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Effects of a Suggestion Based Intervention on Human Cooperation in the Stag Hunt Game

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EFFECTS OF A SUGGESTION BASED INTERVENTION ON HUMAN COOPERATION IN THE STAG HUNT GAME

by

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(Under the Direction of Michael Nielsen)

ABSTRACT

Cooperation has been one of the most foundational aspects of human society and is frequently studied via use of "The Stag Hunt" which has been used to tease out factors which may influence cooperation. The present study is the first study to attempt to influence human cooperation by means of positive imagery. Participants included 33 males and 72 females who listened to either a 7-minute audio designed to encourage them to trust others or an audio designed to encourage them to trust themselves. Participants played 40 rounds of the Stag Hunt game. The total number of times the participant played stag was recorded. An independent-samples t-test found a significant difference in the scores for the trust others (M= 21.47, SD=3.28) and the trust self (M=19.82, SD=3.92) conditions. This suggests guided imagery tasks may influence cooperation.

INDEX WORDS : Suggestibility, Guided imagery, Hypnosis, Stag hunt game, Cooperation, Game theory, Trust

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CHAPTER 1:
INTRODUCTION

Purpose of the Study

This study seeks to establish whether it is possible to influence the likelihood of cooperation when playing a computerized stag hunt game by use of therapeutic imagery and positive suggestions. There have been many studies in the literature about stag hunt games in adults, children, non-human primates and the personal factors influencing an individual's playing of either "stag" or "hare." Attempting to influence the cooperation level towards either the playing of stag which would require both players to cooperate to obtain the pay off, or away from cooperation by the playing of hare, has not been studied in previous literature.

How this Study is Original

The present study is the first study to attempt to influence cooperation in the Stag Hunt game by means of a suggestion-related intervention and positive imagery. Further, in the research which focuses on the use of suggestibility, such as the hypnosis scientific literature, this appears to be the first study to attempt to influence cooperation in this manner even exclusive of cooperation games such as "Stag Hunt."

CHAPTER 2:
LITERATURE REVIEW

On the serengeti, a herd of zebra is seen in the distance, blissfully unaware that they are being watched by not one, but two sets of predators. The zebras continue to sip water and graze together depending on not only their camouflage markings to make it more difficult to separate one individual from others in the herd but also on the other animals who share the watering hole. The long necks of the neighboring giraffe give the zebra some advanced warning of what may be lurking on the horizon.

The small hunting party watches from downwind. They have not had a decent kill in days. Sure, they could kill some small prey to keep the hunters alive, but that is not enough to take back to feed their tribe, who are all depending on them. A small prey item may only feed one person and it takes only one person to kill it. How many rabbits would it take to feed the tribe for a week?

The hunters have been watching the zebra for hours now, slowly making a complex plan to separate just one from the herd. Once separated, the zebra will fall with a few well-placed arrows, and the meat can be butchered and divided to take back home. One zebra is nearly impossible for a person to separate, kill, butcher, and bring back to their tribe alone. It requires teamwork.

They aren't the only predators watching. A pack of lionesses are hiding in the grassland. While the human hunters are drawing up plans to feed their family, the lionesses are doing similar to feed their pride.

A small snap of a twig alerts the zebra that something is coming. In a few moments, they see the lionesses come from all direction to confuse the herd. It doesn't work though as the herd *of prey animals break into a run while assuring no one falls behind. To fall behind would be to leave one of their own to die so they cooperate to protect each other while the hunters try to cooperate to feed themselves.*

The zebra herd gets away not losing a single member.

It would seem both the humans and the lionesses would have to do better next time, at least if they want to eat.

The Evolution of Cooperation

Throughout human history, cooperation has been a key part of survival. From hunting to providing mutual defense, cooperation has often provided benefits. While predators may have little difficulty catching food their size or smaller, cooperation to take down larger animals has traditionally been vital to success (Roebroeks, 2001; Smith et al., 2012; Swedell & Plummer, 2012, 2019; White et al., 2016). Current theories in human evolution and evolutionary psychology suggest the shift towards a more carnivorous diet may be directly related to the evolution of cooperation in hominids (Leroy & Praet, 2015; Smith et al., 2012). Not only is cooperation helpful when hunting for food, other areas such as cooperative foraging (Kuroda & Kameda, 2019; Leroy & Praet, 2015; Stiner & Munro, 2011; Swedell & Plummer, 2019; Tomasello et al., 2012), scavenging (Nakamura et al., 2019; Wilson & Harris, 2017), transportation of carcasses (Saladié et al., 2011), cooperative rearing of offspring (Swedell & Plummer, 2019), and mutual defense (Swedell & Plummer, 2012; Willems & van Schaik, 2017) are all important benefits of cooperation. Social interaction, particularly referring to that needed to organize complex cooperation, has been theorized to explain the human capacity for more complex forms of communication (Nakamura et al., 2019; Santos et al., 2011; Smith, 2010;

Steele, 1989) as well as improved technology and societal specialization (Pradhan et al., 2012). All of these help groups of people reach a common goal while providing mutual benefits.

Cooperation is not just seen in humankind. Indeed, cooperation has been seen and studied throughout the animal kingdom (Covas & Doutrelant, 2019). Cooperation has been studied in birds (Dickinson et al., 2009; Edelman & McDonald, 2014; Kaiser et al., 2019; McDonald, 1989; Wascher et al., 2019), boars (Focardi et al., 2015), dogs (Bauer & Smuts, 2007), hyenas (East & Hofer, 2002; Gersick et al., 2015; Smale et al., 1995; Smith et al., 2015; Smith et al., 2011), mongoose (Thompson et al., 2017), non-human primates (Benenson et al., 2019; Caselli et al., 2018; de Waal & Davis, 2003; Gilby et al., 2008; Hall & Brosnan, 2017; Hrdy, 2016; Silk, 2007; Willems & van Schaik, 2017), rats (Kozma et al., 2019; Wood et al., 2016) as well as many more animals. As cooperation continues to improve in various predators, both human and non-human, there is a concern that this will lead to extinction of prey due to more efficient hunting (Banerjee et al., 2020).

Humans also, however, are not always the most cooperative animals and will act in selfish ways despite parents trying to impress cooperation on their young children (Marcu et al., 2016). Certainly, selfish behavior such as hoarding (Hombali et al., 2019) as well as price gouging (Dekker & Suparamaniam, 2006) during natural disasters such as the recent COVID-19 pandemic (Togoh, 2020) are more common than one would hope. Outside of a natural disaster, it is likely most people have experienced a group project where not every member has pulled their own weight. Selfish behavior would be not contributing to the group when able to do so, but instead using that time or resources on more selfish pursuits (Aggarwal & O'Brien, 2008). This tendency for some people to put in less effort if they are working in a group, rather than individually, is often termed "social loafing" of which Simms and Nichols (2014) provided a review of the literature.

Because no one can force someone to cooperate and some theories say the temptation to be selfish, whether it is called "defection" or "social loafing," is equally as strong if not stronger than the drive to cooperate, those studying human behavior have often been interested in answering the question, "How does one make a choice on how to behave?" In addition, not only is there interest in how someone makes decisions on which choice of behavior to put forth, whether to cooperate or to act selfishly, there are often questions as to what influences someone to make a specific "correct" choice given a situation. The field of study dedicated to studying social interactions and decision-making process when one's decision depends on the decision of another is frequently referred to as the field of "game theory."

Game Theory and Stag Hunt

Although the idea that games have an ideal equilibrium strategy dates back to the 1700s, game theory as a field was first discussed in the book "Theory of Games and Economic Behavior" written in 1944 by John Von Neumann and Oskar Morgenstern (Gambarelli & Owen, 2004). Originally intended to discuss the similarities of economic strategies to games, the book formalized much of the groundwork for game theory and provided more formal definitions relating to cooperation and competition (Gambarelli & Owen, 2004). The basic structure and concepts that the authors laid out would eventually influence not only economics (Agi & Hazir, 2019; Bourke et al., 2020; Groba et al., 2020; Y. Zhang et al., 2020), but fields including computer science (Bu et al., 2019; Kakkad et al., 2019), medicine (Mendonça et al., 2019), psychology (Ali et al., 2019; Azar, 2019; Cheng et al., 2019), waste management (Palafox-

Alcantar et al., 2020; D. Zhang et al., 2020) and even environmental science such as river flooding (Álvarez et al., 2019).

While there are many “games” used in discussions on game theory, one often used in experimental tasks about cooperation and defection is most commonly known as “the Stag Hunt” game. Other names for the “Stag Hunt” which may be less commonly referenced in the literature include “the assurance game,” “the coordination game,” “2 player minimum effort game,” or the “trust dilemma.” In Kausel (2017), the Stag Hunt was also referred to as the “Wolf’s Dilemma.”

The Stag Hunt is a form of coordination game (Antonioni et al., 2013). In this game, two players take on the role of two hungry hunters with the options of going after the rabbits (hare) or going after the deer (stag). If both hunters work together, they can corner and kill the stag and bring home more meat individually. If one hunter wishes to hunt the stag, but the other does not, the defector is able to go out and kill both hare leaving nothing for the other hunter. If neither wish to cooperate and hunt the stag, each would be able to hunt one rabbit, which may only be enough for one meal.

Table 1: Mathematical Representation of Stag Hunt Game

	Player B plays STAG	Player B plays HARE)
Player A plays STAG	3 (player A), 3 (player B)	0 (player A), 2 (player B)
Player A plays HARE	2 (player A), 0 (player B)	1 (player A), 1 (player B)

In order for both hunters to obtain food, it is helpful for both to attempt to predict the behavior of the other. If both believe the other is likely to cooperate, the best option would be to play stag which is the payoff dominant option. However, if both players believe the other is likely to play hare or otherwise not cooperate, then that player should also select hare, the risk dominant option (Bosworth, 2017). Playing Stag/Stag or Hare/Hare represent the two pure strategy Nash Equilibria for Stag Hunt (Al-Ubaydli et al., 2013). In every game, a player has a strategy that is unique to themselves and which "maximizes his expected utility payoff against the given strategies of the other players. If we can predict the behavior of all the players in such a game, then our prediction must be a Nash equilibrium, or else it would violate this assumption of intelligent rational individual behavior" (Myerson, 1999, pp. 1069-1070).

One would assume that once two participants settle on one strategy that they would not change in repeated encounters unless the other alters strategies first. If a player changes his or her strategy in order to maximize his or her payoff on the next round, this is sometimes called the myopic best-reply (Antonioni et al., 2013). If a player alters his or her decisions seemingly randomly creating a situation where no player can benefit then that player is playing a mixed strategy Nash equilibrium (Ekins et al., 2013). That being said, different researchers have calculated different mixed strategies. Ekins et al. (2013) calculated the mixed equilibrium for Stag Hunt of someone playing a risk-neutral strategy as the odds of one player playing one option (for example, H) minus the other playing the other option (for example, S) divided by the odds of player one playing the other option (S) minus the other player playing the one they did not play before (H) combined with their odds of playing the other set. This is simplified by the equation $p = (D - B) / [(A - C) + (D - B)]$ which represents a risk neutral individual playing one of two options (Up or Down), with A and B representing up and C and D representing down which causes that strategy to equal 0.5[1]. While Feltovich et al. (2012) simplified this as just stating it was equal to 2/3 in their study.

Stag Hunt Experiments

Mathematical models and computer simulations dominate the Stag Hunt literature. However, while computer simulations are less resource intensive, the importance of doing this with live participants cannot be understated. In fact, the computer simulations do not always represent an accurate representation of real-world behavior (Antonioni et al., 2013). Antonioni et al. (2013) designed a repeated Stag Hunt like game where each participant was connected to five other participants, four of them very strongly (a clique) and one connection to a random member of a different clique. The game was then played. Over time, the computer simulations mostly settled on playing hare as a strategy although some simulations ended in a dimorphic result with both hare and stag being played. In simulations with human participants, 75% of the runs settled on stag exclusively. Due to the inaccuracy of these models, this would suggest computer simulations are not an adequate replacement for live study.

Given the relative straightforwardness of the Stag Hunt game, its relevance to the real world (Al-Ubaydli et al., 2013), and its relative ease at transferring to a laboratory setting, there has been an increase in experiments with live participants. While the actual decisions made are still the primary focus, other studies have focused on which parts of the brain activate when decisions are being made (Ekins et al., 2013). These brain areas include the so called Theory of Mind (ToM) networks which help some decide what another person may be thinking (Yoshida et

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[1] P = 1-p which causes it to equal 0.5. A = odds of player 1 choosing up. B = odds of player 1 choosing down. C = odds of player 2 choosing up. D = odds of player 2 choosing down

al., 2010) that include the parietal lobe which activates during the risk dominant payoff option, the anterior cingulate cortex, posterior cingulate cortex, and fusiform gyrus (Ekins et al., 2013). This has informed researchers about the possibilities of how the decision-making process occurs in the brain.

The ease of conversion to a laboratory setting has led to experiments featuring a variety of participants. While most participants in psychological studies are adults, usually undergraduates, the Stag Hunt game can easily be modified for children as well as non-human primates. Children as young as four years of age are able to understand the Stag Hunt game (Duguid et al., 2014; Siposova et al., 2018; Wyman et al., 2013). While Siposova et al. (2018) as well as Wyman et al. (2013) found eye contact alone served as a signal to cooperate among young children, Duguid et al. (2014) found children will cooperate to get a larger prize coordinating on stag nearly 100% of the time even if the two children were unable to establish visual contact with each other. The children preferred to cooperate in all of these studies.

The Stag Hunt has also been modified to work with non-human primates although there is less consistency in their cooperation even, at times, among the same species. Chimpanzees (Brosnan et al., 2011; Brosnan et al., 2017; Bullinger et al., 2011; Duguid et al., 2014; Hall et al., 2019), capuchin monkeys (Brosnan et al., 2013; Brosnan et al., 2011; Brosnan et al., 2017), rhesus monkeys (Brosnan et al., 2013; Brosnan et al., 2017), and squirrel monkeys (Vale et al., 2019) have all played the Stag Hunt game. Humankind's closest relatives, the chimpanzees tend to be the most successful of the non-human primates in settling on the risk dominant Nash Equilibrium (stag-stag) at a high rate (Brosnan et al., 2011; Brosnan et al., 2017; Bullinger et al., 2011), with some groups matching rates as high as 91% (Bullinger et al., 2011). Some suggest that this high rate of matching could be due to the tendency of chimpanzees to work together to hunt prey (Bullinger et al., 2011). There was variation in chimpanzee cooperation however, with Hall et al. (2019) finding a decreased cooperation rate when playing Stag Hunt using a token economy instead of a more direct reinforcement. They suggested the chimpanzees were not as interested due to the choice of reinforcer.

An Old World monkey species tested, the Rhesus monkeys, often would settle on stag-stag both during synchronous and asynchronous play, although not to the extent that chimps or humans did (Brosnan et al., 2013; Brosnan et al., 2017). One suggestion is that Rhesus monkeys might be using matching law, which suggests there is a relative relationship between the rates of response to the provided award, to attempt to compute which selection might pay out with more food (Brosnan et al., 2013). Interestingly Parrish et al. (2014) showed the Rhesus monkeys, while they were not choosing the stag option to the extent of the humans, their strategy of choosing hare often led to similar amounts of points when playing against computerized simulations (Parrish et al., 2014).

The capuchin monkeys, a New World monkey, were less likely to play stag-stag unless they were playing asynchronously, permitting one to make a decision and allowing the other player to see what the first chose before making their own decision (Brosnan et al., 2013; Brosnan et al., 2017). Even when it was proven that the capuchin monkeys understood the game, they would only consistently match when one player first asynchronously. Even when partners were sitting next to each other, the capuchin monkeys often did not match (Brosnan et al., 2011). Surprisingly, the squirrel monkey, a close relative of the capuchin monkey and a species upon which there is little research in the cooperation literature, had a much higher rate of cooperation with three of the four pairs playing stag consistently (Vale et al., 2019).

Factors Influencing Choice

The largest area of research on the Stag Hunt regarding factors that influence people playing Stag or Hare have primarily involved communication. Communication, regardless of the form it takes, has been found to increase the likelihood of choosing stag provided that the cost of communication is low or free (Blume et al., 2017; Brosnan et al., 2013; Büyükboyacı & Küçükşenel, 2017; Hernandez-Lagos, 2019; Wyman et al., 2013). Specifically, Hernandez-Lagos (2019) observed an increase in cooperation from 5% to 70% when free pre-play communication was allowed. The cost of communication, if there is a cost, does play a role. Assuming a player decided to use a high cost communication option, this resulted in a greater likelihood of playing stag (Büyükboyacı & Küçükşenel, 2017). However, increased message cost usually decreased whether or not a message was sent overall (Blume et al., 2017). Studies which had a charge for communication were only implemented in adults.

Communication was studied in non-human primates and children as well, but without implementing a cost. Visual sight as well as auditory communications were the primary options studied. Auditory communication has allowed chimpanzees to coordinate approximately 90% of the time regardless of their ability to see their partner (Duguid et al., 2014). Humans as young as four communicated audibly with their partner regardless of whether or not their partner could be seen, allowing them to coordinate from 96% to 98% of the time, depending on which specific condition they were in (Duguid et al., 2014). If auditory sounds were not available, eye contact alone was shown to encourage cooperation (Siposova et al., 2018; Wyman et al., 2013).

Outside of communication, other areas have been studied to examine factors that might influence cooperation. It appears that one consideration is the expected likelihood of working with that person again, with repeated interactions assumed to increase the likelihood of cooperation between two people (Al-Ubaydli et al., 2013). That being said, experiments have examined one-shot scenarios (Belloc et al., 2019; de Souza & Rêgo, 2014; Girtz et al., 2017; Jansson & Eriksson, 2015) as well as repeated interaction scenarios (Al-Ubaydli et al., 2013; Antonioni et al., 2013; Blume et al., 2017; Bosworth, 2013, 2017; Brooks et al., 2018; Brosnan et al., 2013; Brosnan et al., 2011; Brosnan et al., 2017; Bullinger et al., 2011; Büyükboyacı & Küçükşenel, 2017; Cartwright & Singh, 2018; Ekins et al., 2013; Feltovich et al., 2012; Hall et al., 2019; Hilbig et al., 2018; Le Coq et al., 2015; Parrish et al., 2014; Vale et al., 2019). As expected, repeated interactions improved likelihood of cooperation, with Cartwright and Singh (2018) finding a statistically significant difference in cooperation by the fifth round.

While increased likelihood of repeated interaction has been known to influence the choice of stag, there are many other factors which may impact one's likelihood to cooperate with the other player. These factors include knowledge of the nature of the payoffs (Bosworth, 2017; Ekins et al., 2013; Feltovich et al., 2012; Liu & Riyanto, 2017), a follower's willingness to follow a specific leader as well as any communication the leader (Bullinger et al., 2011; Hernandez-Lagos, 2019), and how quickly the payout will occur (Deck & Jahedi, 2015). Surprisingly, being under a time constraint, even in a one-shot scenario leads to increased cooperation (Belloc et al., 2019).

Perceived riskiness can also play a role. Feltovich et al. (2012) found that if a participant perceived a lower risk, the participants are more likely to play stag while whereas with a higher risk, they are more likely to play hare. The playing of hare during increased stakes may suggest that a starving person might be more likely to choose the "sure thing" and therefore choose hare rather than risk playing stag even though a cooperation between two players would provide more meat in the long run.

There are also personal characteristics that Al-Ubaydli et al. (2013) considered in their study. They found cognitive ability, patience, and risk-aversion were all likely to have an influence on cooperation. However, while all three were positively correlated with playing stag, only patience strongly predicted playing of stag over repeated sessions in this study. While Al-Ubaydli et al. (2013) showed risk aversion was not found to be a significant correlate, whereas other studies showed risk-loving individuals played stag more (Girtz et al., 2017). Other personal factors for playing stag included being male (Al-Ubaydli et al., 2013; de Souza & Rêgo, 2014), being of lower social status (Brooks et al., 2018), being optimistic (Hernandez-Lagos, 2019), having responsibility for others if one is risk loving (Girtz et al., 2017), having high self-monitoring (Girtz et al., 2017), being part of the same in-group (Le Coq et al., 2015), and perceived similarities between partners (Chierchia & Coricelli, 2015). On the other hand, those who tested high for risk aversion, playing for someone else in their place reduces their playing of stag (Girtz et al., 2017).

In addition, perceived trustworthiness of an opponent is also strongly predictive of playing stag (Bosworth, 2013; Ekins et al., 2013; Jansson & Eriksson, 2015) as well as what a person suspects the other person believes about them, also called “second-order beliefs” (Bosworth, 2017). Additionally, what one partner believes or suspects the other partner might be feeling as their emotional state has also altered the likelihood of the first partner playing stag which them much more likely to not play stag if they believe the other person is fearful (Kausel, 2017). Interestingly honesty was not associated with cooperation in the Stag Hunt, although it was seen for Prisoner’s Dilemma (Hilbig et al., 2018).

Hypnosis and Suggestibility

Often regarded as a side show act or entertainment, hypnosis has a long history of use in medicine and psychology (Bramwell, 1930; Reid, 2016). The earliest records of hypnosis go back to the sleep temples of Imhotep in Ancient Egypt where sufferers would look for cures by the priests who inhabited said temples (Reid, 2016). Even if one wishes to ignore the sleep temples as well as the other similar practices performed in the ancient world, hypnosis has still been practiced in a medical context for centuries.

While Gasner and Mesmer have their part in the history of hypnosis, the father of modern hypnosis is usually considered James Braid (1785–1860), a Scottish surgeon (Bramwell, 1930; Reid, 2016). While Braid's immediate predecessors and contemporaries, such as Mesmer, were using a different name for a similar technique and would often make wild claims, Braid was more interested in understanding the phenomena that we now call hypnosis. Braid would conduct experiments as best he could and try to debunk myths which other practitioners were suggesting (Bramwell, 1930). Although Braid desired to know and understand the process and to teach other physicians hypnosis in order to better help the patients, he remained clear that this technique could not cure everything (Bramwell, 1930).

Since Braid's time, many scientists, physicians, and psychologists have taken an interest in using hypnosis. Sigmund Freud used hypnosis early in his career (Bachner-Melman & Lichtenberg, 2001) and noted psychiatrist Milton H. Erickson made a significant influence on how hypnosis is used today (Saudi, 2005). Professional organizations dedicated to hypnosis research, such as the Society for Clinical and Experimental Hypnosis (SCEH) and the International Society for Hypnosis (ISH) were both founded in 1949 with the less research focused and more clinically oriented American Society for Clinical Hypnosis (ASCH) being founded by Milton Erickson in 1957. Along with these three societies, there are also several peer reviewed journals which publish hypnosis research: those include the *American Journal of Clinical Hypnosis*, the *Australian Journal of Clinical and Experimental Hypnosis*, *Contemporary Hypnosis*, *the International Journal of Clinical and Experimental Hypnosis*, *Journal of Mind Body Regulation*, and *Sleep and Hypnosis*.

While hypnosis and suggestibility research has been occurring for centuries and the practice has been occurring for millennia, there is not always a clear definition of what hypnosis specifically is. Reid (2016) stated "hypnosis can be separately and/or simultaneously referred to as a process (hypnotize), a state of being or consciousness (in hypnosis), externally influenced (hypnotic), and an identity (hypnotist/hypnotherapist)." Other researchers wish to define hypnosis or hypnotizability as it pertains to specific changes in the brain. Jensen et al. (2015) found participants who had higher hypnotizability scores were found to have higher baseline levels of theta waves and individuals who were hypnotized seemed to show higher levels of theta-gamma coupling (Jensen et al., 2015).[2] This study will use the recent definition from the American Psychological Association's Division 30 Society of Psychological Hypnosis which defines hypnosis as "a state of consciousness involving focused attention and reduced peripheral awareness characterized by an enhanced capacity for response to suggestion" (Elkins et al., 2015).

[2] The ease of which a person can be hypnotized is usually measured by the Harvard Group Scale of Hypnotic Susceptibility, Stanford Hypnotic Susceptibility Scale, or the Elkins Hypnotizability Scale (EHS) among other scales.

The enhanced capacity for suggestion caused by the hypnotic state has been used successfully to treat smoking addiction (Bollinger et al., 2020; Munson et al., 2018), pain management (Thompson et al., 2019), irritable bowel syndrome (Miller et al., 2015; Peters et al., 2015), weight loss (Miller et al., 2015), as well as many others. This has also been used to reduce hot flashes in breast cancer survivors. In that study Elkins et al. (2008) randomized 60 female breast cancer survivors who suffered from 14 or more hot flashes weekly to five weeks of hypnosis treatment or no treatment and found that hypnosis reduced both severity and frequency of hot flashes as well as improved sleep in that group.

While suggestion-based interventions such as hypnosis have been used to modify many behaviors, a literature search has found no experiments on hypnosis or suggestion relating to influencing cooperation. The closest research involved using hypnotic suggestion to increase tolerance of unfairness in an economic bargaining task (Brüne et al., 2012). Given the interest in cooperation as well as the increased research in suggestion as well as hypnosis in general, this seems unusual and a topic worthy of investigation.

Traditionally, the beginning of the hypnotic process leading a subject into the altered state of consciousness is called an induction (Falchi, 2006). There are many ways to initiate an induction, including direct authoritarian techniques where orders are provided by the hypnotist such as verbal commands, eye-to-eye contact or rhythmic eye movement inductions, permissive techniques such as simple eye closure or eye fixation with very permissive and indirect commands or suggestions, as well as confusion inductions which will confuse a resistant client into trance. After an induction, the hypnotist would deepen the trance, provide the suggestions, and reorient the person back to the room after the hypnotic intervention takes place.

However, some research has challenged the idea of formal hypnosis being necessary to cause the changes previously attributed to hypnotic interventions. Kirsch and Braffman (2001) made the argument that based on the high correlation of hypnotic and non-hypnotic suggestibility and the small effect of hypnosis specifically, all of the changes in behavior previously ascribed to hypnosis could be attributed exclusively to non-hypnotic suggestibility. The authors argue that this should be properly termed *imaginative suggestibility* which can be used either in hypnotic trance or outside a hypnotic experience. If this is the case, any suggestions that may be provided during a hypnotic intervention will also be equally as effective in a suggestibility-based intervention which does not specifically involve a hypnotic induction and thus will only including the suggestion portion.

We hypothesize that a suggestion-based intervention may affect the likelihood of playing stag and thus could affect the amount of cooperation and help that is rendered when playing a repeated measure Stag Hunt game. Specifically, I predict that participants who experience an audio file encouraging trusting others will be more likely to cooperate, as demonstrated by selecting the Stag option, than are participants whose audio file encourages the trusting of one's self over trusting others, which would be more likely to play hare. This experiment helps answer the research question "Can suggestion influence trusting others, and thus influence cooperation?"

CHAPTER 3:
METHODOLOGY

Participants

Participants (n=126) were recruited from the undergraduate student body at Georgia Southern University using Systems Research Management Software (SONA) as one option to fulfill an undergraduate psychology course requirement or for extra credit. The criteria for the study included being over 18 years of age, no known psychological or neurological issues, no hearing dysfunction, and having normal or corrected vision and having access to a computer to run the task. Participants that started with a phone, but were able to transfer to a computer, were able to contribute data which were analyzed. If they had a technical issue and said they were coming back, when they returned, they were granted credit. Data from 13 participants were excluded due to the following reasons : compromised technology due to unauthorized alteration of the calculator affecting the programming (n=6), not following directions (n=4), compromised by hearing the hypothesis (n=2), and prior knowledge of the game (n=1). Once these were excluded, this left 105 participants (33 males, 72 females) whose data was analyzed. Participants were run in small groups with each group being randomly assigned, via a coin flip, to each condition. For simplicity, a research assistant labeled the audio mp3s as heads or tails (see Appendix A for scripts). Participants were asked to read an informed consent document (Appendix B) before signing up for the experiment where it was then read to them. If they chose not to play, they were awarded credit regardless.

Materials

The Stag Hunt game was played via a spreadsheet programmed in Google Sheets. The sheet included an artificial opponent, played by the researcher, who used a deck of well shuffled cards labeled either S or H, to generate responses which were manually entered and would appear on the participants' tabs. Once both the participant and researcher entered their move, the spreadsheet would automatically calculate the points awarded. The game could accommodate up to six participants at a time, although four was generally considered the maximum due to challenges in managing six participants. The participant's attention was directed to the bottom of the spreadsheet, where tabs were labeled "Instructions," "Player1," "Player2," etc., as shown in Appendix D. When they clicked on a tab, they saw a list of trials. The first column listed the trial number. There were five trial rounds listed, then there were forty experimental rounds listed. The second column was coded to show what the researcher plays. The column was labeled as "Player 0." The third column is where the participant was playing. The beginning of where the participant had to start for the practice rounds was highlighted in yellow. For each trial, the participant placed either an S or an H in the appropriate round. Where the participant needed to start was highlighted in blue. A black line separated the practice versus trial rounds. In addition, a column labeled "Points this round" showed how many points were earned each round. Another column listed a running total of points. Scoring was provided by a tab that served as a calculator using a series of "If, then" statements with all possible options so the participant will score 3 points if both play stag, 1 if both play hare, 2 if the participant plays hare and the researcher plays stag, and 0 if they play stag and the researcher plays hare. The researcher's tab displayed when the participants played and the total number of times S was played per participant.

Participants for the study utilized their own personal computer with the ability to access Google Sheets. Participants were asked to only use a laptop or desktop computer, as smartphones were not able to navigate the Google Sheet properly. The audio consisted of two 7-minute audio files. These were recorded by the researcher with premade scripts (Appendix A). Given that perceived trustworthiness of an opponent is strongly predictive of playing stag (Bosworth, 2013; Ekins et al., 2013; Jansson & Eriksson, 2015), one audio recording focused on encouraging the participant to trust others while the other audio recording focused on the participant trusting themselves.

Measures

The dependent variable is perceived cooperativeness by playing stag as measured by how many times the participant played "S" instead of "H." Cooperation is defined as two people working together to achieve a common goal.

Design

This experiment utilized a two-group between-subject design. All participants in a given session were assigned to the same condition which was randomly assigned to either the Trust Self vs. Trust Others condition which had been blinded and labeled as either Heads (n=55) or Tails (n=50). The opponent played stag 50% of the time over 40 trials. The dependent variable is the mean proportion of stag responses.

Duration

The average time required for an individual participant to complete the study was less than 30 minutes. This included approximately five minutes to read the informed consent document (Appendix B) and the instructions out loud, approximately seven minutes for the suggestion phase, 10 minutes for the computer task (including practice rounds), and approximately three minutes for debriefing. A few participants (exact number not recorded) required additional trouble-shooting due to their unfamiliarity with the “tabs” feature in Google Sheets.

Procedure

This procedure was approved by the Institutional Review Board at Georgia Southern University under the title “Assurance, Confidence, Positive Imagery, and Trust in Gaming [Online]” approval H21137. Participants signed up for a time slot and were informed they were to report to a Zoom chatroom. Shortly before the designated time, the researcher allowed participants into the Zoom chatroom and greeted them. If a participant came early and there was a space in this time slot, such as due to a no-show, they were asked if they would like to participate in the earlier session. The researcher provided a link to the Google Sheet. Then the researcher read to them the informed consent document (Appendix B). In addition to giving their consent through that document, participants received a link where they could obtain and download a copy of the Informed Consent document for their own records. Due to the virtual nature of the experiment, it could not be physically signed, however, the informed consent document is a modified version of the example provided by Georgia Southern’s IRB for use in internet applications where continuing on to play is considered to be consent.

The researcher then read to them the instructions which asked them to play either H or S into a labeled column and explained the game (Appendix C). Each participant was assigned a Google Sheets tab to work in (See Appendix D for researcher and participant views) and played five practice rounds. The researcher played based on a well shuffled deck of 40 cards, 20 of which were labeled as Stag and 20 of which were labeled as Hare. These cards remained invisible to the participant as the Zoom video was disabled throughout the experiment. Cards were shuffled between the practice and experimental rounds and then again in between each session. The researcher waited for the participants to make their selection before playing. The researcher's tab allowed the researcher team to see if a participant has played and if they attempted to cheat by changing the letter.

Once the practice rounds were complete, the session was then randomly assigned to one of two conditions (Trust self vs. Trust others) by a coin toss. The individual audio file was run prior to the start of the "real" game. While a research assistant was frequently in charge of running the audio file, when the research assistant was not present, earplugs were used by the researcher allowing the researcher to remain blind to the content of the audio files. Each audio file was labeled as "Heads" or "Tails" signifying their coin flip until the analysis was complete. After the audio file concluded, the participants each played a block of 40 rounds with the researcher.

The results were recorded and copied into another spreadsheet for analysis. Next, the participants were debriefed, asked "Did you notice a pattern?" in reference to obtaining more points if both played S. If they said no, which the majority indicated that they did not, they were asked more specifically about whether they noticed the scoring. If they said yes, they were asked what they noticed. Many of those who initially said yes, did not mention scoring. After this question and reading the debriefing form, they were provided with the researcher's name and contact information. While data were not treated differently if the participants did recognize a pattern, not noticing a pattern but playing stag anyway could suggest there was something below their level of awareness that continued to drive them to play how they played. Participants were awarded their credit after they completed their participation. In keeping with IRB policies, credit was awarded whether a participant completed the game or elected to discontinue participation early.

Predicted Results

Results were expected to show a statistical difference in the playing of stag between conditions, with participants in the Trust Others condition showing greater cooperation than those in the Trust Self condition, as indicated by the proportion of plays using a cooperation strategy.

CHAPTER 4:
RESULTS

Data were recorded and assessed for completeness and any potential problems during data collection were noted prior to analysis. Questionable data – for example, when the calculator spreadsheet experienced an unauthorized change by a participant and subsequently failed to show the correct calculations in either the practice or experimental round– were examined thoroughly before being accepted or rejected. The miscalculation error was caught quickly and corrected. Other circumstances when the participants were not paying attention, such as if they played turns ahead and did not wait for the researcher, suggested they were more focused on finishing the game and were unlikely to be considering which option they should play. For those who may have heard the hypothesis or had heard of the stag hunt game previously, this would suggest that information might have influenced their playing strategy. This resulted in data from 13 participants being excluded. The researcher remained blinded to the condition until after analysis was complete.

A one tailed independent-samples t-test was conducted to compare levels of cooperation in the two guided imagery conditions. The standard $p < .05$ criterion was used to determine statistical significance. The analysis confirmed that there was a significant difference in the cooperation exhibited between the two conditions; participants who received the suggestion to trust others (M= 21.47, SD=3.28) demonstrated greater cooperation than did those in the trust self (M= 20.10, SD= 3.41) condition, $t(102)= 2.09$, $p = .020$, $d = 0.41$. The effect size is moderate.[3] Please see Table 2 for more information the average mean of stag played per condition by sex.

Table 2 : Average Number of Times Stag Played (Condition x Sex)

	Male	Female
Trust Others	21.21	21.56
Trust Self	19.78	20.3

Further, a single sample t-test was performed to assess whether or not the participants responded greater than or equal to chance. Participants undergoing the trust other condition were more likely to play S (M= 21.47, SD=3.28) a proportion greater than chance would suggest, $t(54)= 3.33$, p= 0.0016. Participants who underwent the trust self condition did not play different from chance.

[3] This result reflects the removal of one apparent outlier in the trust self-condition whose score was three standard deviations beyond the mean. Including the outlier in the analysis showed no change in the outcome, with participants in the trust others condition (M= 21.47, SD=3.28) showing more cooperation than those in the trust self-condition (M=19.82, SD=3.92), $t(103)= -2.35$, p = .010, d = 0.46.

CHAPTER 5:
DISCUSSION AND CONCLUSIONS

The purpose of this study was to see whether or not a guided imagery session could influence the cooperation and playing of Stag (“S”) in a Stag Hunt game. The results indicated that guided imagery did impact cooperation, with participants in the “trust others” condition showing more cooperation than did those in the “trust self” condition. According to these data, suggestions made in a guided imagery task can lead someone to cooperate more in this task even if the participant is not aware of the combinations which would provide the best pay off.

The results of this study add to our understanding of the nature of cooperation by examining the influence of trust itself. While perceived trustworthiness of a specific opponent has already been linked to increased playing of stag (Bosworth, 2013; Ekins et al., 2013; Jansson & Eriksson, 2015), a more generalized trusting of others has not been studied prior to this research. Further, the participants were not directly told to trust others for this game; instead, they were simply to visualize trusting others more generally. Likewise, the trust-self condition, did not tell people that they could not also trust others, merely that they could trust themselves. These more generalized instructions may imply that such a suggestion may affect a specific instance. Further research is needed to replicate this effect and to discover its limitations. For example, would generalized suggestions such as were used in this study have an impact 30 minutes later? Is the effect short lived, or might its duration be longer? Does suggestion still account for variance in the context of other factors noted above that could influence cooperative behavior (e.g., perception of the other player)?

One interpretation of the form of suggestion used in this study is that it is a cognitive priming task which leads participants to be more likely to trust in this situation. In cognitive priming, a preceding prime such as a word could, for example, facilitate processing of a following target word that was meaningfully related (Ashcraft & Radvansky, 2014). When participants are exposed to the auditory stimulus, such as Trust Others, this might have served as a prime to make them more likely to select S for cooperation assuming they realize at some level, be it conscious or unconscious, that S is the cooperative option. Such a conclusion is possible in the current study, but the data do not confirm unequivocally that participants are aware S represents the cooperative option. This is possible because the concept of "trusting others" might be partially related to "teamwork" and "cooperation." Likewise, the concept of "trust self" might be more likely to activate self-reliance and related ideas and actions.

By this definition, the suggestions made during the auditory tracks could influence the game play through priming. In suggestion, one attempts to influence a target behavior but the speed of the response is not generally immediate or recorded, but nothing really suggests how unconscious suggestion works in the brain. Nor does any of this mean that all suggestions would be positive primes and speed up a connection. Ulrich et al. (2015) for example found hypnotic suggestions can modulate the effect on neutral primes. How priming was able to cause this effect could be due to a model in Cognitive Science called the Network Model. The network model suggests concepts in memory are nodes which are interrelated and interconnected by a series of pathways (Ashcraft & Radvansky, 2014). As certain nodes are stimulated, closely related nodes may be partially or fully stimulated to respond. This could additionally explain how "trusting others" could stimulate "cooperation" by playing Stag.

Individual differences may also account for the observed effect. For example, a factor related to trusting one's self is self-confidence. It is possible that self-confidence is associated with cooperation, such that individuals with more confidence in themselves are less likely to cooperate with others. Research on self-confidence and cooperation, conducted by De Cremer and Van Vugt (1998) indicates this might be the case. In their study, they found individuals were less likely to contribute towards the greater good if their personal (as opposed to their collective) identity was stressed and this was thought to be mediated by beliefs in one's self efficacy. Certainly, this is something that should be examined further. Other individual differences could include how much individual participants know about the payoffs; how quickly they expect the reward; personal characteristics such as cognitive ability, patience, their social status; how similar they believe they are to their partner; or, possibly, their level of suggestibility. Assuming something as little as a few minutes of imagery can influence cooperation or independence, this may help improve cooperation in a variety of social situations.

Potential Limitations

A potential limitation in this area of study relates to the methodology that needed to be designed for this study which will require further exploration and replication. Specifically, this appeared to be the first research study attempting to influence cooperation through guided imagery. In fact, experiments regarding suggestions, guided imagery, or hypnosis being used to influence cooperation do not appear to exist in the literature one way or the other. Despite the novelty of the methods used, the current study would to be consistent with the results found in studies that have explored the links between cognitive priming and cooperation. For example, Bry et al. (2009) showed that cognitive priming of cooperation improved baton speed changeover while one stressing individualism did not impair performance. Likewise, in the current study varying suggestions related to trust affected performance reflective of more or less cooperation.

Another area of potential improvement is in the script used in the two conditions. Lacking any previously verified and tested models, the scripts used in this study represent a first effort in establishing cooperation or trust suggestions and should be further tested and refined. For the purposes of this experiment hypnotic induction was not included. Instead, the study only used the principle of imaginative suggestibility (Kirsch & Braffman, 2001), which eliminated the need for an induction, deepener, or reorientation allowing only the suggestions to be provided. This improved safety, eliminated concerns about hypnosis, altered state levels, as well as the depth of trance which would have otherwise occurred. The lack of inclusion of a formal induction is unlikely to affect the results as there is evidence the traditional induction phase of hypnosis does not increase suggestibility or responsiveness in comparison to giving the suggestions without the induction and thus the induction may be safely removed from the experiment (Kirsch & Braffman, 2001). This allowed it to remain in the realm of guided imagery although hypnosis related suggestions were present. However, a script could be expanded to include an induction which could further test whether an induction is or is not needed and if it does impact the results.

A second methodological element that would have improved the study is in using software designed more specifically for this purpose. Although Google Sheets offer flexibility that allowed the project to be completed, a more streamlined interface may have reduced participants' confusion regarding having to navigate to the correct tab as well as the correct cell. Further, had such software been used, it is likely the experiment would have progressed more quickly as some participants took a longer time to choose been H and S. This would be particularly important if the researcher plays against multiple participants at once, as in this study, the researcher's response can only come when all players had played, which adds a non-standardized time delay between participant's answer and the researcher's response. Generally, when the "Stag Hunt" is considered in the experimental literature testing cooperation, the concept is that the two players do not have time to second guess themselves and change their answer. Ideally, a near instantaneous response would be best, as occurs in other, validated implementations of the stag hunt game.

Because data were collected virtually, participants were in an uncontrolled environment which, based on the amount of noise heard periodically by the researcher, was sometimes not in an ideal, quiet environment. Several participants had others in the room, and some participants appeared to behave in manners consistent with distractors. Further, it is possible that the imagery manipulation may have been weakened by participants not closing their eyes and may not have even listened to the audio file, the effect was found in spite of less than ideal circumstances. All participants were asked if they noticed anything about the study. Future research should conduct a manipulation check to confirm participants' awareness of the manipulation. Furthermore, the researcher could not observe participants to confirm that they followed these instructions, which, given the differences in brain activity and resting state between people who had their eyes open versus closed, may have caused some of the imagery to not have full effect (Weng et al., 2020).

There were also various limitations with technology as this was unable to be played on smartphones. Some participants nevertheless attempted to use their smartphones even when asked to use a computer which caused delays and may have caused frustrations for the other participants who might have altered their cooperation levels. Additionally, there was also some uncertainty in the reliability of the data collection instrument, as the limitations of the technology necessitated that players have access to tabs other than their own. That the experiment showed the predicted effect in spite of the uncontrolled testing conditions and technological challenges suggests that the effect of the manipulation may be robust.

Future Directions

Given the dearth of previous studies, this research shows a gap in the literature and more studies should be conducted. Ideally, this study should be replicated in a laboratory setting to assure a more controlled environment and should be replicated. Further, as participants were not tested for suggestibility, future studies could examine factors such as individual differences in this context. For example, whether participants are more likely to be influenced than others as highly hypnotizable subjects have previously been found to have higher kinesthetic imagery ability (Ruggirello et al., 2019). There are also some suggestions that maybe the researcher playing stag at different frequencies, such as playing stag 25% of the time rather than 50% of the time, could also influence the playing of stag. At a more conceptual level, designing experiments that might allow researchers to distinguish between cognitive priming and suggestibility mechanisms would advance this area of research. The current study presents a novel approach that can be utilized to build upon the literature examining the factors underlying suggestibility effects and behavior. Simple suggestions can influence cooperation in an interpersonal context. Further research is warranted to examine the extent to which this effect extends to other social situations, such as negotiations.

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APPENDIX A :
SCRIPTS

Trust others script

Hello

Before you play the game, it may be a good time for you to spend some time relaxing before you play so you can feel *confident* that you can score the best score possible by making the best decisions possible. You can, of course, sit back and relax in your chair or lay on your couch or on your bed, it doesn't really matter where you are or if you are sitting or lying down. What is more important is that you are comfortable and relaxed whatever that means to you. Being calm may lead to more improved performance than if one is anxious… allowing you to have more confidence in the decisions to be made.

As you consider what this game will be like… you can feel great *comfort* in having *complete* and *utter trust* in your gaming partner…. This wonderful feeling will inspire you to *cooperate* and *trust* your partner…. The more *relaxed* you are… the more you *trust* them… The more you *trust* them… the more *relaxed* you become… Having *trust* in your partner is such a pleasant thought… for every round you play with them, your feelings of *trust* will grow more and more. And because you have *complete trust* in your partner, your score will be higher. You know how beneficial *trust* can be… *working together* to work towards a common goal. Knowing they *have your back* and you have theirs, furthering that sense of relaxation. What will it be like if you could bring that feeling of trusting others into your daily life?

Putting your energy into *trusting others* to do a good job instead of worrying about they might do. Having *the confidence* and trust in others to know *they will do their best* just as you will to do the best job possible. Working together like a well-oiled machine towards your goal, like a sports team vying for the championship. Each player in a sports team has a complete *trust* in each one of their teammates to do the right thing, to make the right decision, to make the right play.

I wonder if you could picture in your mind's eye, the most trustworthy person you know. Perhaps it is a family member, perhaps it is a friend, it really does not matter who it is provided *you trust them*. Hear their voice and feel their presence. Remember all of the times you trusted them, and they came through like a miracle worker. Visualize what the word trust looks like, feel what trust feels like. Really feel and sense this phenomenon and let it grow more and more. As you become more confident in feeling this trust you can know that this can be transferred to any person or player you wish to transfer this feeling to. Trusting others is a remarkable skill and one that is so very important in the game of life.

I wonder if it will be as important in this game as well? I suppose we will see and you can feel free to open your eyes and enjoy playing the game.

Trust self script

Hello

Before you play the game, it may be a good time for you to spend some time relaxing before you play so you can feel *confident* that you can score the best score possible by making the best decisions possible. You can, of course, sit back and relax in your chair or lay on your couch or on your bed, it doesn't really matter where you are or if you are sitting or lying down. What is more important is that you are comfortable and relaxed whatever that means to you. Being calm may lead to more improved performance than if one is anxious… allowing you to have more confidence in the decisions to be made.

As you consider what this game will be like… you can feel great *comfort* in having *complete* and *utter trust* in yourself… the self confidence that comes with it…. This wonderful feeling will inspire you to *trust* yourself…. The more *relaxed* you are… the more you *trust* yourself… The more you *trust* yourself… the more *relaxed* you become… Having trust and confidence in yourself is such a pleasant thought… for every round you play, your feelings of *trust* will grow more and more. And because you have *complete trust* in yourself, your score will be higher. You know how beneficial *trust* and *confidence* can be… knowing how positive trusting yourself.

Knowing you can do anything you wish... furthering that sense of relaxation. What will it be like if you could bring that feeling of trust into your daily life?

Putting your energy into *trusting yourself* to do a good job instead of worrying about what others might do. Having *the confidence* and trust in yourself to know *you will do your best* just as you know others will do their best. Trusting yourself to work towards your goal, like a mountaineer slowly approaching a mountain's summit. Knowing that it is you and you alone, and trust in yourself alone, to do the right thing, to make the right decision, to make the right play.

I wonder if you could picture in your mind's eye, yourself after you did something yourself for the first time. How proud you were. Perhaps you just won a game, or aced a hard quiz, or changed your first tire, it really does not matter what it was provided you see that confidence and *self-trust*. Hear your voice saying "I did it" and feel how good it felt when you were able to do something yourself. Really notice how much *confidence* you had. Visualize what the word trust looks like, feel what trust feels like. Really feel and sense this phenomenon and let it grow more and more. As you become more confident in feeling this trust you can know that this will always be within you even if you feel less than completely confident. Trusting in yourself is a remarkable skill and one that is so very important in the game of life.

I wonder if it will be as important in this game as well? I suppose we will see and you can feel free to open your eyes and enjoy playing the game.

APPENDIX B :

INFORMED CONSENT

Informed Consent

Project : Assurance, Confidence, Positive Imagery, and Trust in Gaming [Online]

1. The principal investigator is Melvin S Marsh, a second year Experimental Psychology graduate student in fulfillment of his thesis requirement. He is part of the Department of Psychology in the College of Behavior and Social Sciences

2. Purpose of the Study: The purpose of this research is to study positive imagery on the decisions made during a computerized game.

3. Procedures to be followed: Participation in this research will involve listening to an approximately 7-minute-long audio recording and playing a decision-making game with the goal of maximizing a payoff. Instructions will be provided through Zoom.

4. Discomforts and Risks: No risks have been identified beyond those in playing games in everyday life.

5. Benefits:

   a. The benefits to you as a participant include a possible increased capacity for trust and confidence.

   b. The benefits to society include a better understanding of decision-making processes.

6. Duration/Time required from the participant: less than 30 minutes.

7. Statement of Confidentiality : Once the game has been played data will be transferred to an excel spreadsheet. The Zoom session will not be recorded, nor will identifying data be nor recorded. Names will only be used to check SONA participation. The researcher named above and the investigators listed below will be the only ones with access to the data. However, We are careful to ensure that the information you voluntarily provide to us is as secure as possible; however, you must be aware that transmissions over the Internet cannot be guaranteed to be completely secure. Your confidentiality will be

maintained to the degree permitted by the technology being used. You will be subject to the privacy policy of Zoom.

8. Future use of data: Data from this study may be placed in a publicly available repository for study validation and further research. You will not be identified in the data set or any reports using information obtained from this study, and your confidentiality as a participant in this study will remain secure. Subsequent uses of records and data will be subject to standard data use policies which protect the anonymity of individuals and institutions.

9. Right to Ask Questions: Participants have the right to ask questions and have those questions answered. If you have questions about this study, please contact the researcher named above or the researcher's faculty advisor, whose contact information is located at the end of the informed consent. For questions concerning your rights as a research participant, contact Georgia Southern University Institutional Review Board at 912-478-5465.

10. Compensation: Participants participating in the study will earn research credits for class once participation has been confirmed. This will be issued regardless of study completion.

11. Voluntary Participation: You do not have to participate in this study and you may end your participation at any time by logging out of Zoom and navigating away from the online spreadsheet. You will still receive research credit

12. Penalty: There is no penalty for deciding not to participate in the study.

13. You must be 18 years of age or older to consent to participate in this research study.

You may print a copy of this consent form to keep for your records. This project has been reviewed and approved by the GSU Institutional Review Board under tracking number H21137.

Title of Project: **Assurance, Confidence, Positive Imagery, and Trust in Gaming [Online]**

Principal Investigator: Melvin S. Marsh, Dept of Psychology, Brannen Hall 2039, 770-778-9016, mm42816@georgiasouthern.edu

Research Advisor/Co-investigator: Michael Nielsen, Dept of Psychology, Brannen Hall 1034, 912-478-5334, mnielsen@georgiasouthern.edu

Navigating to the spreadsheet and completing the game indicates your willingness to participation in this research.

APPENDIX C:

INITIAL INSTRUCTIONS

Thank you for agreeing to participate in this study. This study involves a game based in Google Sheets in which you earn points. Your goal is to earn as many points as you can.

In your tab, there are a set of columns as well as rows. There is a column marked Player 0. There is a column labeled as "Your Move." There is also a column signifying points earned per round as well as a column listing the running total. Each row is labeled by round number. The 5 rows above the black line are 5 practice rounds while there are 40 experimental rounds under the black line.

To earn points, you type either H or S into a cell at the intersection of the designated column and round and click enter. You may choose either H or S depending on which you feel will earn you the most points. Feel free to try different combinations to see what could provide you with the most points.

Please play one round at a time and wait for Player 0 to play his or her turn and points to be awarded before making the next selection. The points awarded depend on what both you and the other player (Player 0) choose per round. For each round, the points you receive will be reflected in the "Points this Round" Column. The number of points you receive are shown on that row, along with the total points received up to the completed round in a separate column.

Again, your goal is to get as many points as you can.

When you have finished reading these directions and are ready to start, the researcher will direct you to the tab in which you will be playing and if there are no questions, you may start practice round 1 immediately. After practice 5 is awarded, you are asked to close your eyes while you listen to an audio file. When the audio file is over, you will open your eyes and go on to play the experimental rounds.

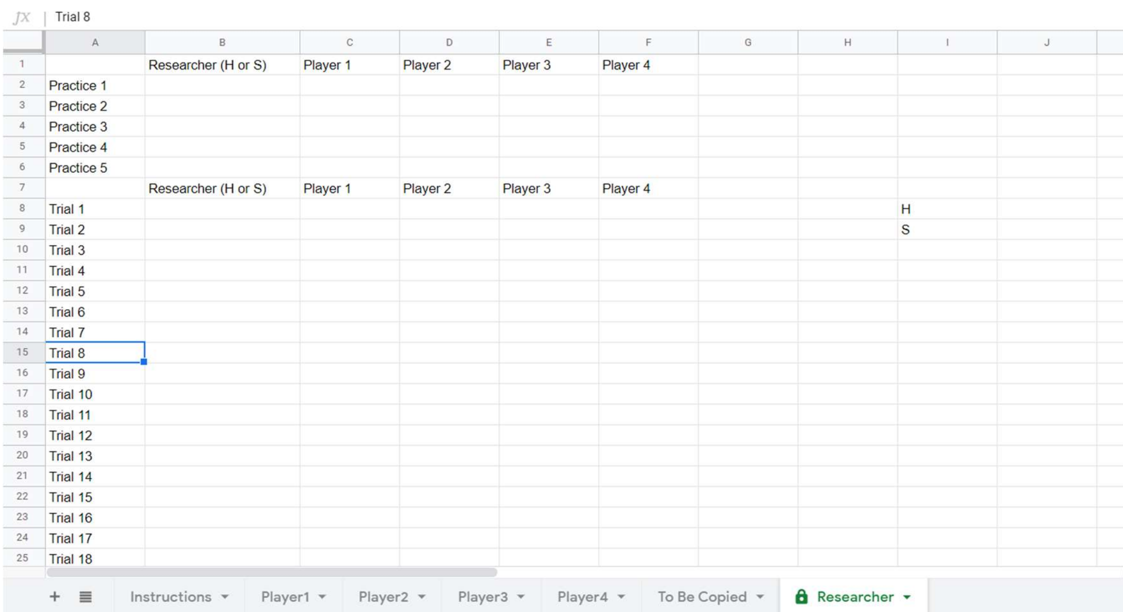
If there are no questions, please ask the researcher for a tab assignment. You may start practice 1 immediately.

APPENDIX D:

VIEWS

Note in these screenshots, Player5 and Player6 are hidden as they were only used on one timeslot. Additionally, a separate tab (labeled calculator) was required to generate the zeros in the participant view. Otherwise an error would occur.

Researcher's View



fx Trial 8

	A	B	C	D	E	F	G	H	I	J
1		Researcher (H or S)	Player 1	Player 2	Player 3	Player 4				
2	Practice 1									
3	Practice 2									
4	Practice 3									
5	Practice 4									
6	Practice 5									
7		Researcher (H or S)	Player 1	Player 2	Player 3	Player 4				
8	Trial 1								H	
9	Trial 2								S	
10	Trial 3									
11	Trial 4									
12	Trial 5									
13	Trial 6									
14	Trial 7									
15	Trial 8									
16	Trial 9									
17	Trial 10									
18	Trial 11									
19	Trial 12									
20	Trial 13									
21	Trial 14									
22	Trial 15									
23	Trial 16									
24	Trial 17									
25	Trial 18									

Instructions | Player1 | Player2 | Player3 | Player4 | To Be Copied | Researcher

	A	B	C	D	E	F	G	H	I	J	K
27	Trial 20										
28	Trial 21										
29	Trial 22										
30	Trial 23										
31	Trial 24										
32	Trial 25										
33	Trial 26										
34	Trial 27										
35	Trial 28										
36	Trial 29										
37	Trial 30										
38	Trial 31										
39	Trial 32										
40	Trial 33										
41	Trial 34										
42	Trial 35										
43	Trial 36										
44	Trial 37										
45	Trial 38										
46	Trial 39										
47	Trial 40										
48											
49	Audio played :										
50		Stag Played	0	0	0	0					
51											

+ ≣ Instructions ▾ Player1 ▾ Player2 ▾ Player3 ▾ Player4 ▾ To Be Copied ▾ Researcher ▾

Participant's Tab

fx

	A	B	C	D	E	F	G	H	I
1		Player 0	**Your Move (Either S or H)**		Points this round				
2	Practice 1				0				
3	Practice 2				0				
4	Practice 3				0				
5	Practice 4				0				
6	Practice 5				0				
7		Player 0	**Your Move (Either S or H)**		Points this round		Running Total (points)		
8	Round 1				0		0		
9	Round 2				0		0		
10	Round 3				0		0		
11	Round 4				0		0		
12	Round 5				0		0		
13	Round 6				0		0		
14	Round 7				0		0		
15	Round 8				0		0		
16	Round 9				0		0		
17	Round 10				0		0		
18	Round 11				0		0		
19	Round 12				0		0		
20	Round 13				0		0		
21	Round 14				0		0		
22	Round 15				0		0		
23	Round 16				0		0		
24	Round 17				0		0		
25	Round 18				0		0		

+ ≣ Instructions ▾ Player1 ▾ Player2 ▾ Player3 ▾ Player4 ▾ To Be Copied ▾ Researcher ▾

	A	B	C	D	E	F	G	H	I
24	Round 17				0		0		
25	Round 18				0		0		
26	Round 19				0		0		
27	Round 20				0		0		
28	Round 21				0		0		
29	Round 22				0		0		
30	Round 23				0		0		
31	Round 24				0		0		
32	Round 25				0		0		
33	Round 26				0		0		
34	Round 27				0		0		
35	Round 28				0		0		
36	Round 29				0		0		
37	Round 30				0		0		
38	Round 31				0		0		
39	Round 32				0		0		
40	Round 33				0		0		
41	Round 34				0		0		
42	Round 35				0		0		
43	Round 36				0		0		
44	Round 37				0		0		
45	Round 38				0		0		
46	Round 39				0		0		
47	Round 40				0		0		
48									

Instructions | Player1 | Player2 | Player3 | Player4 | To Be Copied | Researcher

APPENDIX E:
DEBRIEFING

Debriefing for study entitled Assurance, Confidence, Positive Imagery, and Trust in Gaming [Online]

Thank you for your participation. The goal of this study was to determine whether it is possible to influence the likelihood of cooperation when playing a computerized stag hunt game by use of positive imagery and suggestions on influencing trust in others versus trust in self. You listened to an audio designed to either increase your feelings of trust in others or trust in yourself before playing a form of "Stag Hunt." In this game, both players needed to play S to score higher points. The selection of S signified a higher desire to cooperate and trust others than with the H, which always scored at least one-point, signifying a less trusting strategy and one more dependent on self-reliance.

Your participation is not only greatly appreciated by the researchers involved, but the data collected could possibly help others understand the nature of cooperation.

If you have any questions about this study or would like to learn more information, please contact me Melvin Marsh, mm42816@georgiasouthern.edu . Also please screenshot this screen with the date and time you finished and email it to the above email address so you can obtain credit for your participation.

Thank you!