedereen.
22. Het beschermen van de natuur zorgt ervoor dat mensen een betere levenskwaliteit hebben.
23. We hoeven ons geen zorgen te maken om het milieu omdat toekomstige generaties beter in staat zullen zijn om met milieuproblemen om te gaan dan wij.
24. De effecten van vervuiling op de publieke gezondheid zijn erger dan we ons realiseren.
25. Vervuiling veroorzaakt in mijn directe omgeving schaadt mensen in de gehele wereld.
26. Ondanks dat sommige lokale plant- en diersoorten kunnen zijn geschaad door aantasting van het milieu, op de gehele aarde heeft dit weinig effect gehad.
27. In de aankomende decennia zullen duizenden diersoorten uitsterven.
28. Beweringen dat de huidige niveaus van vervuiling het klimaat aantasten zijn overdreven.
29. Tropische regenwouden zijn essentieel voor het behouden van een gezonde aarde.
30. Moderne industriële ontwikkelingen bedreigen het dierenrijk.

**Geef uw mate van verantwoordelijkheid aan met betrekking tot de volgende vraag (1 = helemaal niet verantwoordelijk, 7 = zeer verantwoordelijk):**

1. Hoe verantwoordelijk acht u uzelf in relatie tot milieuproblemen?

**Demografische kenmerken**

1. Wat is uw geslacht?
   - Man
   - Vrouw
2. Wat is uw leeftijd?
3. Wat is uw hoogst genoten (huidige) opleiding?
   - WO-doctoraal of master
   - HBO of WO bachelor
   - HBO of WO propedeuse
   - MBO
   - HAVO/VWO
   - MAVO/VMBO (theoretische en gemengde leerweg)
   - Basisonderwijs/geen onderwijs
   - Weet niet/geen opgave
4. Geef met een cijfer (1-10) aan in welke inkomensklasse, in vergelijking met landgenoten, uw familie zich bevindt (1= laag inkomen, 10 = hoog inkomen).
5. Bent u op het moment al donateur van een goed doel?
   - Ja
   - Nee
6. Zo nee, zou u donateur willen worden?
   - Ja
   - Nee

*Appendix VII* *Consent form (control group)*


**Uitleg experiment**

Door het lezen van deze uitleg en onderstaande consent verklaring ga je automatisch akkoord met alle voorwaarden van dit experiment. Indien je niet meer wenst deel te nemen na het lezen van dit document, geef dit dan direct aan bij de experimentleider.
Na het lezen van dit document, mag je de Google Chrome browser aanklikken die onderin het scherm al openstaat. Het experiment zal verder via deze browser verlopen.

Binnen dit experiment ga je voor onbepaalde tijd een online game spelen. Het spel staat open op het eerste tabblad van de Google Chrome browser. Na het lezen van dit document mag je direct starten met spelen. Binnen deze game kruip je in de huid van een panda en moet je veilig het pandabos bereiken. Hierbij maak je enkel gebruik van de pijltjestoetsen.

Je speelt het spel voor onbepaalde tijd. Mocht je game-over zijn, dan mag je het spel opnieuw starten. De experimentleider zal aangeven wanneer je mag stoppen met spelen. Hierna wordt je verzocht om het tweede tabblad aan te klikken wat openstaat in de Google Chrome browser.

Het tweede tabblad bestaat uit een online survey. Je zult hier meerdere stellingen beoordelen en vragen beantwoorden. Daarnaast zullen er een aantal algemene vragen gesteld worden met betrekking tot geslacht, leeftijd en opleidingsniveau.

Indien je tijdens het spelen van het spel, of tijdens het invullen van de survey vragen hebt, aarzel dan niet om contact op te nemen met de experimentleider.

Ik wil je vast hartelijk danken voor je deelname aan dit experiment.
Veel succes!

**Informatie & Consentverklaring**

**Code**: 30-61-2013
**Titel**: Het gebruik van serious games in goede doelen organisaties.

Doel onderzoek: In dit onderzoek willen we onderzoeken hoe goede doelen organisaties gebruik kunnen maken van serious games. Een serious game is een spel waarbij zowel educatie als entertainment een grote rol spelen. Binnen dit onderzoek laten we studenten een serious game spelen. Je wordt straks gevraagd om een aantal online vragenlijsten in te vullen en je zult een computerspel gaan spelen.

Duur onderzoek: Het onderzoek duurt ongeveer 30 minuten en je kunt er 0.5 proefpersoonuren mee verdienen.

Vertrouwelijkheid: Alle data die worden verzameld, waaronder de antwoorden op de persoonlijke vragen en de vragenlijst erna, zullen hoogst vertrouwelijk worden behandeld. Jouw naam zal in geen enkel geval verbonden worden aan de resultaten. Alleen leden van het onderzoeksteam of wetenschappers die de data opnieuw willen analyseren hebben toegang tot de data. De onderzoeksgegevens zullen minimaal vijf jaar worden bewaard.

Vrijwillige deelname: Je bent niet verplicht om aan dit onderzoek deel te nemen. Als je toestemt in deelname, kun je op elk moment je deelname aan het onderzoek opzeggen. Je bent niet verplicht om vragen te beantwoorden die je niet wilt beantwoorden.

Contact: Mocht je na afloop van dit onderzoek nog vragen hebben, dan kun je contact opnemen met dhr. Pieter Spronck  of Cindy van Miltenburg.
Voor meer informatie over de richtlijnen waaraan onderzoeken dienen te voldoen, zie het proefpersonenreglement en de ethische richtlijnen onder Course Information van de Proefpersonenpool op Blackboard.

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**Toestemming**

Ik heb de gelegenheid gehad deze Informatie & Consentverklaring te lezen en het onderzoek is aan mij uitgelegd. Ik heb de mogelijkheid gehad om vragen te stellen over het onderzoek en mijn vragen zijn beantwoord. Ik ben bereid om te participeren in het huidige onderzoek. Ik krijg een kopie van deze verklaring na ondertekening.

_____ _____
Handtekening proefpersoon Datum

_____
Naam proefpersoon

_____ _____
Handtekening proefleider Datum

*Appendix VIII* *Consent form (experimental group)*


**Uitleg experiment**

Door het lezen van deze uitleg en onderstaande consent verklaring ga je automatisch akkoord met alle voorwaarden van dit experiment. Indien je niet meer wenst deel te nemen na het lezen van dit document, geef dit dan direct aan bij de experimentleider.
Na het lezen van dit document, willen we je verzoeken om de experimentleider te raadplegen. Zij zal het programma open wat van belang is voor de rest van dit experiment.

Binnen dit experiment ga je voor onbepaalde tijd een serious game spelen. Binnen dit spel kruip in je in de huid van een goede doelen organisatie die zich bezig houdt met het behoud van de natuur. Een nieuw project draait om het behoud van een nationaal natuurpark, waarin olifanten, gorilla's en nijlpaarden leven.

Het natuurpark en haar inwoners heeft last van diverse bedreigingen, zoals stroperij en houtkap. Je krijgt een initieel budget toegewezen wat je mag verdelen over diverse oplossingen voor deze bedreigingen. Je bent volledig vrij om te bepalen of je geld toewijst aan een oplossing of niet. Het is hierbij echter wel van belang dat je zowel de dierenpopulaties zo goed mogelijk in stand houdt, als de leefgebieden waarin ze leven (bos, savanne en het meer).

Het spel zal bestaan uit 10 relatieve jaren. Ieder jaar mag je zoveel en zo weinig budget verdelen als je zelf wilt. Na het verdelen van het budget wordt je geacht op de knop "volgend jaar" te klikken, waarna je verder gaat met het overgebleven budget. Na 10 jaar zul je een overzicht te zien krijgen van jouw prestaties door middel van een kort rapport.

Nadat het spel aangeeft dat je het einde hebt bereikt, mag je de Google Chrome browser aanklikken die onderin het scherm al openstaat. De rest van het experiment zal bestaan uit het invullen van een online survey, die openstaat op het eerste tabblad. Binnen de survey zul je meerdere stellingen beoordelen en vragen beantwoorden. Daarnaast zullen er een aantal algemene vragen gesteld worden met betrekking tot geslacht, leeftijd en opleidingsniveau.

Indien je tijdens het spelen van het spel, of tijdens het invullen van de survey vragen hebt, aarzel dan niet om contact op te nemen met de experimentleider.

Ik wil je vast hartelijk danken voor je deelname aan dit experiment.
Veel succes!

**Informatie & Consentverklaring**

**Code**: 30-61-2013
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Duur onderzoek: Het onderzoek duurt ongeveer 30 minuten en je kunt er 0.5 proefpersoonuren mee verdienen.

Vertrouwelijkheid: Alle data die worden verzameld, waaronder de antwoorden op de persoonlijke vragen en de vragenlijst erna, zullen hoogst vertrouwelijk worden behandeld. Jouw naam zal in geen enkel geval verbonden worden aan de resultaten. Alleen leden van het onderzoeksteam of wetenschappers die de data opnieuw willen analyseren hebben toegang tot de data. De onderzoeksgegevens zullen minimaal vijf jaar worden bewaard.

Vrijwillige deelname: Je bent niet verplicht om aan dit onderzoek deel te nemen. Als je toestemt in deelname, kun je op elk moment je deelname aan het onderzoek opzeggen. Je bent niet verplicht om vragen te beantwoorden die je niet wilt beantwoorden.

Contact: Mocht je na afloop van dit onderzoek nog vragen hebben, dan kun je contact opnemen met dhr. Pieter Spronck of Cindy van Miltenburg. Voor meer informatie over de richtlijnen waaraan onderzoeken dienen te voldoen, zie het proefpersonenreglement en de ethische richtlijnen onder Course Information van de Proefpersonenpool op Blackboard.

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_____ _____

Handtekening proefpersoon Datum

_____

Naam proefpersoon

_____ _____

Handtekening proefleider Datum