Aalto University
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THE SHORT-TERM EFFECT OF PLAYING CO-OPERATIVE AND COMPETITIVE CARD-/BOARD GAMES ON PRO-SOCIAL BEHAVIOR

Master's Thesis
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Abstract

The thesis experiment tested whether card-/board games could be used to increase pro-social behavior among participants. Positive results would give credence to their use for improving team work among groups, e.g. in the work place.

The study utilized three different games, a cooperative, a neutral and a competitive game. Participants were randomly assigned a game to play for 5 minutes before being given a pro-social task. The pro-social task involved asking participants to assign tangram puzzles of varying difficulty for another person to solve, and if the person could solve 10/11 puzzles within a 10 minute time frame they would receive a monetary reward. The participants could, thus, help the other person by assigning easy puzzles or hinder them by assigning difficult puzzles. The study found differences in pro-social tendencies among the three game groups however the differences were not statistically significant. The effect of gender was also analyzed, and no statistically significant difference was found between genders. The result was unexpected as past research testing video games effect on pro-social behavior found significant differences between violent, co-operative games and neutral games.

Three potential reasons for the result were identified. First the utilized game time of 5 minutes was very short, pro-social scripts may not have had enough time to be primed in the participants' minds and thus their effect on the pro-social task were negligible. The medium of card-/board games may not have been beneficial in inducing the pro-social behavior. Finally it is worth noting that while not statistically significant there was an increase in pro-social tendencies both in the competitive and co-operative game group. Both games were played with other participants, while the neutral game was played solo. This may suggest that the context of playing with other people mattered more than the content of the game played.

The study found that short durations of game play utilizing card-/board games did not show statistically significant benefits in improving pro-social behaviors.

Abstrakti

Opinnäytetyössä kokeiltiin, voidaanko kortti-/lautapelejä käyttää osallistujien prososiaalisen käyttäytymisen lisäämiseen. Positiiviset tulokset tukisivat pelien käyttöä ryhmätyön parantamiseen esimerkiksi työpaikalla.

Tutkimuksessa käytettiin kolmea erilaista peliä: yhteistyötä vaativaa, neutraalia ja kilpailullista peliä. Osallistujat pelasivat satunnaista peliä viiden minuutin ajan, ja tämän jälkeen heille annettiin prososiaalinen tehtävä. Tehtävässä osallistujia pyydettiin määräämään eri vaikeustasoisia tangram-tehtäviä toiselle henkilölle ratkaistavaksi, ja jos tämä toinen henkilö kykenisi ratkaisemaan 10/11 tehtävistä 10 minuutin kuluessa, hän saisi rahallisen palkkion. Osallistujilla oli siis mahdollisuus auttaa tätä toista henkilöä antamalla hänelle helppoja tehtäviä tai haitata heitä antamalla vaikeita tehtäviä. Tutkimuksessa havaittiin eroja kolmen peliryhmän prososiaalisissa taipumuksissa, mutta erot eivät olleet tilastollisesti merkitseviä. Myös sukupuolen vaikutusta analysoitiin, eikä sukupuolten välillä havaittu tilastollisesti merkitsevää eroa. Tulos oli odottamaton, koska aiemmissa tutkimuksissa, joissa testattiin videopelien vaikutusta prososiaaliseen käyttäytymiseen, löydettiin merkittäviä eroja väkivaltaisten, neutraalien ja yhteistyöpelien välillä.

Tuloksille tunnistettiin kolme potentiaalista syytä. Ensinnäkin käytetty viiden minuutin peliaika oli hyvin lyhyt. Prososiaalisilla skripteillä ei välttämättä ollut tarpeeksi aikaa painua osallistujien mieliin, joten ne eivät vaikuttaneet prososiaaliseen tehtävään merkityksellisesti. Korttipeli-/lautapeli ei mahdollisesti ollut hyödyllinen väline prososiaalisen käyttäytymisen aikaansaamiseen. Lopulta on huomioitava, että vaikkeivat muutokset olleet tilastollisesti merkittäviä, prososiaalisuus lisääntyi sekä kilpailullisessa että yhteistyöpelissä. Nämä pelit pelattiin muiden osallistujien kanssa, kun taas neutraali peli pelattiin yksin. Tämä voi viitata siihen, että tilanne, jossa osallistujat pääsivät pelaamaan muiden ihmisten kanssa, oli tärkeämpää kuin pelatun pelin sisältö.

Tutkimuksessa havaittiin, että lyhytkestoisten kortti-/lautapelien käyttämisestä ei ollut tilastollisesti merkitseviä hyötyjä prososiaalisen käyttäytymisen kehittämiselle.

Table of Contents

List of tables

List of figures

Table of Abbreviations

DG - The Dictator Game

GLM – General Learning Model

H_0 - The Null hypothesis

H_1 - Hypothesis

PGG - The Public Good Game

UG - The Ultimatum Game

μ - Mean

1 INTRODUCTION

The thesis tested whether short duration card-/board game play utilizing competitive and co-operative games would affect pro-social behavior in the short term. Additionally the thesis looked to determine what effect if any gender would play on post-game pro-social behavior. Past research testing video games effect on pro-social behavior has shown violent games to decrease pro-social behavior and co-operative games to increase said behavior. Research on gender effects utilizing economic games has shown differences between males and females. Females responded to social framing with increases in pro-social behavior while males were unaffected. Males were more effected than women by reflection based framing, showing a greater decrease in pro-social behavior than females. Under neutral settings no differences between genders have been detected. The gender effects however were not consistent across studies.

The aim of the thesis was to expand on the current state of research regarding the utilization of games to improve pro-social behaviors. Literature on the topic of utilizing games to improve pro-social behavior is currently focused entirely on utilizing video games as the testing medium. This is understandable as the video game industry eclipses the board game industry in size ($130 billion per annum compared to the $4.6 billion). The increase in popularity and industry growth of board games over the past decade alongside board games gaining a wider acceptance among people and organizations warrants their inclusion for study. The theoretical models utilized in the research are the General Learning Model (GLM; Buckley & Anderson, 2006; Maier & Gentile, 2012) and the Key Dimensions of Video Games (Gentile, 2011). The research suggests that playing pro-social games should lead to an increase in pro-social behaviors both in the short and long-term, while violent games have the opposite effect. A meta-analysis of 98 independent studies provides supporting evidence to this effect (Greitemeyer & Mügge, 2014).

The research gap this thesis aims to fill, is testing whether the same pro-social effects observed in co-operative video game studies can also be found in card-/board games. Research on the effects of video games on pro-social behavior have largely focused on the content of games, comparing the effect of violent and co-operative games on post-game behavior. In this area the results have consistently shown that the content of the game matters

with violent games leading to decreases in pro-social behavior and co-operative games increasing said behavior. In addition to content, the context dimension has also been studied. The context of a game has been also shown to have a moderating effect on pro-social behaviors, for example playing with other people can increase or decrease the effect created by the content of the game. The results of published studies are consistent with the theoretical foundations laid out by the GLM. Finally, only limited research was discovered which focused on the time dimension. While exposure to violent or co-operative games has been shown to have both short and long-term effects, only a single study (Langlois, 2017) was found which tested the effect of game play duration on pro-social behavior.

A potential contribution of the current study is to demonstrate an additional means of improving pro-social behavior within organizations. A short game could act as an acceptable ice breaker before starting a team activity, for example. To this end the experiment utilized a game time of just five minutes to ensure easy transfer into everyday use. The study's hypothesis states that people that play card-/board games with collaborative elements, will continue to act in a more pro-social and collaborative way in the short term after the game is played compared to those playing competitive or neutral games. The secondary research question posed asks: what is the association between gender and the short-term effect of playing co-operative and competitive card-/board games on pro-social behavior?

The thesis structure begins with an introduction to relevant literature, the GLM and Multiple dimensions of video games, on which the hypothesis is built. The literature review is followed by relevant experimental game studies and gender focused experiments, which are the base for the gender research question. Hypothesis development, methodology and results precede final discussion and conclusions.

2 LITERATURE REVIEW:

The literature is focused on two main topics, the GLM and the multiple dimensions of video games, which together provide the theoretical frame that the hypothesis is based on. These are followed by relevant game studies which provide evidence of the efficacy of the theories.

2.1 General learning model

The Theoretical framework on which the experiment is based, is the GLM (GLM, Buckley & Anderson, 2006). The GLM is a Meta theoretical model, which incorporates domain-specific theory in an attempt to provide a more holistic picture of how people learn. In essence the GLM explains how humans learn by incorporating six different learning theories: Habituation and Discrimination, Classical (Respondent conditioning), Operant Conditioning, Observational learning, Cognitive learning and Emotional learning (Gentile & Groves 2014).

The Domain-specific theories from which the GLM is derived are explained below.

2.1.1 Habituation and discrimination

Habituation describes the learning process in which there is a decrease in response over time to a repeated stimulus (Bridger 1961). An example of the phenomena would be as follows: when sleeping with a snoring partner, initially this would be very noticeable, however over time we become accustomed (habituated) to the stimulus and notice it less or not at all.

Discrimination describes the learning of a particular response to some stimuli but not to others. A response to hearing a loud noise, e.g. a gunshot would elicit a different response (ducking for cover) than another loud noise, such as hearing someone bang on a drum. Learning through habituation and discrimination often have to occur before other types of learning. "Only after you recognize something (habituation) or discriminate it as being different from other things can you learn to associate it with different things and consequences" (Gentile and Groves 2014 p. 123).

2.1.2 Classical (respondent conditioning)

Classical conditioning, also known as Pavlov's conditioning after its originator Ivan Pavlov refers to the process, in which a neutral signal is placed before a naturally occurring biological reflex on a repeated basis. This neutral signal begins to elicit a similar reflexive

response. In Pavlov's experiments dogs were shown food and a bell rang at the same time. After repeated occurrences the dogs began to associate the bell with the food. They understood that the sound of the bell meant they would be fed which caused them to salivate. Seeing food (unconditioned stimulus) leads to salivation (unconditioned response) for dogs in a normal setting, over time the combination of a bell (neutral stimulus) in combination with seeing food (unconditioned stimulus) becomes a conditioned stimulus where the sound of the bell elicits the conditioned response of salivation (Pavlov, 1927). This conditioning based learning has been shown to function in the same way in humans. During experiments on conditioned emotional reactions a small child was conditioned to associate the sight of a white rat with a fear response (induced by a loud noise), further it was shown that this response lead to generalization as the child came to fear similar stimuli such as a furry rabbit or a seal skin coat (Watson & Rayner, 1920). Classical conditioning thus deals with involuntary learning.

2.1.3 Operant conditioning

Operant conditioning is a learning theory which gained acceptance after Burrhus Frederic Skinner published his studies on the Skinner box experiments based on learning of mice (McLeod, 2018). Operant conditioning explains how consequences lead to changes in voluntary behavior. Operant conditioning is a function of two main components: reinforcement and punishment.

A reinforcement increases the likelihood of a behavior being repeated while a punishment decreases the likelihood. Reinforcement and punishment can be positive or negative. Positive refers to the addition of a stimulus and negative refers to the removal of a stimulus. Positive reinforcement can, thus, be the addition of a stimulus to increase the occurrence of a behavior, e.g. an employer paying a salary to employees for doing their job. Alternatively, a negative reinforcement (negative stimulus) such as an employee having to return a bonus payment received in advance which can be avoided if the desired action is completed (thus leading to the desired action).

Punishment is the opposite of reinforcement in that the aim is to reduce or eliminate a behavior by creating a negative consequence for the action. A dog will learn not to bark if doing so incurs an electric shock (positive punishment). A prisoner will likely become more

compliant if not doing so leads to her being denied food (negative punishment). Though the behavior in both of these cases may only apply if the punisher is present.

Finally voluntary behavior can be modified through extinction. Extinction refers to the process of non-reinforcement, here the prior reinforcing and punishing actions are taken away. The learner will come to understand that the behaviors which were previously rewarded (or punished) will no longer carry a stimulus, which leads to a decrease in said behavior.

Frequency and amount of reward are both important factors affecting learning. In each case increased exposure leads to increased learning however the law of diminishing returns applies. In addition to the time and amount of reinforcement, the schedule of reinforcement is also a factor.

In his schedules of reinforcement study Skinner tested various means of reinforcement to test the response and extinction rates of different reinforcement methods. He found that variable reinforcement produced the most consistent behaviors over the long-term. These variable reinforcement methods are often employed in gambling mechanics such as slot machines or loot boxes in video games. The possibility of a future reward keeps people playing regardless of negative results in the short-term.

Continuous reinforcement, consistently rewarding a certain behavior, lead to a reliance on the reward, once the reward stopped being offered the behavior quickly disappeared. (Ferster & Skinner, 1957).

2.1.3.1 Schedule of reinforcement in games

One of the key reasons games make for useful learning tools is the variable reinforcement mentioned above. A certain strategy may win one game but lose another due to the many variables involved. Many card and board games include varying degrees of randomness, due to the influence of other players in multiplayer games, and the randomness involved in the shuffling of cards, throwing of dice or variable game setups (randomized starting game states). Skinners schedules of reinforcement theory suggests we can expect the behaviors learned through gaming and the resulting variable reinforcement to remain with a person for a longer time than if other schedules of reinforcement were in play (Ferster,& Skinner, 1957).

2.1.4 Observational learning

The previous learning theories have taught us that learning can occur in a number of ways, classical conditioning demonstrated that we can learn by associating neutral signals with naturally occurring biological reflexes – Pavlov's dogs associating the sound of a bell with food.

Operant conditioning demonstrated that learning occurs due to the consequences of behavior – positive outcomes lead to repetition of behaviors whilst negative outcomes lead to a decrease or cessation of behaviors.

Albert Bandura's (1963) research named observational learning dealt with learning based on simply observing something happening. In his study Bandura examined how kindergarten children would behave after different observational cues.

Children were placed in three experimental groups and then directed to rooms with art materials. They were then exposed to an adult acting in an aggressive manner towards a doll: the first group was in the same room as the adult, the second witnessed the acts through a television and the third group witnessed a cartoon character acting aggressively towards the doll.

"The children were then led into another room with appealing toys but were instructed not to play with them. The goal was to induce frustration, which as per the Dollard, Miller, Doo'b and Mowrer's (1939) frustration – aggression hypothesis, was likely to induce aggression" (Gentile & Groves, 2014 p. 125).

Control groups followed the same protocols without witnessing the aggressive acts.

The children were then led into a 3rd room and an observer recorded their behavior, documenting each instance a child acted in an aggressive manner towards the doll. Observers witnessed equal levels of aggressive acts within the experiment groups, which was twice that recorded in the control groups (Bandura, Ross & Ross, 1963).

The follow up study on transmission of patterns of self-reinforcement through modeling (Bandura & Kupers, 1964) demonstrated that when the experiment was done with models being praised or reprimanded for their aggressive behaviors towards the doll, this led to the children imitating the praised actions but not the punished actions. Further, the children were

able to demonstrate the punished actions when requested to do so. These experiments demonstrated that learning through observation without other reinforcement was possible, with the follow up study showing that "reinforcing or punishing consequences primarily affects performance, not learning" (Gentile & Groves, 2014 p. 126).

2.1.5 Cognitive learning

The theory of cognitive learning was developed by Jean Piaget in 1936. His cognitive learning theory suggests that children learn by testing previous models of the world. Unlike the learning described in the above theories, this learning happens without the need to act. "Humans can learn by associating cognitive concepts together, by creating new mental representations of concepts, and by creating cognitive maps of spatial arrangements" (Gentile & Groves, 2014 p. 126). Piaget theorized that our minds create mental representations of real-world objects and actions, which are referred as schema. Through the process of assimilation we use an existing schema to deal with a new object or situation. Accommodation occurs when an existing schema is forced to change to fit a new object or situation as assimilation is not possible. E.g. a schema of a dog exists in the mind of a child that is loosely a four-legged furry creature with a tail. If a new breed of dog is encountered, it will fit the existing schema and is, thus, assimilated into this category of "Dog". Then when a cat is encountered, this would normally also fit the above schema description of a dog, however if the child is told that it is not a dog, a disequilibrium state will occur where no current schema can account for this new information and a new schema will be created known as "Cat" and the schema for dog will be adapted to not include all creatures that have four legs, fur and a tail.

2.1.6 Emotional learning

"Emotion plays an important role in attention and motivation to attend. Specifically, it moderates attention and memories, and facilitates remembering emotional aspects of experiences and concepts" (Gentile & Groves 2014 p. 127).

Memory has been shown to be enhanced in the event of an emotional response. An experiment testing the effect of emotion on recall was conducted by showing participants two videos with 3-7 days in between each viewing. One consisted of 12 emotionally neutral films and the other – 12 emotionally arousing film clips. Three weeks after the second

viewing session participants were asked to recall the videos seen. The experiment showed that the participant's average emotional reaction was higher for the emotionally arousing film clips and that they were able to recall more of them as compared to the emotionally neutral clips. "The findings support the view derived from both animal and human investigations that the amygdaloidal cortex is selectively involved with the formation of enhanced long-term memory associated with emotionally arousing events." (Cahill et al., 1996 p. 8016).

2.1.7 General learning model processes

The GLM includes both short-term and long-term models of learning.

2.1.8 Short-term learning processes
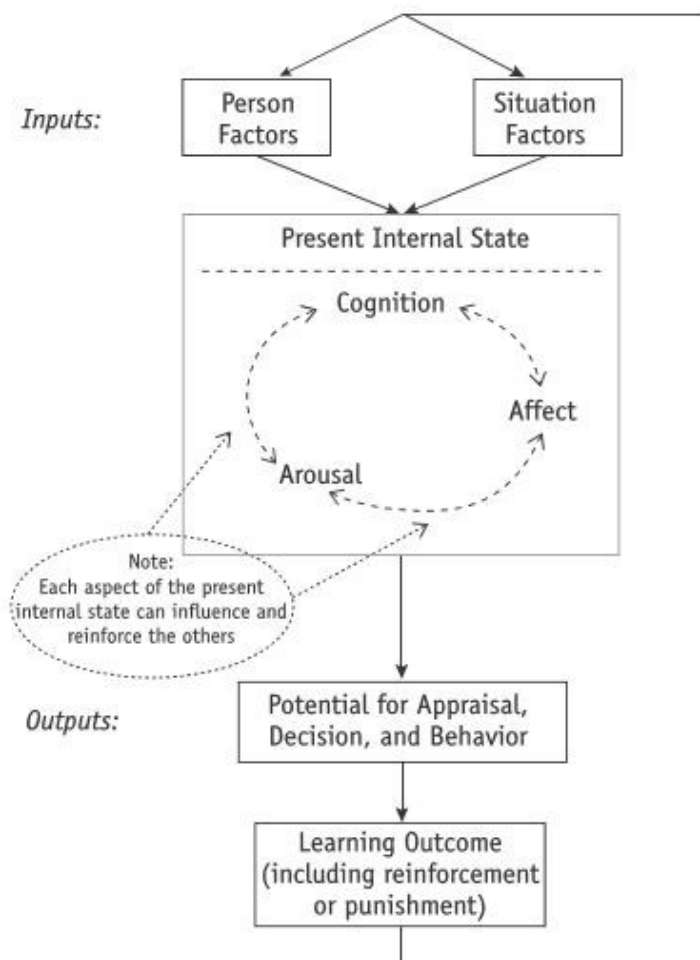
Figure 1 Short-term process overview in the General Learning Model. (Gentile, Groves & Gentile, 2014 p. 128)

The GLM posits that learning outcomes are influenced by both person and situation factors. "Person factors include all aspects of the person at that moment in time, including, all prior learning, genetic predisposition, personality traits, beliefs and attitudes, mood, sex, short- and long-term goals, motivations, and attentional resources." and "situation factors include all of the physical environment, other potential actors in the environment, the history of the situation to that point, and all of the information that exists to be detected by an organism in the environment." (Gentile & Groves, 2014 p. 127).

2.1.8.1 Sensation and Perception
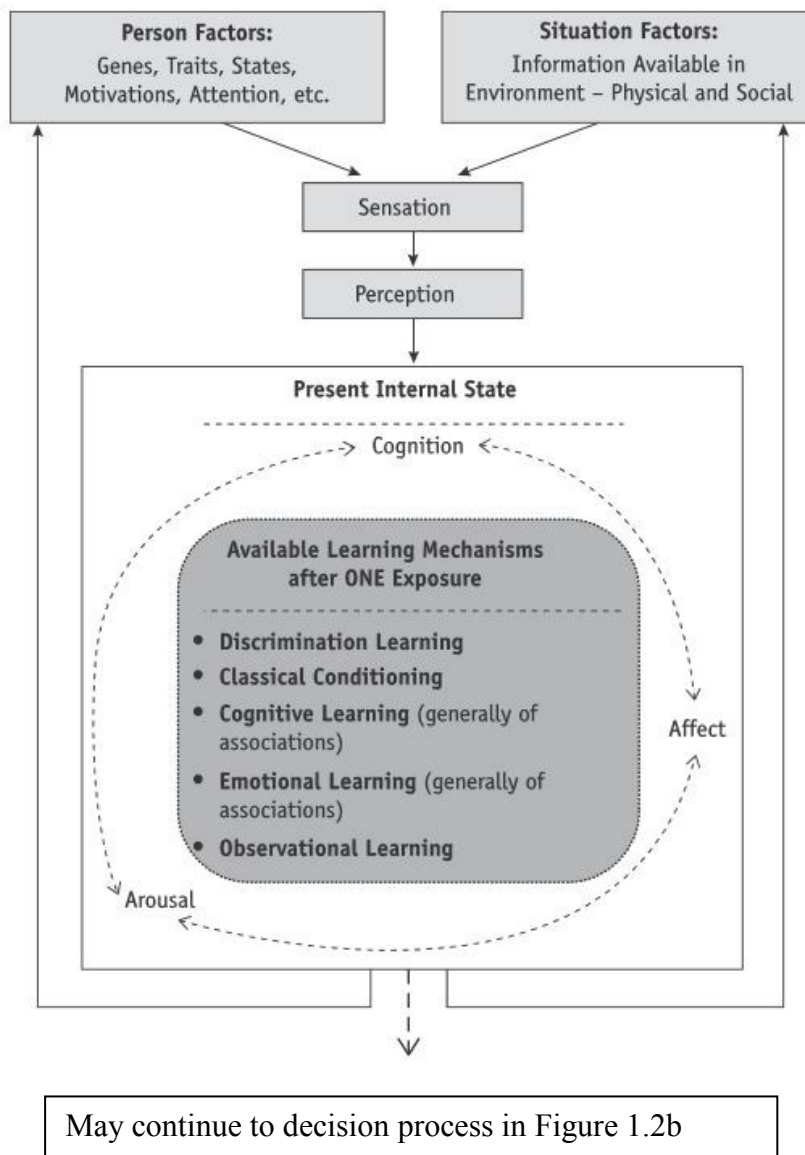
Figure 1.2a Detailed GLM single short-term processes prior to behavioral response.
(Gentile, Groves & Gentile, 2014 p. 129)

The first stage of information input is sensation, defined as the bottom-up process by which our senses (e.g. vision, hearing, smell & touch) receive and relay outside stimuli. Perception is the top-down way our brains organize and interpret that information and put it into context (making sense of our sensations). Perception can benefit from prior knowledge or experience.

In order to learn individuals take in information from their environment and summon relevant knowledge to help them process and operate upon that information. Several types of learning can occur immediately at this stage – (Figure 1.2b) (Gentile & Groves, 2014).

Discrimination based learning can occur, if a detected feature is different from a comparable one. Learning based on classical conditioning may happen if a biological reflex is triggered simultaneously to perceiving something the reflex could be associated with. Cognitive learning ensues if an existing schema is adapted or a new one created due to new information. Emotional learning may follow when a perception can be connected to an emotion and finally observational learning may occur when a behavior observed in the environment provides useful information to the learner.

The above learning outcomes can occur very quickly. As a person perceives their environment her cognition, physical arousal and affect (feelings) may be primed. However no learning outcomes necessarily follow as a lack of attention may lead to learning opportunities being missed, alternately familiar or unimportant situations may lead to automatic responses, which do not facilitate learning.

Any changes to thoughts, feelings, or arousal, can immediately feed back into the set of a person and environmental variables. These changes provide new information in the environment for others to react to, beginning a new cycle.

Once the present internal state has been influenced a person may have the opportunity to appraise the situation and respond. The following action will depend on the circumstances and motivations and may be either thoughtful or automatic. Unimportant decisions or situations requiring a quick response will likely revert to impulsive (automatic) responses based on prior behavior. If a person has the time and cognitive resources available a thoughtful action may be taken, leading to additional learning opportunities. Cognitive learning may occur if a person considers the connections between ideas and likely operant

outcomes of each option. The thoughtful actions based on appraisal may then reinforce prior concepts that lead to the chosen action. Impulsive actions are also likely to prime and reinforce heuristics, which lead to the chosen action leading to similar behavior in the future.

"Once an action is taken, the action feeds back into the person factors, the situation factors and affects the present internal state (Figure 1.2b). Both the situation and present internal state provide opportunities for operant learning." (Gentile & Groves, 2014 p. 132) Others may respond in a reinforcing or punishing manner. Alternatively, an actor may recognize feelings of happiness or guilt in association with her actions, which may also act as reinforcing or punishing learning outcomes. The above learning outcomes may occur from a single situation, however multiple instances of similar situations may lead to long-term learning in the form of habituation and discrimination (Figure 1.3).
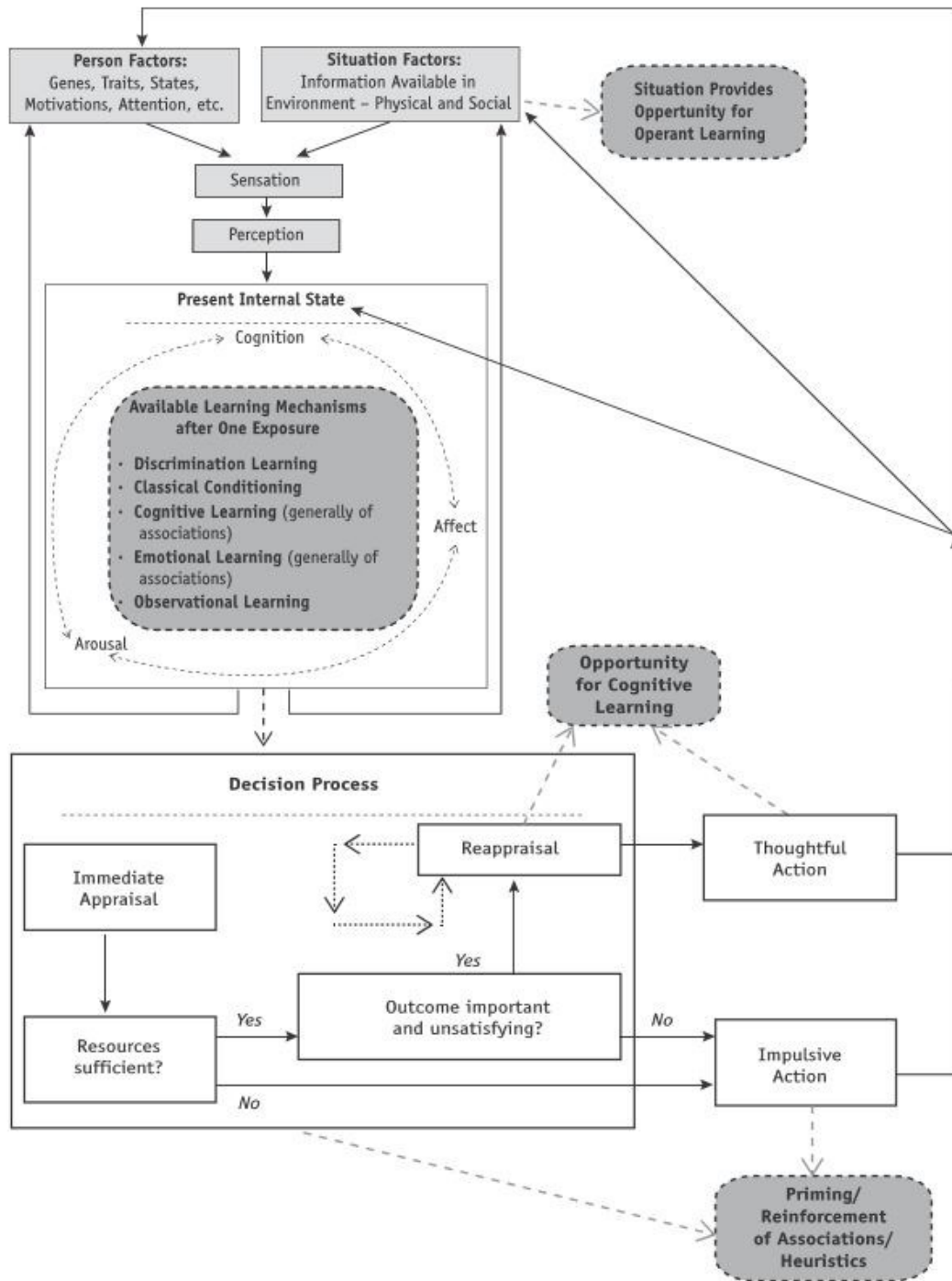
Figure 1.2b Detailed GLM single short-term processes including behavioral.
(Gentile, Groves & Gentile, 2014 p. 130)

2.1.9 Long term processes

While the thesis experiment is focused only on the short-term learning processes, the long-term processes of the GLM have been explained below as they demonstrate the effect past experiences can have on participant's tendencies towards competitive or co-operative behaviors. It also highlights the importance of the experiment's randomized control trial method and the need for a large sample size.

The GLM suggests that repeated exposure to experiences can lead to long-term effects. "As knowledge structures and emotions are repeatedly primed, associated, and reinforced, they become better developed, more easily accessible, and more interconnected with other knowledge structures." (Gentile & Groves, 2014 p. 132)

Figure 1.3 details the three categories of long-term learning. The first, Perceptual and Cognitive Constructs includes, beliefs, scripts and perceptual and expectation schemata, an example of which given by Gentile relates to "experience with media violence, which may increase hostile attribution bias (a perceptual schema by which others' ambiguous actions are perceived to be of hostile intent" (Gentile & Groves, 2014 p. 132).

The second category, Cognitive-Emotional Constructs includes attitudes and stereotypes. An example of which is an experiment by Saleem & Anderson (2013), which showed repeated exposure to anti-Arab media (media which portrayed Arabs as violent, both through American TV and video game exposure, as Arabs are frequently utilized as the "bad guys" in games) lead to long-term negative attitudes and stereotypes. This experiment showed that the mere presence of Arabs in a game, regardless of whether or not violence was involved, led to the priming of negative attitudes due to the strong Terrorism-Arab associations held by the American study participants. The negative associations were stronger for participants playing games with violent Arabs than for those in the non-violent game group. The experiment demonstrated a short-term effect in addition to the long-term effect on attitudes.

The third category, Emotional Constructs proposes that repeated media exposure can lead to long-term influences such as affective habituation (e.g. associating media violence with fun and excitement), conditioned emotions (e.g. desensitization to real-life violence following media violence exposure) and affective traits (development of trait anger for habitual violent video game players) (Gentile & Groves, 2014).
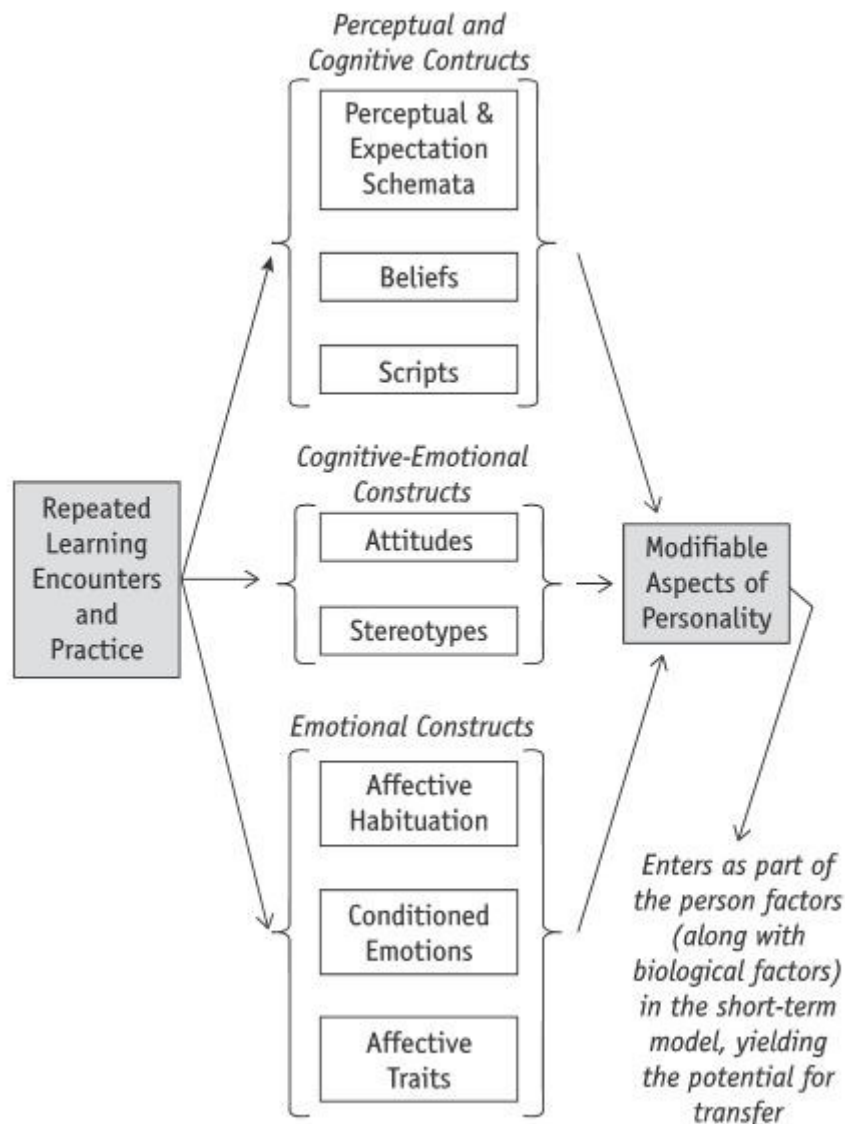
Figure 1.3 Long-term processes in the General Learning. (Gentile, Groves & Gentile, 2014 p. 133)

2.1.9.1   Transfer

Transfer refers to "the ability to use previously learned skills or knowledge in settings or on problems different from the original learning, including the capacity to distinguish when and where these learnings are appropriate" (Gentile & Groves, 2014 p. 134).

Video games studies have shown high levels of "far" transfer (the distance refers to how similar the transferred content and context are to the original) suggesting video games may be useful educational tools according to Gentile (2011).

A meta-analysis of violent video games effects on aggression and pro-social behavior showed "exposure to violent video games is a causal risk factor for increased aggressive behavior, aggressive cognition, and aggressive affect and for decreased empathy and prosocial behavior" (Anderson et al., 2010). In addition to the negative effects associated with long-term exposure to violent video games, other studies have shown benefits such as the transfer and generalization of helpful and co-operative behaviors induced by long-term exposure to pro-social games (Gentile et al., 2009).

2.2   Multiple dimensions of video games

The benefits and harms of video games are often discussed in a simplistic good versus bad manner. Those on the harm side will cite studies, which show that playing aggressive games leads to an increase in aggressive thoughts (Gentile & Gentile, 2007), and, that increased time spent playing video games can increase the prevalence of obesity (Laurson et al., 2008) and lead to lower grades in adolescents (Gentile, Lynch, Linder & Walsh, 2004). When arguing for the beneficial effects of games, one can quote research that video games can be useful as teaching tools. "They are motivating, provide immediate feedback, can adapt themselves to the level of the learner, provide repetition to the point of automaticity, encourage distributed learning, can teach for transfer, and use other excellent teaching techniques" (Gentile, 2011 p. 75).

According to Gentile (2011) the current research posits that at least five dimensions of video games exist, which can affect players learning. Rather than having a good vs bad discussion, there is value in looking into the value of each dimension as games can have both positive and negative effects, often with a single game providing harms and benefits within multiple dimensions. The five dimensions are the amount of play, the content of play, the game context, the structure of the game, and the mechanics of game play.

2.2.1   Amount of play

Research has shown that the amount of time spent playing video games is associated with numerous positive and negative effects, such as the examples above relating to increases in aggression and obesity, the effects of which rise as game time increases. Additionally the frequency of play is also a factor as the same amount of time spent playing split over regular

and frequent play sessions is likely to lead to a greater effect than fewer but longer sessions (Gentile & Gentile, 2007).

2.2.2 Content of play

The content of games matters in determining the short and long-terms effects the games have on players. Violent games have shown to increase aggressive feelings and behaviors in players, similarly playing pro-social games have led to both short and long-term increases in prosocial behavior. Educational games often focus on a core area of learning (e.g. reading or math). Games themselves make for useful learning tools, however the content of the games is a major factor in what is learned.

2.2.3 Game context

Game context refers to the moderating effect on a player that a change of context can have. An example of how game context affects player behavior can be found in the video game Blood Bourne. This game asks a player to perform violent acts in order to succeed in the game, which, according to past research likely lead to increased aggressive behaviors. Yet the game also includes a feature where novice players can request aid from more advanced players. Thus, in this case the context for the advanced player changes, from performing violent acts to succeed, to performing violent acts to help another player succeed. The focus of the player's attention shifts from the violent game content to a pro-social context even though what is happening on screen remains the same. Another context change that can have a large effect is the social dimension. A game played in a group may lead to a moderated effect from the group. Violent actions taken by a player within a game can lead to enhanced effect if the feedback from the group encourages said behavior or dissuades it. Gentile (2011) theorizes that the context of a game can have an enhancing or mitigating effect depending on the gaming context, however he also states that no studies had taken place to test the theory at the time of publication.

2.2.4 Game structure

Games are structured in a manner that allows game designers to convey the information on the screen to a player in a meaningful way. A game like Horizon Zero Dawn for instance creates the illusion of openness, allowing a playing to move where she wants while simultaneously guiding a player in the direction set by the developers in line with a linear

story. Developers guide players, for example by signaling with color, which walls are climbable, and leaving other visual cues. Repeated practice of utilizing different structural information within a game can lead to the improvement of specific skills. For instance, first person shooter games can improve visual attention (Green & Bavelier, 2007), and 3D games can improve 2D to 3D transfer skills (Greenfield, Brannon, Lohr, 1994), as well as navigation and way-finding skills.

2.2.5 Game mechanics

Games are played with some form of controller – joysticks, keyboard and mouse or steering wheels and pedals for driving games. Practice with these devices leads not only to expertise and automaticity but also to transferred improvements in fine motor skills (from the use of a thumb controller), gross motor skills (from the larger movements of a motion controller), and balance (use of Nintendo Wii balance board). Additionally, the feedback loop resulting from a player taking an action with a controller and seeing the response on screen leads to improved hand eye coordination.

Research showed that surgeons who had engaged in regular video gaming of three hours or more per week performed better during laparoscopic surgery with faster reaction speeds (27%) and made fewer mistakes (37%) than those without video game experience (Rosser et al., 2007).

2.3 Key dimensions in the thesis experiment

The experiment conducted in this thesis differs from earlier experiments in that it utilizes card games and a board game rather than video games as the medium. The multiple dimensions of video games, however, offer a valuable insight into explaining how each dimension can effect participants in the short- and long-term. The content and context dimensions are especially relevant.

2.3.1 Content

The key variable in the experiment is the content of the games. The co-operative game 5 Minute Dungeon has been chosen specifically as the game relies on players working together to defeat a common enemy. If players do not co-operate with one another, the game will be lost. The expectation based on the GLM was that participants would be influenced by this

pro-social in-game behavior and that said behavior would positively influence the pro-social post-game task. On the other hand, Speed, the competitive game, was expected to have the opposite influence: competitive behavior was expected to carry on by priming competitive processes, which would negatively influence the pro-social post-game task.

2.3.2   Context

The context of game play may have a moderating effect on the influence of game content, e.g. the social context might enhance some effects when playing a multiplayer game (Stone & Gentile, 2008). The competitive game utilized in the thesis study named Speed is a two player game with a single winner and loser. Unlike the video games utilized in the studies described earlier, where a player is isolated alone in a room with the only a virtual contact to another person, Speed, a card game, is played sitting face-to-face opposite the other player. The game relies on participation from the other player, otherwise the game will stall and a stalemate will occur. While this participation is necessary in order to give a player the chance to win, it does change the context for the participants. Players, in essence, compete against each other but also work together in order to complete the game. Thus, there is an element of teamwork involved. Additionally, the presence of the other person within the same setting may also influence the pro-social task given after the game is played (within the experiment, participants were not asked to refrain from talking to each other and filled in the questionnaire at the same time).

2.4   Introducing relevant studies (video games)

While academic studies focusing specifically on board games are rare, there are many studies utilizing video games, which share many of the key board game features in terms of amount, content, structure and mechanics. A key difference between these studies is context as video games are often played in solitude (especially in game studies) whereas board games and card games necessitate interacting with others in most cases, which leads to more direct and immediate feedback from the other players. The overview of research, presented within this section, focuses on studies, which explore the impact of video games on pro-social behavior.

2.4.1   The effects of pro-social video games on pro-social behaviors: International evidence from correlational longitudinal and experimental studies

Gentile et al. (2009) examine three different studies in three countries across three age groups focusing on the potential effects of pro-social games.

2.4.1.1   Video game habits and prosocial behaviors of Singaporean secondary school children

727 Singaporean children with a mean age of 13 years from six participating schools took part in the study. The study measured pro-social behaviors and video game habits. Data on gaming habits was collected by asking the students to list their three favorite games, estimate how many hours per week they spent playing these games, and rate how often they helped or harmed others within said games. The pro-social and violent content of each game was then multiplied by the amount of time spent playing each game and averaged across the three games. Pro-social behavior was measured using an 11-item pro-social orientation, a 7-item co-operation and sharing and a 16-item children's empathic attitudes questionnaire.

The study's findings revealed that "pro-social game exposure was positively related to pro-social behaviors and traits" and that "violent game play was negatively related to the pro-social behaviors and traits" (Gentile et al., 2009 p. 5).

The study gives credence to the current study's hypothesis that playing pro-social games leads to increases in pro-social behavior.

2.4.1.2   The effect of habitual playing of pro-social video games on pro-social behavior over the long-term

Participants consisted of 780 Japanese 5th graders with a mean age of 10.9 years and 1050 8th & 11th graders with mean ages of 13.6 and 16.6 years. Each participant was tested twice with an interval of three to four months between assessments.

Students completed surveys, which assessed pro-social game exposure, in their classrooms. Within the surveys they were asked to rate on a scale of 1-5 (not at all − very often) the frequency of playing video games with two types or pro-social scenes: scenes where a character helped a troubled person and scenes where friendship or affection was shown between parents and children. Pro-social behavior was assessed by asking the participants

26

how often in the past month they had demonstrated each of four helpful or pro-social behaviors (e.g., I helped a person who was in trouble) using the same 5 point scale.

The study's results showed that "the causal path from amount of pro-social game playing at time 1 to amount of pro-social behavior at time 2 (3-4 months later) was significant. In addition, the causal path from pro-social behavior at time 1 to prosocial gaming at time 2 was significant. Thus, there was a bi-directional relationship between pro-social gaming and pro-social behavior" (Gentile et al., 2009 p. 6).

The GLM posits that repeated exposure to experiences reinforces the primed structures in the mind leading to long-term effects. Thus, the above study is aligned with GLM and supports the hypothesis of the present thesis that pro-social content in games leads to pro-social behavior.

2.4.1.3 The short-term effect of playing pro-social and violent video games on behavior

Two games from three different categories (pro-social, violent and neutral) were used within the study with neutral games utilized as controls. Participants played one type of game for 20 minutes and after that were given a task where they had an opportunity to help or harm another participant. The study was conducted with 161 college students with a mean age of 19.2 years. The pro-social games used within the experiment were Super Mario Sunshine and Chibi Robo, the violent games were TY2 and Crash Twin Sanity and the neutral games used were Pure Pinball and Super Monkey Ball Deluxe.

After the 20 minute gaming session participants were asked to assign 11 tangram puzzles to their partners. If a partner could complete 10 puzzles within 10 minutes, he or she would then receive a $10 gift card. The 11 puzzles were to be selected from 10 easy, 10 medium and 10 difficult tangram puzzle stacks, and students were encouraged to choose multiple difficulty levels.

The study found that the participants who had played a pro-social game acted in a more pro-social way in the follow-up task than those who did not play a pro-social game and were significantly more helpful to their partners than those who had played a violent video game. Those who had played a violent game acted in a more harmful way than those who did not

play a violent game and acted to harm their partners significantly more often than those who played a pro-social game.

The authors of the study concluded that "playing video games with pro-social content causes people to be more helpful after playing. In contrast, playing games with violent content causes people to be less helpful and more hurtful after the game is turned off" (Gentile et al., 2009 p. 9).

The study provides evidence to support the assertions made by Gentile (2011) in his multiple dimensions of video games article. The study successfully demonstrated that the content of a game can have a significant effect on the players post game pro-social behavior.

The study provides the strongest evidence to support the thesis hypothesis that pro-social game play over a short period would yield increased pro-social behavior immediately after the gaming exposure. The thesis experiment largely emulated the design of the above study, and the expectation was that similar pro-social behaviors would be observed regardless of the change in medium and game duration.

2.4.2   Effect of playing violent video games co-operatively or competitively on subsequent co-operative behavior

Research by Ewoldsen et al. (2012) compared the effects of playing violent video games competitively and co-operatively on pro-social behaviors. The study utilized a first person shooter game named Halo. Within the study 119 participants (96 males, 18 females, and 5 un-specified) were put into four groups: direct competition group – participants attempted to kill their opponents more times than they were killed themselves, indirect competition group – participants attempted to progress through the single player version of the game as far as possible in a 15 minutes with the goal of beating their partner, co-operation group – participants attempted to progress through the game as far as possible with another player over a 15 minute time span, and, finally, a control group which had the participants answer the social dilemma task before playing the game.

Post-game the game group participants were give a social dilemma task: participants were given 4 dimes which they could secretly give to their partner, the value of which would double for the receiver. The task was repeated over 10 rounds. With the results of each round revealed before the next round.

The study found that players in the co-operative group engaged in more co-operative behaviors than those in the control group or either of the competitive groups.

The authors state that the social context of playing with a partner has a greater effect on players than the violent content of the game, which has shown to decrease pro-social behaviors within the earlier studies. "Co-operative play in video games – whether violent or not – has the potential to improve co-operation in different circumstances" (Ewoldsen et al., 2012 p.3).

The study's results provide evidence to support Gentile's theory (2011) that the context of a game can have a moderating effect on pro-social behavior.

2.4.3 Meta-analysis of pro-social content in video games

Additional support for the statement that pro-social content in video games influences pro-social behaviors can be found in a 2014 meta-analytic review of impact of video games on social outcomes: data from 98 independent studies found that "violent video games increase aggression and aggression-related variables and decrease pro-social outcomes, pro-social video games have the opposite effects" (Greitemeyer & Mügge, 2014 p. 1).

2.4.4 The effect of game time on pro-social behavior

A 2017 Master's thesis examining the effects of pro-social video games on resulting pro-social behaviors by Danielle Langlois looked at the impact of game duration on the pro-social behaviors of participants.

Within the experiment setting 111 participants (79.3% female) were divided into four gaming groups and a non-gaming control group. The groups were given a pro-social task to complete after the game. The task took the form of selecting the number of easy to difficult Raven's Progressive Matrices. The participants chose how many easy and difficult puzzles to assign, choosing 11 puzzles out of 10 easy and 10 hard options. The four gaming groups played one of the following games – a 20 minute pro-social game, 10 minute pro-social game, 20 minute neutral game, 10 minute neutral game, while one group didn't play any game.

After the game the participants had to complete multiple surveys to evaluate their pro-social tendencies. The study's results showed "no significant differences between participants that

played the neutral or no game and those that played the pro-social game" (Langlois, 2017 p. i) The study also found no statistically significant differences in impact of various game exposure times (across the groups that played 20 minute and 10 minute games) on pro-social behavior.

The author stated that the results were unexpected as past studies of similar design and power such as studies by Greitemeyer & Osswald (2011), Greitemeyer (2013); Greitemeyer et al. (2012), Greitemeyer & Osswald (2010) had found much larger pro-social effects.

It is worth noting that while the total sample size was similar to that in the Greitemeyer & Osswald (2010) and Greitemeyer & Osswald (2011) studies, there was a large difference in the sizes of the groups as the Langlois'es study divided the 103 (8 were omitted) participants into 5 groups resulting in 19-21 participants per group, while the Greitemeyer & Osswald studies utilized groups consisting of 27-34 individuals. The smaller group sizes utilized in the study may have caused problems in finding statistically significant results and may explain the difference in effect levels observed.

2.5 Board game studies

The majority of board games studies focus on the games themselves rather than educational outcomes or behavioral changes of the players. No studies utilizing board games specifically for the research of pro-social behaviors were discovered, however interest in the usage of board games for research purposes has been growing in recent years in a wide variety of research fields.

The healthcare field has been especially interested in utilizing board games in studies aimed at improving health outcomes. A meta-analysis of literature focused on the use of board games in health education and treatment found 83 relevant articles. The authors of the research report that playing traditional board games such as Go and Chess can lead to alleviating cognitive impairment and depression while using "newly developed board games is beneficial for behavioral modifications, such as the promotion of healthy eating, smoking cessation, and safe sex." (Nakao, 2019 p.01). The second meta-analysis within the field, which identified 21 studies utilizing 16 board games, found that board games can increase knowledge, improve neurological skill and physical rehabilitation skills, increase interest in global health issues and improve the likelihood of seeking medical advice (Gauthier et al., 2019).

Another popular field, in which board games have been successfully utilized, is children's education. A meta-analysis focused on this field found 27 relevant studies. The authors of the research state that their "findings showed that, as a tool, board games can be expected to improve the understanding of knowledge, enhance interpersonal interactions among participants, and increase the motivation of participants" (Noda, S., Shirotsuki & Nakao, 2019 p. 1).

A study by Vogt et al. (2018) comparing tradition math training (teacher-led match exercises) to a play-based approach designed by the research team utilizing board games and card games within a group of kindergarteners found "a significantly higher learning outcome for the group of play-based mathematics compared to the traditional kindergarten" (Vogt et al., 2018 p. 598).

Outside of the academic world both video games and board games are being increasingly utilized within organizations for a variety of purposes. Numerous companies around the

world such as Workz in Denmark, Muutostaito and World of Insights in Finland are creating games catered for specific companies' needs and/ or are utilizing board games as educational tools to teach change management, company culture, strategy, marketing and etc. to employees.

The examples described above demonstrate an increasing interest in application of board games for diverse educational and non-educational purposes. Board games are transcending classrooms to become universal learning and developmental tools for youth and adults across multiple facets of society. In line with this trend the board game research is growing in relevance as means to support and widen practical application of board games in various fields including business field.

2.5.1 Motivation for board game study focus

Board games have been in people's lives for thousands of years, with the first known game called Senet, originating in ancient Egypt approximately 3500 BCE. Another well-known game, Checkers, thought to have originated in Ancient Mesopotamia around 3000 BCE, is still played today. In the past board games were largely enjoyed by children and a small minority of adults, however the past decade has seen a huge increase in the popularity of board games among adult gamers. According to Matthew Hudak, a toys and games analyst with Euromonitor International, "2016 was the most influential year for board games with more than 5,000 board games introduced into the U.S. market last year" (Marie Oliver 2018 para. 1).

To further illustrate the popularity of board games, a review of successful crowdfunding campaigns for board games on the Kickstarter website shows that board games campaigns dwarf those of video games and have been growing continuously over the 4 year period between 2015 and 2018 as demonstrated on Figure 2.
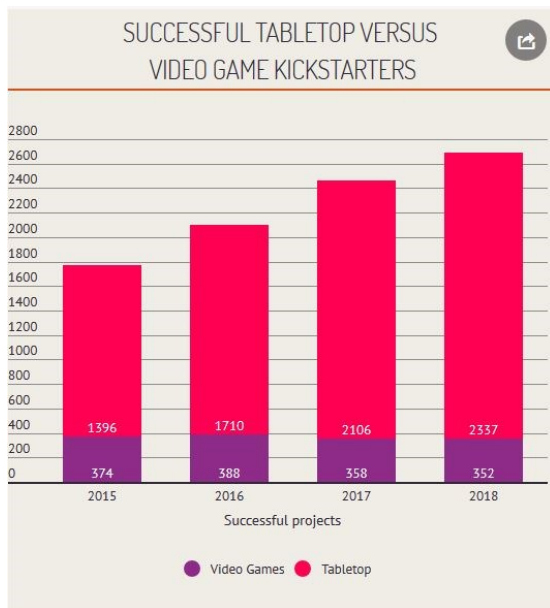

Figure 2 Kickstarter statistics (Charlie Hall 2018)

Board games are quickly moving from a niche audience into the mainstream, appealing to people of various ages within different fields. Apart from the leisure activities, board games

are increasingly used for diverse applications within healthcare, education and business industries. The increase in the variety of available games has been largely driving growth in popularity of board gaming as wider selection has allowed to find games addressing unique sets of needs and tastes.

A further motivation to study board games is the fact that there has been very little academic research focusing on board games so far even though a rapid growth in the size of the board game market valued at $4.6 billion in 2019 (Aniket Sharma, 2019) clearly demonstrates that the board games are widely penetrating and growing in importance among individuals and entities across the globe. In contrast video games, have been in the limelight in society and academia over the last decade, and, thus, been utilized in the multitude of studies.

Another factor in favor of using board games in research as opposed to video games is that the environment within board game studies can be controlled to a much greater extent than in a video game studies. "Their (board game) game play is fairly constrained and their core mechanisms are transparent enough to analyze" (Zagal, Rick & Hsi, 2006 p. 24). A board game has only the written rules to drive the game forward, in contrast, video games have countless hidden and unexplained rules that govern how the game plays. While it's possible for the player to explore, experiment and over time understand how the game works, different players will have a different understanding of the rules as they are not all apparent or explained within a video game.

All in all, considering all the above in terms of application to business context, the author of the study believes that companies and organizations could benefit tremendously from utilizing board and card games instead of video games for various educational and non-educational purposes, in particular for improving collaboration among employees. From a practical standpoint, board and card games are also easier to use within the office setting since they don't require any special arrangements (e.g. equipment such as game console or PC software) and can be played within a short time frame. The author also believes that further academic research is needed to demonstrate benefits of board games to business audience, and through this amplify application of such games within business context.

2.6   Gender game studies

The focus of the current study is to determine the short-term effect of card-/board games on pro-social behavior. Past research has shown that the pro-social behaviors of males and females vary with study methodology playing a key role in size of difference detected. A study utilizing The Prosocial Personality Battery found significant differences in two dimensions, perspective taking and moral reasoning with females scoring higher than males (Abdullahi, Kumar 2016). A meta-analysis on Children's and Adolescents' Prosocial Behavior found females scored higher on kindness/considerateness, helping, sharing and aggregated pro-social indexes. However the author's note "the relatively large sex differences in the former global indexes may be partially a function of methodology" (Fabes & Eisenberg, 1998. p. 13). Prior research on gender effect on pro-social behavior along with the analysis of economic games below, suggests that gender can have an effect on pro-social behavior when tested both experimentally and through surveys. Research design should be mindful of the conditions under which the design may manipulate the pro-social results and analysis of gender effect on pro-social behavior should be conducted to ensure the results can be attributed to the correct source.

The focus of the gender game studies below is on economic games which focus on the effect of gender on pro-social behavior. The 2015 paper by Espinosa & Kovářík looked at six experiments in this area. This paper is the basis for the gender analysis section 5.5. The study analyzed data from three types of economic games, The Dictator game, the Ultimatum game and the Public good game.

In the conclusions for their paper Espinosa & Kovářík pose that that their analysis of the experiments 2.6.1 - 2.6.6 suggests "the social behavior of both genders is malleable, but each responds to different details of the context. Females react more to aspects of social framing whereas males are more affected by reflection-related manipulations." Their interpretation contrasts with the common belief in the experimental literature (Croson and Gneezy, 2009, p.1) ''Social preferences of women are more situationally specific than those of men; women are neither more nor less socially oriented, but their social preferences are more malleable.''

Espinosa & Kovářík suggest that women are not more socially malleable as others have interpreted but rather may appear so due to experimental design. The experiments detailed below show that without social framing men and women behave the same.

The three games are described below.

The Dictator Game (DG). "The dictator game has one player, the Dictator, propose a division of a fixed amount of money between herself and another participant, the Recipient. Since the Recipient has no choice but accept the proposed division, the amount given by the Dictator is considered an indicator of prosocial behavior.

The Ultimatum Game (UG) introduces one important modification to the DG. One player, the Proposer, proposes a division of a fixed amount of money between herself and another player, the Responder. In contrast to the DG, the Responder observes the proposed division and can either accept or reject it. If accepted, the money is divided as proposed; if rejected, both players earn zero. Hence, the Responder has a possibility to ''punish'' the Proposer if the former views the proposed division as unfair. The key difference between the Proposer and the Dictator is that the decision of the latter can be considered an indicator of her pro-sociality, while the former's proposal confounds pro-sociality with strategic concerns.

The Public Good Game (PGG) is a continuous multi-layer version of a social dilemma. There is a group of n players and each of them is endowed with the same amount of money. The experimental subjects have to decide how much of this amount they will hold in their private account and how much they will contribute to the public good. The money contributed to the public good is multiplied by a factor larger than one but lower than n, and placed into a public account. The payoff of each player in the game is the sum of her private account and an n-th part of the balance in the public account. Hence, the selfish choice is to keep all the money in the private account. If everybody does, the payoff of each player equals her endowment. The efficient outcome is achieved if all contribute the entire amount. The fraction of the endowment contributed to the public good serves as a measure of social preferences." (Espinosa & Kovářík, 2015 p. 2)

Espinosa & Kovářík posed two hypotheses for their paper, the first proposed that experiments which included a "social frame" would lead to females increasing their pro-sociality compared to the baseline and males, and that experiments which allowed or primed

reflection would lead males to adjust their behavior towards self-interest to a greater degree than females. The social framing in this case meant that when asked to perform a pro-social task, e.g. deciding how much money to share in the DG, the person receiving the money would be described as a family member, a friend, or someone else within the person's social circle, as opposed to a stranger.

The second hypothesis stated that "Since emotions are naturally linked to social dilemma-like situations, the capacity to control emotions may be associated with lower sharing and less co-operation in these situations. In particular, men might be more able to abstract from the social and emotional aspects of social dilemmas and behave more in line with their self-interest if prompted." (Espinosa & Kovářík 2015 p. 2)

2.6.1   The effect of framing on prosocial behavior

(Brañas-Garza et al., 2010) Participants were assigned to three groups and asked to play the DG. Neutral treatment (*Neutral* N= 26, 16 females) were asked to divide a sum of money between themselves and a stranger. A second group (*Friend* N=27, 17 females) were asked to share the money between themselves and a friend. The third group (*Framing* N26, 17 females) was asked to share the sum with someone "that relies on you"

Both men and women showed increased giving in the friend and framing groups compared to the neutral group however the change was not significant for men while women reacted strongly to the treatment effect.

2.6.2   Social framing effect on Dictator Game results

(Dreber et al., 2013) Participants were asked to play the DG and placed into two groups. In the first group the participants were informed that the recipient will know that her payoff comes from a decision made by another person (Recipient informed treatment N= 327, 145 females) and in the second group the recipient would not be informed (Recipient not informed treatment N = 336, 146 females).

Giving by men showed no difference between the groups, women increased giving when in the recipient informed treatment group however the result was not statistically significant.

A second framing variation was also tested with the game being called a Giving or Keeping game. Women showed a greater increase in giving compared to men but the effects were not significant.

2.6.3 Delayed decision making utilizing the Ultimatum Game

(Grimm and Mengel 2011) The study placed participants into three groups. The first group were asked to play the UG followed by filling in a survey before making their decision (Delay, N = 132, 26 females), a second group was asked to make a decision immediately after the game (No Delay (N = 84, 19 females). The final group was asked to decide immediately, followed by answering the survey after which they had the opportunity to change their decision. (Change, N = 126, 24 females).

In both comparisons of No Delay to Delay, and No Delay to Change groups, both showed an increase in acceptance rates caused by the delayed decision. This change however was significant for men but not for women.

2.6.4 Testing experience and time delay effect utilizing a repeated Dictator Game

(Brañas-Garza et al., 2013) The study conducted a repeated DG using the same participants. The first experiment was run in October 2010 and the follow up in May 2011. Participants: ($N = 199$, 87 females in 2010; $N = 163$, 74 females in 2011; $N = 136$, 62 females in both). The experiment studied how experience and time delay caused people to change their behavior within the DG.

No gender difference was observed the first 2010 results. Both genders showed a significant decrease in giving in the second experiment in 2011 with men showing a greater adjustment than women.

2.6.5 Time pressure and time delay utilizing the Public Good Game

(Rand et al., 2012) The study ran variations of the Public Good game (PGG) to test the effect of time pressure and time delay. Participants were instructed to decide their contribution within 10s in the time pressure group and after 10s in the time delay group. The study was conducted online which lead to many participants not following the time constraints. Only those in adherence were accepted into the final analysis. Participants were grouped into the

Benchmark treatment without time manipulation (N = 212, 88 females) Time Pressure (N = 194, 92 females) and Time Delay (N = 249, 97 females).

(Espinosa & Kovářík, 2015) utilized the data and disaggregated the results by gender. They additionally ran an analysis utilizing the same data while also including the participants that did not meet the time constraints Time pressure (N = 372, 169 females) and Time delay (N = 308, 121 females).

No statistical difference was found between the benchmark and time variation groups for the participants that followed the time constraints. A significant difference was found between the time pressure and time delay group however the difference between genders was not statistically significant.

When analyzing all participants including those previously excluded the authors found a significant difference in men's behavior in the Time Delay treatment compared to the benchmark, the effect for women was not significant. No difference was found between Time Pressure and benchmark groups.

2.6.6   Intuition and Reflection-Priming on Public Good Game decisions

(Rand et al., 2012) Prior to the game subjects were shown a screen which they were asked to recall and describe in one paragraph a situation in which they made a decision based on either intuition or reflection that lead to either a good or bad outcome. This lead to four treatment groups: (i) intuition-good; (ii) reflection-bad; (iii) intuition-bad; and (iv) reflection-good. The first two were aggregated to Intuition-Priming treatment and the last two into Reflection-Priming treatment. Participants: Intuition-Priming treatment (N = 175, 108 females) Reflection-Priming (N = 168, 98 females).

No significant difference was found between genders for the Benchmark and the Intuition Priming groups. For the Benchmark – Reflection Priming, a weak significance (p = 0.0922) was found for males but not females. A significant difference was found for men between the Intuition-Priming and Reflection-Priming (p = 0.0489).

2.6.7   Gender experiments review

The research by Espinosa & Kovářík suggested that females and males respond in a different way to different types of framing. Females respond to social framing with increases in pro-

social behavior while men remain unaffected. Males on the other hand respond to reflection based framing to a greater degree than females with a decrease in pro-social behavior (an increase in self-serving behavior). Finally under a neutral unframed setting both genders behave the same.

It is worth noting that the results from the above six experiments are far from conclusive. As the authors themselves stated "the effects are statistically weak in our between-subjects comparisons applying the standard differences-in-differences approach. Consequently, we view the present evidence as indicative."

Their claim that women respond more to social framing is based on studies one & two. The first was able to show a statistically significant increase in females when a social framing was utilized but not in males. The second study found an increase in women but the result was not statistically significant. The evidence for their claim that women respond to social framing is thus not based on a great deal of evidence and warrants further study.

The claim that men respond more to reflection based framing is based on studies three to six, and provides a more convincing but still obscure result. Studies three & six found reflection based manipulations lead to statistically significant results in males but not females with study six showing a weak significance (p. 0.09). Study four showed a reflection based framing lead to a significant reductions in giving for both men and women, though the effect was stronger for men. Finally study five only showed a significant effect for males but not females when the experiment data was re-examined to include data that the original authors of the study had discarded due to non-compliance with experiment design.

Studies one & two don't so much show that women respond "more" to social framing than men, so much as men don't respond to social framing at all while women sometimes do. With just two experiments with one providing a non-result is make it difficult to come to a real conclusion. Studies three to six are better at showing that reflection based framing has a greater effect on males as there are multiple experiments that all show a similar result however the value of study five is questionable as the data supporting the hypothesis was only found in originally excluded data without a good justification of why this data should be accepted. Finally Study four confounds the result for women as it is the only one that showed a reflection based manipulation having an effect.

While not conclusive, the above studies gave evidence to support the idea that gender effects social behavior differently based on the framing utilized. The effect of a neutral non-manipulated setting however was consistent and showed no difference between genders. As the authors stated "both genders behave equally when the context is experimentally neutral, deprived of a frame." (Espinosa & Kovářík, 2015 p. 7).

3   HYPOTHESIS DEVELOPMENT

The experiment conducted in this thesis was designed to closely emulate the Gentile et al (2009) study. The main differences are a change in format from video games to card-/board games and the duration of the gaming activity has been changed from 20 minutes down to five. The goal in the Gentile video game study was to test whether pro-social games (games in which actors work towards a common goal) would lead to more prosocial behavior in the real world as compared to those playing violent video games (games in which players harm other actors). The thesis study aimed to test a similar hypothesis with a new format. In addition the study attempted to determine the effect that gender played on the resulting pro-social behavior.

3.1   General learning model's relation to current study

The study focused on the short-term effects of learning caused by playing games and how they influence pro-social behavior. The GLM suggests that playing games provides learning encounters which can have affective, arousal and cognitive effects as seen in Figure 1. The most relevant of these effects is the effect of priming scripts. Past research on the General Aggression model has demonstrated that games that include aggressive content prime aggressive scripts of players. (Bushman & Anderson, 2002) The GLM suggests the same is true of pro-social behavioral scripts primed by games with pro-social content. A co-operative game should increase pro-social behavior in the short-term while a competitive game decreases pro-social behavior. Games can additionally provide opportunities for operant reinforcement or punishment. As Figure 1 shows both the person and situation factors affect the learning encounter. Should a game present an opportunity for the player to make a decision regarding whether to help or harm another actor, the outcome of said decision (reinforcement or punishment) will feedback into the situation factors creating a continues cycle of learning and reinforcement. The GLM states that in the short-term if a person is given an opportunity towards pro-social behavior, (helping another person) the likelihood of which behavior is chosen is based on which behavioral scripts have recently been primed and which behaviors have been reinforced. Games which require pro-social behavior for success are likely to increase pro-social behaviors of players in the short-term after the game. Long-term effects can also be expected should the short-terms effects above be repeated over time however long-term effects are not the focus of this study.

The GLM has previously been utilized to research the effects of video games on pro-social behavior. The use of GLM to study the pro-social effects of board games and card games is new, however the learning mechanisms in play remain the same. Board and card games may additionally benefit from the fact that the reinforcement is likely to be given immediately during the game, and be given by other players who are in close proximity. This will often not be the case with video games which rely on feedback purely from the game or players elsewhere (e.g. during online play). The moderating effect of game context was discussed in more detail in chapter 2.2.3.

3.2   Gender game studies effect

The gender focused meta-analysis of pro-social behavior (Fabes & Eisenberg, 1998) and the review of economic games effect on gender (Espinosa & Kovářík 2015) suggest that there are differences between genders in relation to pro-social behaviors. Additionally both sources suggest that study design can have a significant effect on the difference in measured pro-social results between genders.

Chapter 2.2.3 additionally demonstrated that the context of playing with another person can have a moderating effect on the effect posed by the content of the game. Whether playing face to face with another person was enough to create an unintentional social framing for the thesis experiment was unknown. While the evidence for the hypothesis was not strong Espinosa & Kovářík's research suggested such a frame would increase pro-social behavior in women but not men.

The research on gender effect on pro-social behavior has not been able to able to demonstrate consistent findings, this was especially the case in the review of economic games with studies testing similar theories providing different results. The inconsistent findings of past research lead to the research question in the current study.

3.3 Hypothesis

People that play card-/board games with collaborative elements, will continue to act in a more pro-social and collaborative way in the short-term after the game is played compared to those playing competitive or neutral games.

3.4 Gender Research Question

What is the association between gender and the short-term effect of playing co-operative and competitive card-/board games on pro-social behavior?

4 METHODOLOGY

The 161 participants were randomly assigned to one of three groups. Group one played a competitive game named speed, group two played a co-operative game named 5 Minute Dungeon and group three played a neutral game with neither co-operative nor competitive elements called solitaire. The participants consisted of University students (+ 2 high school students). Participants were motivated to take part with a small reward (chocolate bar) in exchange for approximately 15 minutes of their time.

After playing the game the game the participants were asked to participate in a study investigating how different types of board games affected puzzle performance. They were asked to choose 11 puzzle boards from the board game Ubongo for another participant to solve. (Ubongo is an abstract geometric puzzle game). Each player is given a puzzle board and their task is to perfectly fill said board within a short time limit by utilizing a set of 3 or 4 polyomino shapes seen below. The game has 12 shapes in total to choose from.

Selvarajan,S., 2020. Ubongo game. [Photograph] (Private collection)

The boards are two sided, one side contains easy to solve puzzles with three pieces used to fill the puzzle board and the other side contains a hard side which requires the use of four pieces. The participants were told that should their partner – (the person solving the puzzles

that they have chosen) complete their 11 boards within 10 minutes they will receive a reward. The participants can thus choose to help or hinder their partner by choosing easy or difficult puzzles to be solved. They will be asked to choose boards of both difficulties.

4.1 Group 1 (competitive) game: Speed

Group one participants were matched in pairs of two and played a game of speed before choosing the puzzle boards.

Selvarajan,S., 2020. Speed game. [Photograph] (Private collection)

Description: "Each player is dealt five cards to form a hand, and each player is dealt 15 cards face down to form a draw pile. Two stacks of five cards, placed face down on each side between the players, serve as replacement piles. Finally, two cards are placed face down in the center between the replacement piles.

The round begins when the players each flip one of the face-down cards in the center at the same time. Using cards from their hand, the players must simultaneously place cards using only one hand, one above or one below on top of either of the center stacks without hesitating to shuffle cards or otherwise delay the game (however a player may only play one card at a time). For example, a pile with a six on top may have a five or a seven placed on it, but not another six, however multiple cards at one time can be placed. Ace is both a high and low card, considered one value above a King as well as one below a Two, so that the cards form a looping sequence. Whenever the number of cards in a player's hands drops below five, he or she has to draw back up to five cards until that player's draw pile is depleted. When both players run out of options for play they simultaneously flip a card from the side piles onto the top of the central piles. If these piles become depleted, the central stacks are shuffled individually and are placed face-down as new side piles from which cards can be flipped.

A player wins by running out of cards in his hand and draw pile before the other player. If a player has a card to place it must be placed" (En.wikipedia.org, 2019).

4.2   Group 2 (collaborative) game: 5 Minute Dungeon

Group two participants were put into teams of 2-5 players and played a game of 5 minute Dungeon before choosing puzzle boards.

(5 Minute dungeon, 2020)

Description: (BoardGameGeek, 2019)

"5-Minute Dungeon is a chaotic, co-operative, real-time card game in which players have only five minutes to escape the randomized dungeon. Communication and teamwork are critical to survival because there's no time to form a carefully considered plan — and no predicting what dangers lie ahead.

In more detail, players assume the role of one of ten heroes, each with special cards and abilities. Once the five-minute timer starts, the race is on to defeat all the monsters inside the dungeon. In order to defeat a monster, players must match symbols from their hand with ones on the monster's card. At the end of each dungeon is a powerful dungeon boss." (The game is comparable to a co-operative version of UNO)

The game will be taught to the players by showing the following video:

("5 minute dungeon (how to play)", 2020)

4.3   Group 3 (Control group) game: Solitaire

Group 3 participants played a game of Solitaire before choosing puzzle boards.

"The first objective is to release and play into position certain cards to build up each foundation, in sequence and in suit, from the ace through the king. The ultimate objective is to build the whole pack onto the foundations, and if that can be done, the Solitaire game is won. The rank of cards in Solitaire games is: K (high), Q, J, 10, 9, 8, 7, 6, 5, 4, 3, 2, A (low).

There are four different types of piles in Solitaire, The Tableau: Seven piles that make up the main table. The Foundations: Four piles on which a whole suit or sequence must be built up. In most Solitaire games, the four aces are the bottom card or base of the foundations. The foundation piles are hearts, diamonds, spades, and clubs. The Stock (or Hand) Pile: If the entire pack is not laid out in a tableau at the beginning of a game, the remaining cards form the stock pile from which additional cards are brought into play according to the rules. The Talon (or Waste) Pile: Cards from the stock pile that have no place in the tableau or on foundations are laid face up in the waste pile.

To form the tableau, seven piles need to be created. Starting from left to right, place the first card face up to make the first pile, deal one card face down for the next six piles. Starting again from left to right, place one card face up on the second pile and deal one card face

down on piles three through seven. Starting again from left to right, place one card face up on the third pile and deal one card face down on piles four through seven. Continue this pattern until pile seven has one card facing up on top of a pile of six cards facing down. The remaining cards form the stock (or hand) pile and are placed above the tableau. When starting out, the foundations and waste pile do not have any cards.

The initial array may be changed by building - transferring cards among the face-up cards in the tableau. Certain cards of the tableau can be played at once, while others may not be played until certain blocking cards are removed. For example, of the seven cards facing up in the tableau, if one is a nine and another is a ten, you may transfer the nine to on top of the ten to begin building that pile in sequence. Since you have moved the nine from one of the seven piles, you have now unblocked a face down card; this card can be turned over and now is in play.

As you transfer cards in the tableau and begin building sequences, if you uncover an ace, the ace should be placed in one of the foundation piles. The foundations get built by suit and in sequence from ace to king. Continue to transfer cards on top of each other in the tableau in sequence. If you can't move any more face up cards, you can utilize the stock pile by flipping over the first card. This card can be played in the foundations or tableau. If you cannot play the card in the tableau or the foundations piles, move the card to the waste pile and turn over another card in the stock pile. If a vacancy in the tableau is created by the removal of cards elsewhere it is called a space, and it is of major importance in manipulating the tableau. If a space is created, it can only be filled in with a king. Filling a space with a king could potentially unblock one of the face down cards in another pile in the tableau.

Continue to transfer cards in the tableau and bring cards into play from the stock pile until all the cards are built in suit sequences in the foundation piles to win!" (”Solitaire Game Rules", 2020)
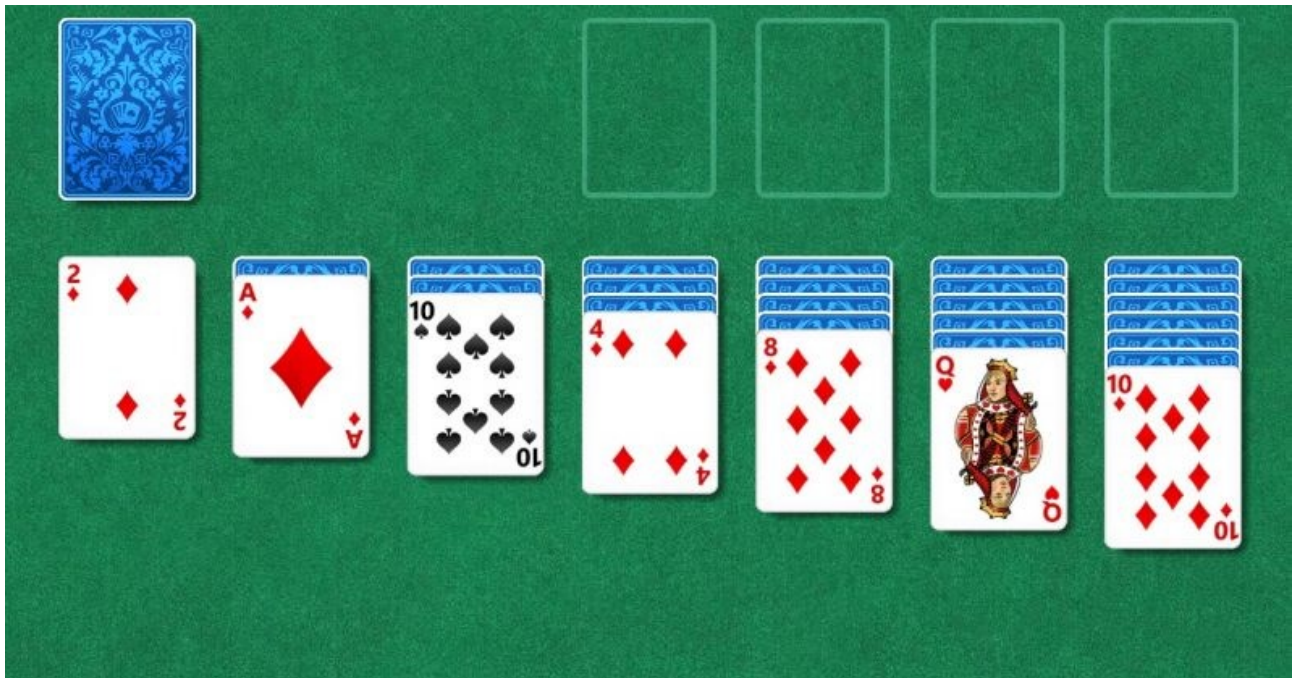
("Solitaire Game Rules", 2020)

4.4   Game selection criteria

When choosing the games to be used in the experiment the author had several goals in mind. As the experiment requires a large number of randomly assigned participants it was necessary to choose games that would be relatively quick to play, as convincing people to play a game for several hours would make data collection very difficult.

Additional value was placed on selecting games people would likely be familiar with, 5 minute dungeon resembles the card game UNO, a popular family card game. Solitaire is a staple as it has long been packaged with the windows operating system and finally Speed or some variant of it is also a commonly played card game in Europe, while the name of the game was unfamiliar, most participants had played a game with similar mechanics.

Additionally as the goal of the experiment is to see how different types of games, collaborative, competitive and solo games affect people's behavior post-game, it was important to find games that would have a strong influence on people's state of mind. 5 minute dungeon has the participants playing towards a common goal and either succeed or fail together which was expected to foster a sense of teamwork. Speed is played in direct

competition with another player with a single winner and loser. The control game Solitaire had no interaction with other players, there for it should not have influenced players towards collaborative or competitive behavior.

Prior to the experiment a group of 19 participants were asked to play games of 5 minute dungeon and Speed. They were then asked on a scale from 1-10 to rate how co-operative – competitive the game was? 1 meaning a great deal of co-operation is required to win, 10 meaning a great deal of competitive behavior is required to win. 5 minute dungeon had a mean score of 1.5. Speed had a mean score of 8.27. The aim was to utilize two games that differed in their competitiveness rating as much as possible.

4.5   Participant and procedures:

Participants

Participants in the final analysis were 161 students, 122 bachelor students, mean age = 21.4 years, SD = 3.65) 33 Master's students, mean age 24 years, SD =2.39) , 2 high school students, 1 executive education student, 1 PhD student and 2 who declined to state their current level of studies.   The sample included 91 male (57%) and 70 Female (43%) participants. Nationalities represented were: Finland (122), German (5), France (4), Spain (3), Russia (2), Malaysia (2), Nepal (2), Argentina (1), Bangladesh (1), Belgium (1), Brazil (1), Chile (1), Columbia (1), Czech (1), Denmark (1), India (1), Japan (1), Kazakhstan (1), Poland (1), Portugal (1), Taiwan (1), UK (1), USA (1), Vietnam (1).

Procedures

Data was collected between Oct – Nov 2019 at the Aalto University Undergraduate Center in Finland. Participation rate was 33% of approached subjects. Participants received minor compensation (chocolate bar) in exchange for their voluntary participation. Participants were told they were being tested in a study investigating how different types of board games affected puzzle performance. Participants were tested either individually in the case of the control group game solitaire or in groups for the co-operative five minute dungeon game and competitive game speed. Participants were randomly assigned to each game.

5 RESULTS

Two analyses were performed, a single factor ANOVA to determine the effect of game type on pro-social behaviors and a Two-Way ANOVA to determine the effect of gender on pro-social behavior.

5.1 Game effect analysis

In order to assess the hypothesis that game content has an effect on pro-social behavior, a one-way analysis of variance ANOVA using Excel was conducted. ANOVA is used to determine whether there are any statistically significant differences between the means of two or more independent groups, in this thesis between the three different game groups.

A mean pro-social score was utilized by subtracting the number of difficult tiles from the easy tiles chosen by each participant. Which ranged from a score of 9 when the participant chose the maximum of 10 easy and 1 difficult tile, or -9 when the participant chose the maximum number of hard and 1 easy puzzle (subjects were instructed to choose both easy and hard tiles). Between-subjects design condition was met as participants only participated in the experiment a single game.

Based on the GLM and past studies utilizing video games the expectation was that the competitive game Speed would decrease pro-social behaviors in the short-term while the co-operative game 5 Minute Dungeon would increase pro-social behaviors when compared to the neutral game Solitaire.

5.2 Assumptions of ANOVA

The Null hypothesis (H_0) states that the means of 3 game groups are equal to one another, which is can be illustrated where the means of each group are equal to one another; $H_0 = \mu_{Competative} = \mu_{Neutral} = \mu_{Cooperative}$. Should the null be rejected the alternative hypothesis (H_1) states there is a mean difference between at least two levels, which is can be illustrated where the means of each group are not equal to one another; $H_0 = \mu_{Competative} \neq \mu_{Neutral} \neq \mu_{Cooperative}$.

ANOVA results rely on three assumptions in order to be reliable:

Response variable residuals are normally distributed, variances of populations are equal and responses for a given group are independent and identically distributed normal random variables.

Normal distribution is a probability distribution that is symmetric from the mean, showing that data near the mean is more frequent in occurrence than data far from the mean.

Table 1 Tests of Normality

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Game	Statistic	df	Sig.	Statistic	df	Sig.
Easy panels - hard panels	5 Minute Dungeon	,195	57	,000	,925	57	,002
	Solitaire	,127	51	,040	,942	51	,015
	Speed	,123	53	,045	,931	53	,005
a. Lilliefors Significance Correction							

Normality was tested with SPSS utilizing the Shapiro-Wilk test for each level of independent variable. A p-value of 0.05 was utilized.

H_0: The data is normally distributed

H_1: There is a difference between the data and normal distribution

All three games returned a Sig value below 0.05 as seen in Table *1* Tests of Normality. The games Speed and 5 Minute Dungeon returned significantly lower p value, an order of magnitude lower than the required significance level. A significance value below 0.05 provides enough evidence to say the populations are not normally distributed thus the null hypothesis H_0 is rejected. This leads to the conclusion that the normality assumption has been violated. There is a statistically significant difference with that of a normal distribution. Due to this violation of normality a Kruskal-Wallis test was also conducted as the Kruskal-Wallis does not require a normal distribution.

Homogeneity of variances was tested utilizing a Levene's test. A Levene's test is used to test if samples have equal variances. An assumption of a one-way ANOVA is that the variances of the populations are be equal.

H_0: The population variances are equal

H_1: There is a difference between the variances in the population

Table 2 Homogeneity of variances

ANOVA

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	37,61	2,00	18,80	2,59	0,08	3,05
Within Groups	1147,58	158,00	7,26			
Total	1185,189	160				

Table 2 shows a p value of 0.08 for the Levene's test of Equality of Error variances. We accept the null hypothesis. It is safe to assume homogeneity of variance is met.

The final assumption of ANOVA. Independence of observation was met by ensuring each game group was independent of the others. Participants could only take part in a single game and provide a single survey response.

5.3 Single Factor ANOVA

ANOVA analysis was conducted however due to the violation of normality as seen in Table *1* Tests of Normality, the results could be considered less reliable.

Table 3 ANOVA analysis between the three game groups

SUMMARY

Groups	Count	Sum	Average	Variance
Speed	53	153	2,89	23,10
5 Minute	57	158	2,77	14,18
Solitaire	51	110	2,16	22,13

ANOVA

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	16,0233	2	8,01	0,41	0,67	3,05
Within Groups	3102,1	158	19,63			
Total	3118,12	160				

The ANOVA analysis returned a P-value of 0,67 as seen highlighted in Table 3 ANOVA analysis between the three game groups. The null hypothesis is accepted. ($H_0 = \mu_{Competative} = \mu_{Neutral} = \mu_{Cooperative}$). The likelihood of a random error returning the observed data is very high. The data does not support the thesis hypothesis that game content has an effect on pro-social behavior.
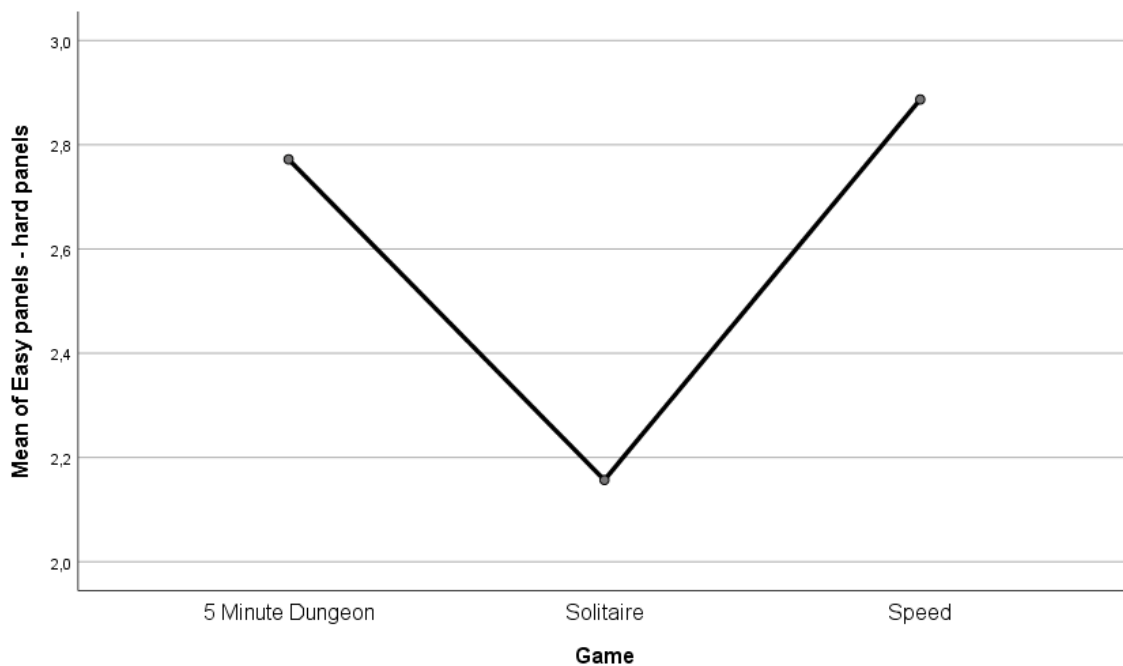

Figure 3 Means Plots (scale: min = -9; max = 9)

While the results of the One-way ANOVA were not statistically significant, the results depicted in Figure 3 show an increase in pro-social behaviors in both the competitive game group Speed and the co-operative game group 5 Minute Dungeon. The result is not in line

with past experiments or the GLM, as the expectation based on past research was to see an increase in pro-social behavior in the co-operative game group and a decrease in the competitive game group.

5.4   Kruskal-Wallis Test

Due to the assumption of normality violation the results of the ANOVA were not entirely reliable. A non-parametric Kruska-Wallis test was performed using SPSS as the Kruskal-Wallis test does not rely on the assumption of normality. The Kruskal-Wallis test is a non-parametric method for testing whether samples originate from the same distribution. (Howell & Mcconaughy, 1982)

Table 4 Kruskal-Wallis Test

Ranks

	Game	N	Mean Rank
Easy panels - hard panels	5 Minute Dungeon	57	81,71
	Solitaire	51	75,40
	Speed	53	85,62
	Total	161	

Test Statistics[a,b]

	Easy panels - hard panels
Kruskal-Wallis H	1,299
df	2
Asymp. Sig.	,522

a. Kruskal Wallis Test

b. Grouping Variable: Game

The test returned a similar result as the ANOVA with no statistically significant result found. As seen from Table *4* Kruskal-Wallis Test the significance value of 0.522 far exceeds the chosen p value of 0.05. Meaning there is no discernable difference between the three groups. The data does not support the thesis hypothesis. The null hypothesis is thus accepted. There for the game content does not have an effect on pro-social behavior.

5.5 Gender effect analysis

An analysis was performed to determine the effect of gender on prosocial behavior. Past research utilizing experiments to test for gender differences on pro-social behavior suggest that there are differences between males and females however the results of past experiments have been inconsistent.

The hypotheses and null hypothesis are listed below.

H_0 (game group): The means of all game groups are equal
H_1 (game group): The mean of at least one game group is different

H_0 (gender group): The means of the gender groups are equal
H_1 (gender group): The means of the gender groups are different

H_0 (interaction): There is no interaction between the game group and gender
H_1 (interaction): There is interaction between the game group and gender

A two-way ANOVA utilizing SPSS was conducted to test the effect of gender as well as game type. The two-way ANOVA differs from the one-way ANOVA in that there are two independent variables. In this case the genders male and female.

5.6 Assumptions of Two-way ANOVA

The following assumptions must be met in order for the two-way ANOVA to be accurate: The populations from which the samples were obtained must be normally or approximately normally distributed. The samples must be independent. The variances of the populations must be equal. The groups must have the same sample size.

The SPSS program has a statistical manipulation to solve the issue of unequal sample sizes. The sum of squares type III model was utilized. The model uses an unweighted mean approach. There for it does not take into account the fact that some groups have larger sample sizes. The model uses a harmonic mean, taking the average of the mean sample sizes and applies this to each factor (Howell, D. C., & McConaughy, S. H. 1982).

Normality was tested with SPSS using the Shapiro-Wilke test.

Table 5 Shapiro-Wilk test Male, 5 Min Dungeon

Tests of Normality							
	Gender	Kolmogorov-Smirnovb			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Result	Male	0,136	34	0,11	0,924	34	0,021
a Gender = Male, Game = 5 Min							
b Lilliefors Significance Correction							

Table 6 Shapiro-Wilk test Male, Solitaire

Tests of Normality							
	Gender	Kolmogorov-Smirnovb			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Result	Male	0,14	34	0,091	0,928	34	0,027
a Gender = Male, Game = Solitaire							
b Lilliefors Significance Correction							

Table 7 Shapiro-Wilk test Female, 5 Min Dungeon

Tests of Normality							
	Gender	Kolmogorov-Smirnovb			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Result	Female	0,309	23	0	0,853	23	0,003
a Gender = Female, Game = 5 Min							
b Lilliefors Significance Correction							

Table 8 Shapiro-Wilk test Female, Speed

Tests of Normality							
	Gender	Kolmogorov-Smirnovb			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Result	Female	0,186	30	0,009	0,871	30	0,002
a Gender = Female, Game = Speed							
b Lilliefors Significance Correction							

Table 9 Shapiro-Wilk test Female, Solitaire

Tests of Normality							
	Game	Kolmogorov-Smirnovb			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Result	Solitaire	0,181	17	0,142	0,935	17	0,26
a Gender = Female, Game = Solitaire							
b Lilliefors Significance Correction							

Table 10 Shapiro-Wilk test Male, Speed

Tests of Normality							
	Game	Kolmogorov-Smirnovb			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Result	Speed	0,132	23	,200*	0,944	23	0,222
* This is a lower bound of the true significance.							
a Gender = Male, Game = Speed							
b Lilliefors Significance Correction							

Tables 5-8 show four of the six groups fail to meet the assumption of normality with sig levels below 0.05. This may decrease the accuracy of analysis. It is worth noting that ANOVA is robust to moderate deviations from normality; simulation studies, using a variety of non-normal distributions, have shown that the false positive rate is not affected very much by the violation of the normality assumption (Glass et al. 1972, Harwell et al. 1992, Lix et al. 1996, Howell 2013. p. 334)

Homogeneity of variances was tested utilizing a Levene's test. A Levene's test is used to test if samples have equal variances. An assumption of a two-way ANOVA is that the variances of the populations are be equal.

Table 11 Leven's Test of Equality of Error Variances for gender analysis

Levene's Test of Equality of Error Variances[a,b]

		Levene Statistic	df1	df2	Sig.
Result	Based on Mean	3,230	5	155	,008
	Based on Median	2,836	5	155	,018
	Based on Median and with adjusted df	2,836	5	144,319	,018
	Based on trimmed mean	3,268	5	155	,008

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Dependent variable: Result

b. Design: Intercept + Game + Gender + Game * Gender

H_0: The population variances are equal

H_1: There is a difference between the variances in the population

Table 11 shows a statistically significant p value of 0.008 which is smaller than the chosen 0.05 for the Levene's test of equality of error variances which suggests homogeneity of

variances has been violated. We reject the null hypothesis, variance of the dependent variable is not equal. However Two-way ANOVA is robust to violating the assumption of homogeneity of variances. "If the largest variance is no more than four times the smallest, the analysis of variance is most likely to be valid" (Howell 2013).

Table 12 Two-way ANOVA descriptive statistics

Descriptive Statistics

Dependent Variable: Result

Game	Gender	Mean	Std. Deviation	N
5 Min	Male	2,50	4,392	34
	Female	3,17	2,622	23
	Total	2,77	3,766	57
Solitaire	Male	2,32	5,109	34
	Female	1,82	3,893	17
	Total	2,16	4,705	51
Speed	Male	1,39	4,961	23
	Female	4,03	4,429	30
	Total	2,89	4,806	53
Total	Male	2,15	4,782	91
	Female	3,21	3,837	70
	Total	2,61	4,415	161

As the larger variances are mostly associated with the larger sample sizes as seen in Table *12* Two-way ANOVA descriptive statistics, and the largest variances are not more than four times the smallest, the analysis should not be greatly affected by the homogeneity violation.

5.7 Two-way Anova

A two-way ANOVA compares the mean differences between groups that have been split on two independent variables. In this experiment the independent variables are the genders male and female. The purpose of the two-way ANOVA is to understand if there is an interaction between the two independent variables on the dependent variables, in this case variables are the three different games.

Table 13 Two-way ANOVA

Tests of Between-Subjects Effects

Dependent Variable: Result

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	115,963[a]	5	23,193	1,197	,313	,037
Intercept	976,850	1	976,850	50,434	,000	,246
Game	16,138	2	8,069	,417	,660	,005
Gender	33,326	1	33,326	1,721	,192	,011
Game * Gender	62,061	2	31,030	1,602	,205	,020
Error	3002,161	155	19,369			
Total	4219,000	161				
Corrected Total	3118,124	160				

a. R Squared = ,037 (Adjusted R Squared = ,006)

Table 13 shows no statistically significant change found in any of the three groups analyzed.

Gender Sig 0.192, we accept the null hypothesis H_0 (gender group): The means of the gender groups are equal.

Game Sig 0.66 there for we accept the null hypothesis H_0 (game group): The means of all game groups are equal.

Game * Gender Sig 0.205, we accept the null hypothesis H_0 (interaction): There is no interaction between the game group and gender

All null hypotheses are accepted. There for in answer to the research question which asked; what is the association between gender and the short-term effect of playing co-operative and competitive card-/board games on pro-social behavior? No statistically significant effect was discovered.
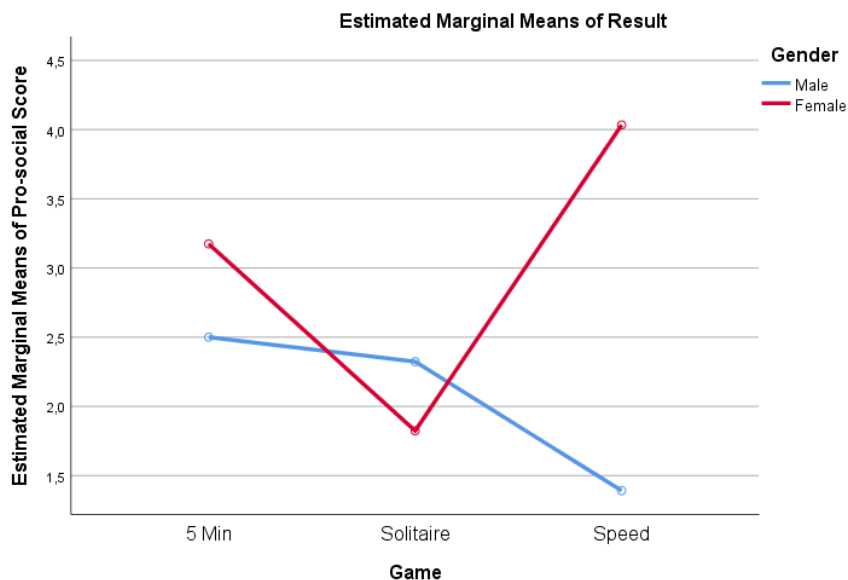
Figure 4 Estimated Marginal Means of Pro-social score

While the results of the two-way ANOVA were not statistically significant, the results depicted in Figure *4* show an interesting difference between genders. Males behaved as predicted by the GLM with increases in pro-social behaviors due to playing the co-operative game, mean pro-social score 2,5 and decreases in said behaviors after playing the competitive game mean 1.39. The same result was predicted by the GLM for females however the outcome was rather different. Both pro-social, mean 3.17 and competitive mean 4.03, games yielded increases in pro-social behavior. Women were potentially influenced by the context of playing with other people more than they were the content of the game. The context of playing with another person may have created an unintended social framing. If so the result would be in line with Espinosa & Kovářík's findings (chapter 2.6.7) suggesting that social framing increases pro-social behavior in women but not in men.

6   DISCUSSION

The main goal of the present study was to test the hypothesis, which suggested that people, who played card or board game with collaborative elements, would continue to act in a more pro-social and collaborative way in the short-term after a game compared to those who played competitive or neutral games. In addition, the thesis sought to examine whether gender had any impact on pro-social behavior after playing co-operative and competitive card-/board games.

The thesis experiment was unable to corroborate past research by Gentile (2011), Ewoldsen et al. (2012), Greitemeyer & Mügge (2014) and found that playing co-operative, competitive and neutral games had no statistically significant impact on pro-social behavior. Similarly the effect of gender was not statistically significant.

To test the hypothesis participants (n 161) were randomly assigned to one of three games: competitive, neutral or co-operative. After playing a game for five minutes, each individual was asked to choose 11 tangram puzzles for another player to solve. Participants were told that successful completion of 10/11 puzzles within 10 minutes would yield a monetary reward to their partner, and that they could choose freely from easy and hard puzzles to assign as long as at least one was chosen from each difficulty category. Thus, the individuals faced the choice of helping or hurting their partner's chances to complete the task

The competitive game named Speed used within the experiment had players compete against each other resulting in a single winner and loser. The collaborative game (5 Minute Dungeon) was played in groups with the team working together to win or lose as one. The neutral game (Solitaire) was played solo.

The experiment design was similar to that of video game experiments discussed in chapters 2.4.1.3 and 2.4.4 with several key differences. The medium was changed from video games to card-/board games. The game time was reduced to 5 minutes (other experiments utilized 10-90 minutes). The competitive and co-operative games were played with other people while the control game was played alone (video game studies isolated participants). Finally, the violent game utilized in video game studies was replaced with a competitive game.

The result of the experiment was unexpected as past studies consistently demonstrated that video game content had an impact on pro-social behavior, and it was the author's expectation

that the same effect would be observed in the thesis experiment utilizing card-/board games. Experiments using video games showed that the participants playing violent games were significantly less helpful to others compared to co-operative game players or control groups. While the impact of playing collaborative game on pro-social behavior within the present study was not statistically significant, there was an observable increase in the amount of helping behaviors in the co-operative 5 Minute Dungeon game group as well as the competitive Speed game group when compared to the neutral control group as seen in Figure 3, the short duration of game play may explain the lack of variation in results across game groups. Previous studies reporting statistically significant impact of games on pro-social behavior utilized longer periods of game play. The pro-social scripts suggested by the GLM may not have had an adequate time within the thesis experiment to become primed. There is evidence to suggest short game time differences do not have a strong effect on pro-social behavior as a study looked specifically into this time issue and found no statistically significant differences between game times of 10 and 20 minutes (Danielle Langlois 2017). The study in question however utilized small group sizes of 19-21 people, below the recommended number for finding statistically significant results. No other studies were found on the topic leaving it as a potential avenue for the future research.

The moderating effect of game context (playing with another person) could be another reason that explains the unexpected result of the study experiment. Prior research has shown that the context of the game can have a large impact on pro-social behavior, potentially greater than the effect from the game content. The Ewoldsen study (2012) described in chapter 2.4.2 demonstrated that even though violent games led people to behave in a less pro-social manner, this effect did not occur when the games were played in a context, which promoted pro-social behavior. According to the same study, a violent game played co-operatively led to an increase in tit for tat behavior post-game while competitive or neutral games decreased pro-social behavior. The results of the current study appear to emulate those of the Ewoldsen's study (2012). The mean helping scores for the competitive game Speed were far higher than previous research focused purely on game content would lead us to expect. The context of playing with other people may to have had a greater effect on pro-social tendencies than the content of the game played. This result was unexpected as the competitive game Speed has nothing in its design to suggest a pro-social context to the game:

the game has a single winner and loser, and the cooperation between the players only stems from the need to move the game forward. Potentially card-/board games by their very nature create a context, which increases pro-social behavior as the games are played face to face with another player. In contrast, video game studies generally isolate participants placing them alone in a room with the game. Understanding the impact of playing games face to face is yet another avenue for the future research.

Finally, while card-/board games share many of the key dimensions of video games, as discussed in chapters 2.2 and 2.3, it is still possible that video games make for more effective learning tools, which could explain why the result of this study differs from those of video game studies. This is yet another direction for the future studies.

As mentioned earlier, this study didn't find any statistically significant impact of gender on pro-social behavior. However, it is worth noting that there was a large difference in results of the pro-social task between males (mean 1.39) and females (mean 4.03) when playing the competitive game Speed. Additionally, females had a higher mean score when playing the competitive game than the neutral or co-operative games (higher scores resulted from a greater number of easy puzzles chosen for the partner meaning more pro-social behavior). A potential explanation for higher mean scores for women in the competitive game can be found in the study by Espinosa & Kovářík (2015), which stated that while men and women are both equally malleable regarding social behavior, women tend to react more than men to social framing resulting in an increase in their pro-social behavior. The thesis experiment did not intentionally utilize a pro-social framing, however the game context may have created the frame inadvertently. As the results were not statistically significant no conclusion can be drawn from the present study, however the direction of the behavior was in line with Espinosa & Kovářík's (2015) hypothesis warranting further study. Past research on gender effect on pro-social behavior provides strong evidence that no difference between genders exists under an unframed setting.

6.1 Research limitations:

The Two-way ANOVA used in the gender effect analysis violated the assumptions of normality and homogeneity of variance, potentially affecting the accuracy. The participants were primarily university students, which may not reflect the general population.

Additionally, as study participants, recruited in one of the buildings of Aalto University, were arriving for the experiment simultaneously in groups, many of them must have known each other prior to experiment. While people were randomly assigned to the game being played it is likely that many knew each other which may have affected the context of the game. (E.g. playing the competitive game with a friend or classmate may have changed whether they perceived the game as being played against or with the opponent). Finally participants were given the option but no mandate to test how difficult the easy and difficult puzzles were, some participants chose to do so while others assigned the puzzles based on the notion that hard puzzles are "harder". This may have affected how some participants assigned puzzles however this was equally true of all groups.

6.2 Future research topics

Research on the effect of short duration game play on pro-social behaviors is limited. Replication of the current experiment or of earlier video game based studies utilizing different gaming periods would provide insight into this effect.

In the current study the competitive game group and the co-operative game group returned similar pro-social task results. The result may suggest that the context of playing with others has a stronger effect than the content of the game. Future studies may attempt to isolate the effect of game context. A potential method would be to test if playing the same game in isolation (for example playing a digital version of a game) yields the same pro-social task result as playing face to face with a another player. This is likely the most important research that needs to be undertaken in order to further card-/board game based research as the nature of both types of games necessitate playing face to face with another person and therefor differentiate them from video games especially in a research setting as video game studies often isolate players.

7   CONCLUSIONS

The aim of the research was to test whether card-/board games would serve as a useful tool in improving pro-social behavior. The research was built on past experiments utilizing video games. Past studies were able to demonstrate significant impact of playing pro-social video games on pro-social behaviors after both short-term and long-term gaming exposure with the content of the game being a key factor. Pro-social games led to pro-social behaviors while violent games led to decreases in pro-social behavior. No studies were identified that utilized card-/board games as the testing medium – this research gap was the motivation for the thesis. A secondary objective of this study was to understand what effect, if any, gender would play on the pro-social behaviors recorded after the experiment. This thesis study was unable to find statistically significant changes to pro-social behaviors when utilizing card-/board games over short gaming durations, nor was any statistically significant gender effect observed.

The study had several key differences to the past research. The duration of game play was shorter, the medium was changed from video games to card-/board games and, finally, the context of the experiment was different: the video game experiments commonly isolated participants while the nature of card-/board games necessitates having participants play together.

The differences in study design may explain the unexpected research results. The duration of game play may have been inadequate to prime pro-social scripts in the participants. Additionally, the context of playing with other people may have overridden the impact of games content – past research has shown that the context of a game (e.g. playing with others) can have a significant moderating effect on pro-social behavior. Finally, card-/board games may function less effectively as a medium for promoting pro-social behavior than video games.

The thesis study was unable to provide any conclusive evidence to suggest card-/board games make for beneficial learning tools. The thesis was the first academic research conducted to examine the impact of card-/board games on pro-social behavior, and several avenues for future studies have been discovered over the course of the current thesis experiment.

8   APPENDIX

8.1   Survey:

The following survey was utilized to collect the data:

The purpose of this experiment is to test "how different types of board games affect puzzle performance" After playing the game please fill in the details below.

Name

Game played

Age

Gender

Phone or email

Education level

Nationality

Your task is to select 11 puzzles for another person to attempt to complete. If they can complete 10 of the 11 puzzles chosen within a 10 minute time frame they will be rewarded with a gift card valued at €10. On the survey table you can see an example of a puzzle from the game. On the left is an easy puzzle requiring the use of three shapes to perfectly fill the board and on the right a more difficult board requiring the use of four pieces.
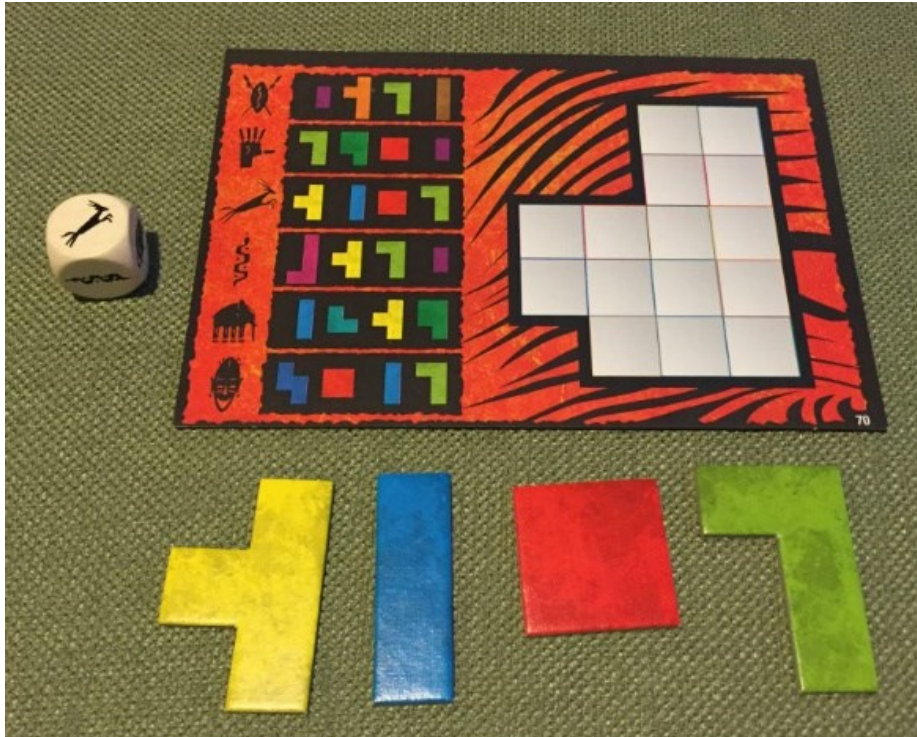
Selvarajan,S., 2020. Ubongo game. [Photograph] (Private collection)

Please select a total of 11 boards from the three piece easy pile and four piece difficult pile. You must select tiles from both difficulties.

Number of easy tiles chosen

Number of difficult tiles chosen

Group 1 participants will only choose tiles, not complete the puzzles)

Indicate for each statement how often it is true for you. The scale runs from always to never.

Item	always	.	.	.	.	.	never
I am happier when I am not striving to succeed	◉	○	○	○	○	○	○

Shared efforts can lead to both individual and group success	○	○	○	○	○	○	○
In the end, co-operation with others is not compatible with success	○	○	○	○	○	○	○
To succeed, one must co-operate with others	○	○	○	○	○	○	○
Success is best achieved through co-operation rather than through competition	○	○	○	○	○	○	○
By achieving success I also get other things which are important to me	○	○	○	○	○	○	○
It is important to me to do better than others	○	○	○	○	○	○	○
Success is something I am willing to work hard for	○	○	○	○	○	○	○
I feel better about myself when I am working toward success	○	○	○	○	○	○	○
To succeed, one must compete against others	○	○	○	○	○	○	○
The rewards of success outweigh the costs	○	○	○	○	○	○	○
Success is not very important to me	○	○	○	○	○	○	○
People who succeed are more likely to have satisfying lives	○	○	○	○	○	○	○
Success is my major goal in life	○	○	○	○	○	○	○
Success is only achieved through individual effort	○	○	○	○	○	○	○
I enjoy the challenge of competing against others to succeed	○	○	○	○	○	○	○
I enjoy working with others to achieve joint success	○	○	○	○	○	○	○

Individual success can be achieved while working with others	○	○	○	○	○	○	○
Joint effort is the best way to achieve success	○	○	○	○	○	○	○

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