Uncertainty Reduction and Game Communication: How Does Uncertainty Reduction Theory Come into Play?

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The goal of this study was to test whether uncertainty reduction theory could be applied to a game environment by examining how players used the information-seeking strategies of the theory: passive, active, interactive, and extractive. It also explored demographic variables to determine whether these influenced strategy use. Few studies have specifically investigated communication in games, and this study attempted to apply a communication-focused theory in order to increase knowledge in this area, as well as potentially expand the theory. This information could also be useful to game designers working on sociability structures in games. An online survey was developed and posted on gaming forums and guild websites, and received 111 completed responses. Results did not show a difference in the frequency of strategy use. Uncertainty reduction theory did not seem to apply to the context of in-game communications. However, results did show correlations between players' level of game experience and desire to reduce uncertainty about both task-related and socioemotional topics. In addition, correlations between players' level of game experience and both interactive and active strategies were found.

Introduction

"Play is more than a mere physiological phenomenon or a psychological reflex. . . .It is a significant function. . . .All play means something" (Huizinga, 1950, p. 1). What play means can be difficult to determine, and what makes it fun can be even more difficult to define, and may vary from individual to individual, but Huizinga (1950) identifies several characteristics that define play. By these characteristics, play is voluntary, it is separate from "real" life, it is limited in terms of time and space, it has rules, and it tends to create social groups and communities based on play that exist even when the game ends.

Although these attributes were defined many years before video games and online games existed, they still apply to online games today. For example, one chooses to play games and which games to play; it is voluntary. Dragons, aliens, and other mythical monsters that may exist in the game worlds do not exist in "real" life, therefore it is separate. Events or quests which may take place in online games often have time limits, and are restricted to the virtual space created by the game developers; certain actions or behaviors may not be allowed in the game. For instance, End User License Agreements may list behaviors that game moderators may "ban" players for engaging in. And those who play online games may form friendships through this medium, join guilds, and communicate outside of the game. But how can one better understand this in-game communication?

In recent years, the number of people who play games, as well as those who specifically play online games, has climbed dramatically (e.g. Longman, O'Connor, & Obst, 2009; Petitte, 2012; Satter, 2013; Soper, 2013). At its height of popularity, World of Warcraft, perhaps one of the more well-known Massively Multiplayer Online (MMO) games, was reported to have between 11.5 and 12 million players (Longman et al., 2009; Satter, 2013); it is only one of many MMO games currently available. Petitte (2012) estimated that there were approximately 400 million MMO players in 2012, and in 2013 an estimated 700 million people played online games (Soper, 2013).

However, while popular opinion may suggest that most gamers are male, the Entertainment Software Association (ESA) has found that females comprise approximately 44% of the gaming population (ESA, 2015). Studies do not always reflect this ratio (e.g. Frostling-Henningsson, 2009; Greitmeyer & Cox, 2013; Gitter, Ewell, Guadagno, Stillman, & Baumeister, 2013; Herodotou, Kambouri, & Winters, 2014): some lean toward almost all male participants, while others may include more than 50% females. There is a large amount of variance in regards to representation of the sexes in games studies, and findings which indicate both behavioral and communicative differences (e.g Dino, 2010; Kuznekoff & Rose, 2013); clearly this is an important variable to consider.

With so many players in online games, both male and female, there is a large amount of communication that takes place in this context, as well

as in game-related forums. But despite the number of studies on games, few have investigated communication within game environments (e.g. Frostling-Henningsson, 2009; Herodotou, Kambouri, & Winters, 2014; Peña & Hancock, 2006).

It is also possible that age may play some role in game communication, although it does not appear that existing studies have specifically examined age as a variable. There are large differences in the ages of those who play games. The ESA (2015) found that gamers range in age from under 18 (26% of gamers) to 50 and over (27% of gamers). Some studies reflect this age diversity (e.g Frostling-Henningsson, 2009; Longman, O'Connor, & Obst, 2009; Herodotou, Kambouri, & Winters, 2014), while others focus on college-age gamers (e.g. Hollingdale & Greitemeyer, 2013; Ferguson & Rueda, 2010; Greitemeyer, Agthe, Turner, & Gschwendtner, 2012).

Games and the topic of play have been subjects of interest and study for over fifty years, and the philosophies and theories developed during this time can still be applied. However, with the advent of new technologies, video games have been the subject of numerous media effects studies and studies on how individuals relate to games (e.g. Fischer, Kastenmüller, & Greitemeyer, 2010; Greitemeyer, Agthe, Turner, & Gschwendtner, 2012; Greitemeyer, 2013; Hollingdale & Greitemeyer, 2013; Trepte & Reinecke, 2010).

While communication does take place in games, the subjects discussed

often include those other than task-oriented or game-based topics (Peña & Hancock, 2006). The government has acknowledged for years the importance of in-game communications (Satter, 2013). In 2013, it was revealed that both U.S. and U.K. government agents have been monitoring in-game communications in recent years in an effort to uncover information on terrorists and other criminals who might be using in-game messaging systems to communicate (Satter, 2013). The agents watched for suspicious communications in games like Second Life and World of Warcraft.

Furthermore, game designers and those in the game industry are beginning to investigate how to design MMOs with more social elements; Christou, Law, Zaphiris, and Ang (2013) surveyed individuals involved in game design to gather their thoughts on how game design can support sociability within the game using open-end questions. Christou et al. (2013) identified three categories of sociability, which included in-game communication. The results also showed that sociability is an important aspect of Massively Multiplayer Role-Playing Games (MMORPGs), but it was found that none of the respondents used specific methods to incorporate structures for sociability within games. As part of the study, several groups where formed and asked to discuss game design options that could increase social opportunities in games based on the results of the survey. One of the groups, which focused on general game aspects to promote sociability instead of a specific game concept, emphasized that "any

social game should include an advanced chat interface, which would allow holding conversations with several people as well as include channels for general chat" (p. 731).

Christou et al.'s (2013) study on sociability in games demonstrates that the game industry recognizes the importance of communication and socializing in games, and, although more research is required, is trying to find ways to incorporate that into game design. Investigating how individuals communicate within games and testing whether established communication theories apply to these environments could aid the game industry in this endeavor by providing more research on the topic. This would help both academics and professionals better understand how players interact in games, and potentially help game designers incorporate sociability structures that would make their games more appealing to players.

As previously mentioned, communication in online games can be used for discussions that are not solely based on the game (Peña & Hancock, 2006; Satter, 2013), and as such there can be some blurring of the lines Huizinga (1950) described that set the game space apart from "real" life. This raises more questions for communication scholars to investigate, such as whether existing communication theories can be applied to game environments, whether players wish to reduce uncertainty in regards to others with whom they interact, which strategies may be used, and whether factors such as age, sex, or game experience

may influence which strategies are chosen.

This study will cover existing research on uncertainty reduction theory, as well as games, and expand this information through the application of uncertainty reduction theory in an online gaming environment. This will be accomplished by studying uncertainty reduction strategies as employed by individuals from a variety of gaming communities. Current literature on both this theory and video games leaves several questions that will be pointed out and addressed. Responses to an online survey designed to answer these questions will then be analyzed and the results discussed and explained.

Uncertainty reduction theory (URT) (Berger & Calabrese, 1975) is an ideal theory to test in a game environment application, since studies have shown that many gamers play in order to meet new people (e.g. Herodotou, Kambouri, & Winters, 2014; Longman, O'Connor & Obst, 2009) and URT was developed to primarily focus on initial interactions.

Testing URT in game environments could also strengthen and further articulate the theory itself. It would provide more information on how this theory functions in a game environment, potentially adding a context in which URT could be applied. Therefore, studying in-game communication within the framework of URT could have theoretical implications, as well as benefitting game developers and perhaps providing additional subjects for future research.

Literature Review

Uncertainty Reduction Theory. Developed by Berger and Calabrese in 1975, URT was intended to provide a communication-based perspective to help explain and predict interpersonal communication behavior. Berger and Calabrese (1975) explained that other research in the field at that time focused more on social psychology theories than communication, and so they sought to construct an explanation that directly focused on interpersonal communication. Since it was first developed, URT has been tested extensively and successfully applied to various contexts, including computer-mediated communication (CMC) situations (e.g. Antheunis, Valkenburg, & Peter, 2010; Palmiere, Prestano, Gandley, Overton, & Zhang, 2012).

In URT, uncertainty is defined as the inability to predict another person's responses or behavior (Berger & Calabrese, 1975), or a lack of information (Yoo, 2009). URT assumes that each person's responses and behaviors are based in part on how he or she predicts the other person will behave and respond, though rules and social or cultural norms also play a role (Berger & Calabrese 1975). These rules or norms may be implicit in that the individual cannot state the rule, but still follows it, or explicit, where the individual can state both the rule and the reason for adhering to it.

When two strangers first meet, neither is able to predict very much about the other; therefore both experience this type of uncertainty and may attempt to reduce it (Berger & Calaberes, 1975). This becomes the main goal of the initial

interaction, to become better able to predict how the other person will choose to behave, which in turn helps each communication partner better determine how she or he will behave. Communication partners may participate in proactive uncertainty reduction, or retroactive uncertainty reduction, according to URT. Proactive means trying to make predictions before the other person acts, while retroactive involves attempts to explain the other person's response after the person has acted or spoken.

Although the theory was originally intended to focus on the prediction of responses in the initial interactions between strangers, it has since been expanded, and includes three potential phases of relationships: entry, personal, and exit (Berger & Calabrese, 1975). The entry phase begins with the interaction of two strangers and explains how they attempt to reduce uncertainty about each other. In the personal phase, the communicators share information on values, attitudes, and personal problems. Indeed, communicators may even begin touching on some of these topics toward the end of the entry phase, such as attitudes and opinions that are considered low risk. The exit phase is defined as the point at which communicators decide whether it is desirable to continue the interaction in the future.

However, there is no set time at which each phase begins or ends; the entry phase may last several minutes, or continue over several separate interactions with the same communication partner. Likewise, the phases

are not necessarily linear. The personal phase may be skipped entirely and communicators may proceed directly into the exit phase from the entry phase. While all three phases are defined, this theory centers on the initial, or entry, phase of interactions.

In addition, Berger (1979) also outlined two levels of uncertainty: cognitive and behavioral. Cognitive relates to understanding and predicting how or what the other person is thinking, while behavioral is related to how the other acts. Behavior may be highly dependent on social norms; therefore it is possible that one could have low behavioral uncertainty and high cognitive uncertainty simultaneously. It is also possible that cognitive uncertainty could be more difficult to reduce in a more formal setting governed by an increased number of social norms. Additionally, Yoo (2009) found that the type of information gained affects uncertainty. Positive information reduces uncertainty to a greater extent than negative information. It is possible that while negative information reduces uncertainty on an intellectual level, it may increase uncertainty in other areas; Yoo's (2009) study measured general, or global, uncertainty, but stated that the effect of the negative information may be directly related to relational uncertainty.

The definition of uncertainty is not necessarily based on the emotions or feelings one might associate with the term, such as doubt, anxiety, or discomfort (e.g. Berger & Calabrese, 1975; Berger, 1979; Kellermann & Reynolds,

1990; Bradac, 2001). The motivation to reduce uncertainty may be attributed to factors such as whether future interactions are anticipated (Kellermann & Reynolds, 1990), which is also more logical than emotional. Kellermann and Reynolds (1990) also found that uncertainty can have a positive relationship with information-seeking behavior, but only when the level of uncertainty surpasses people's tolerance for uncertainty.

Both the definition of uncertainty and the motivations to reduce it are described as more strategic than emotional (Bradac, 2001). Uncertainty reduction is described as an intellectual activity, not one that is engaged in so that individuals will feel less discomfort from not knowing (Bradac, 2001), although it seems likely that the level of tolerance would involve emotions to some extent, and one source points out that uncertainty can result in "stress and anxiety" (Berger, 1987, p. 54). The point of intolerance mentioned by Kellermann and Reynolds (1990) seems to suggest a point at which the lack of predictability, combined with other factors such as motivations, would create feelings of discomfort or anxiety that the individuals would wish to relieve by engaging in information-seeking behaviors to reduce uncertainty.

There are several different strategies which may be used to reduce uncertainty in social contexts, namely passive, active, and interactive strategies (Berger, 1979; Baxtor & Wilmot, 1984; Berger, 1987; Neuliep & Grohskopf, 2000). In passive strategies, the potential communication partner may be observed,

preferably in an environment with fewer social rules, in order to gauge how she or he responds to others. The environment itself may also provide cues about the person being observed; Berger and Calabrese (1975) use an example of a political rally, which would provide cues regarding the attitudes the individual held towards politics and possibly even a certain candidate. These cues would serve to reduce the level of uncertainty by providing potential topics to discuss that would most likely be deemed safe, or would have responses that were more predictable.

Asking others about the potential communication partner is an example of active information-seeking (Berger, 1979). This method also includes actions that are more involved than simple observation, but do not include direct contact with the individual. Interactive strategies are those such as directly communicating with or questioning the individual.

Although URT was intended to apply to face-to-face communication, studies have shown that individuals also use these strategies in online communications (e.g. Antheunis et al., 2010; Gibbs, Ellison, & Lai, 2011; Palmieri et al., 2012; Ramirez, Walther, Burgoon, & Sunnafrank, 2002). However, strategies may be used in differing degrees and in different forms. Antheunis et al. (2010) found that on social networking websites, passive strategies were the most commonly used, followed by interactive and active. Passive strategies were used by almost 99% of participants, while approximately 84% used interactive and

nearly 20% used active. Palmieri et al. (2012) investigated how self-disclosure on Facebook effected perceived uncertainty, and found that more self-disclosure lead to more uncertainty reduction.

It is worth noting that most individuals in Antheunis et al.'s (2010) study used multiple strategies, although it is not clear what determined strategy use. Interactive strategies may be used more in environments with fewer cues, such as text-only chats, while passive strategies may be used more in online social groups or social networking (Antheunis et al., 2010; Ramirez et al., 2002). Palmieri et al. (2012) found that high levels of self-disclosure may compensate of the lack of nonverbal cues in some cases. Self-disclosure is classified as an interactive strategy (Berger, 1979; Antheunis et al., 2010), which may partially explain the high percentage of this strategy's use on social networking platforms, since social networking is ideally suited to both self-disclosure and passive strategies.

In mentioning the pervasiveness of passive strategies in computer-mediated communication (CMC), Ramirez et al. (2002) also referenced a term commonly used online for such strategies, "lurking." This "lurking" may be the result of an increased concern for safety, and online uncertainty reduction strategies may include conducting background checks or searches on the individual in question, as well as observing his or her public online activity (Gibbs et al., 2011). This strategy of online searching may be referred to as a

fourth type of uncertainty reduction strategy considered unique to CMC and labeled as extractive, although of the four strategies it is the least used (Ramirez et al., 2002; Gibbs et al., 2011). Combined, it has been shown that individuals apply these four strategies and attempt to reduce their uncertainty when communicating with others online in social contexts.

Games and communication. Despite the number of recent studies involving video games, there remains the question of how a communication theory will function in a game environment, since play involves "a stepping out of 'real' life into a temporary sphere of activity with a disposition all of its own" (Huizinga, 1950, p. 8). While many studies focus on violence in games (e.g Hollingdale & Greitemeyer, 2013; Fischer, Kastenmüller, & Greitemeyer, 2010; Barlett, Branch, Rodeheffer, & Harris, 2009), few have focused on communication (e.g. Peña & Hancock, 2006; Kuznekoff & Rose, 2013), which is an important aspect of gaming (e.g. Christou et al., 2013; Satter, 2013). Communication in games is regarded as one of the main sources of sociability in games by some game designers (Christou et al., 2013), and can be a motivation for gamers to play (Frostling-Henningsson, 2009). In addition, some game studies allude to variables which may influence communication in games, such as age and sex; one study directly investigated how the sex of participants can influence game communication (e.g. Kuznekoff & Rose, 2013).

Many of the studies conducted on games have investigated violence

and behavior, and have had mixed results (e.g. Adachi & Willoughby, 2011; Barlett, Branch, Rodeheffer, & Harris, 2009; Ferguson & Reuda, 2010; Fischer, Kastenmüller, & Greitemeyer, 2010; Gitter et al., 2013; Greitemeyer et al., 2012; Greitemeyer, 2013; Hollingdale & Greitemeyer, 2013). Hollingdale and Greitemeyer (2013) found that playing violent video games with personalized avatars increased aggression levels, much like Fischer, Kastenmüller, and Greitemeyer's (2010) results, which showed that personalized avatars increased player identification with the avatar which lead to increased aggression in the participants of the study. Barlett et al. (2009) also found that violent games increased aggressive behavior, but results showed that effect was limited in duration; it took four minutes or less for participants' aggressive thoughts and feelings to revert back to their pre-established baselines, and five to ten minutes for aggressive behavior to abate.

Another study found that violent games increased players' perceptions of negative human traits in themselves, but playing prosocial games, increased feelings of positive human traits in the player (Greitemeyer, 2013), possibly by making aggressive thoughts less accessible (Greitemeyer et al., 2012). However, the relationship between the effects of violent and prosocial games is more complicated than it might first appear. Gitter et al.'s (2013) results showed that prosocial content within a violent game could reduce aggression and increase prosocial thoughts, while Ferguson and Reuda's (2010) study found

no link between violent games and increased aggressive behavior or feelings of hostility. Instead, this study found that long-term use of violent games was related to reduced feelings of hostility and depression after stressful tasks. Further complications occur with the results of Adachi and Willoughby's (2011) investigation, where it was found that violence in games is most likely not the only factor involved in increased aggression; the results indicated that competitiveness present in games increased short-term aggressive behavior, regardless of whether the game contained violence.

Despite the number of studies which focus on video games and the effects of games, very few have examined the role of communication or how communication operates in this environment (e.g. Frostling-Henningsson, 2009; Herodotou, Kambouri, & Winters, 2014; Peña & Hancock, 2006; Kuznekoff & Rose, 2013). In-game communication has been recognized as important to the extent that governments monitor in-game communications in several MMOs in an attempt to uncover terrorists and other criminals through their in-game messages to one another (Satter, 2013).

Contrary to what is perhaps the common perception that those who play video games are antisocial and prefer to spend time alone, research has shown that games are an increasingly social activity, and that gamers are often very social individuals (Herodotou, Kambouri, & Winters, 2014). They may join guilds, or groups of players within a game, and interact with other gamers to

build relationships and friendships online with those who share similar interest; since gaming is often a social activity, many players communicate often with others in the game (Herodotou, Kambouri, & Winters, 2014). Individuals may play games as a form of companionship and social support derived through communications with other players (Longman, O'Connor, & Obst, 2009). Frostling-Henningsson (2009) found that communication can be an important motivation for many gamers to play.

Peña and Hancock (2006) may have done the most focused study on in-game communication to date in an effort to determine whether in-game communication was mostly task-oriented or whether it would include relational communication, such as might occur in face-to-face situations. The study recorded text-based communication within a multiplayer game over a two-week time span, gathering over five thousand messages. Participants were unaware they were being recorded until after recording was completed. The researchers then categorized and analyzed messages, using guild rank (or lack of guild associations) to assess the participants' experience levels. They found that in-game communications included significantly more socioemotional communication than task communications (Peña & Hancock, 2006). Socioemotional communication is comprised of the expression of personal information and emotions, while task communication involves offering suggestions regarding aspects of the game and asking for more task-related information.

Peña and Hancock's (2006) results are comparable to Frostling-Hennsingsson's (2009) findings, which showed that communication in games may involve different levels of communication, from discussions regarding game rules to conversations about real world problems and personal issues. "The communication that takes place when gaming online occurs seems to be of utmost importance for many gamers," the results stated (Frostling-Henningsson, 2009, p. 558).

Peña and Hancock's (2006) results also showed that participants were more likely to communicate positive than negative messages to other players, where negative messages included disagreement, antagonism, and profanity (Peña & Hancock, 2006). Negative messages were more likely to originate when other players were not polite, broke social norms, or when complications related to in-game tasks emerged. Peña and Hancock (2006) also determined that experience with games has an effect on in-game communication. Players with more experience were more likely to communicate positive message more often than those with less experience (Peña & Hancock, 2006). Gamers with more experience were also more likely to use specialized language, e.g. abbreviations and emoticons.

Sex. In 1996, Emmers and Canary found that sex may influence which URT strategy is chosen; their results showed that males were more likely to use interactive strategies, while females were more likely to use passive strategies.

Emmers and Canary (1996) were investigating relational uncertainty and repair. However, it is possible a similar effect exists in game communication.

Recent studies have found that sex differences do exist within game play (e.g. Lin, 2011; Yao, Mahood, & Linz, 2010; Dinu, 2010; Behm-Morawitz & Mastro, 2009). Some of the differences involved perceptions and emotions. Lin (2011) found that women were more likely to feel shame when playing games that involve fighting and/or shooting human-like characters or other players, while there was no noticeable effect on males when shooting human characters. Behm-Morawitz and Mastro's (2009) results showed that women who played games with highly sexualized female avatars were more likely to rate women as less physically capable than men,

Differences in behavior were also discovered; Yao, Mahood, and Linz (2010) found that men who played sexually-oriented games that objectified women were more likely to engage in sexual harassment after playing. In a study involving a driving game, Dinu (2010) found that female participants who received worse game scores were more likely to drive aggressively, while males' likelihood of aggressive driving did not appear to be impacted by the game.

Kuznekoff and Rose (2013) found that sex differences can also extend into game communication. The study found that male participants responded more negatively to females in voice chats on games, often including profanity; males were approximately three times more likely to make negative and/or derogatory

comments toward a female voice than a male voice in the chat, although in both conditions the confederate played equally well and responded with similar messages (Kuznekoff & Rose, 2013). While these results show a difference in communication based on the sex of the receiver, it is possible that such a trend would lead females to communicate differently in games than males if they commonly received such responses.

It is also noteworthy that there are different perspectives on who plays video games, in terms of sex. Gitter et al. (2013) used only male participants for their research. Frostling-Henningsson (2009) also used a sample that was 83% male. Other studies included various percentages in terms of males and females, from 96% male and 4% female (Herodotou, Kambouri, & Winters, 2014) to approximately 37% male and 63% female (Greitmeyer & Cox, 2013). While some of these ratios are undoubtedly the result of participant response rates, it is difficult to establish a true representation of gamers based on sex.

Age. In addition, it is possible that age may play a role in game communication; to date it does not appear that any game-communication studies have investigated this as a variable. However, game-related studies mention vast age differences among participants (e.g Frostling-Henningsson, 2009; Longman, O'Connor, & Obst, 2009; Herodotou, Kambouri, & Winters, 2014). The largest difference in age is found in Longman, O'Connor, and Obst's (2009) study, where participants were between the ages of 14 and 65. Others focus primarily

on college-age participants (e.g. Hollingdale & Greitemeyer, 2013; Ferguson & Rueda, 2010; Greitemeyer, Agthe, Turner, & Gschwendtner, 2012; Greitemeyer & Cox, 2013; Gitter et al., 2013; Dinu, 2012). In many cases these age differences may be simply the result of available participants.

However, over the last three years, the average age of gamers has been rising, from 30 in 2013 (ESA, 2013), to 31 in 2014 (ESA, 2014) and 35 this year (ESA, 2015). Furthermore, it was reported this year that approximately 44% of gamers are aged 36 or older (ESA, 2015). Herodutou, Kambouri, and Winters (2014) reported that participants aged 10-15 were not included in their final analysis in order to increase reliability. Combined with the discrepancy between industry findings on demographics and the ages of study participants, this implies that age could have some bearing on results, and should be tested to see if it may influence communication in games.

Games and URT. To date, there does not appear to be existing literature which investigates URT in a game environment. However, it is possible that some of the results of studies done on other topics may be explained by URT.

Although not explicitly stated, it is possible there is a link between the appearance of players' characters within games and the passive strategy of URT as defined by Berger (1979). Some studies have found that character appearance can influence interpersonal attraction and sex inferences (e.g. Lee, 2007; Lo, 2008). Lo's (2008) findings indicated that characters wearing more elaborate outfits

rated higher in interpersonal attraction than characters wearing basic clothing. Lee's (2007) research showed that the sex of an in-game character influenced players' assumptions regarding the sex of the player controlling the character.

While these studies do not directly incorporate URT, the findings of Lo (2008) and Lee (2007) appear to be consistent with the theory; it appears that players attempt to use cues observed in the game environment to gather information on other players. Furthermore, Lo's (2008) results appear to be in line with the seventh axiom of URT, which states "increases in uncertainty level produce decreases in liking; decreases in uncertainty level produce increases in liking" (Berger & Calabrese, 1975, p. 107). It is possible that the more elaborate outfits provided more cues that could help reduce uncertainty, which, according to URT, could potentially increase liking and therefore interpersonal attraction. The findings of these studies could be interpreted as tentative links between URT and games; however, more direct research on game communication within the framework of URT is required to test the theory in this environment.

Research questions and hypotheses. Based on the existing literature discussed above, the following research questions and hypotheses were developed:

RQ1: Which URT strategies are used most frequently? (i.e. passive, active, interactive, and extractive)

RQ2: Do age and sex influence players' desire to reduce uncertainty?

RQ3: Do age and sex influence players' choice of URT strategies?

H1: If players use information seeking strategies, players with less experience in a game will be more likely to use passive strategies.

H2*a*: Players with more game experience will have a stronger desire to reduce uncertainty regarding other players (e.g. more interested in socioemotional, or personal, information).

H2*b*: Players with less game experience will have an increased desire for more task-related uncertainty reduction.

Method

Participants. This study included 111 completed responses. Incomplete surveys were removed from the sample, as well as two responses that did not meet requirements; one response listed an age of 999 years old, and the other was below the age of the 18; both were male. The final total was 111, which was made up of 74 males and 37 females. Of these participants, 68% were between the ages of 18 and 25, 21% were 26-35, and 11% were 36 years old and older; the mean age of participants was 25 years old (see Appendix D). They had an average game experience level of 4.7 on a scale of 1-7, where 1 was less experienced and 7 was more experienced.

Participants were recruited through online message boards, game forums, three guild websites, and several university classes. Two of the gaming forums were connected to specific games: *Perfect World International*, and *Star Trek Online*. These forums were chosen because they had a high number of members posting on the forums, were both MMO games, and allowed the posting of surveys. They also represent two different subgenres within MMOs; *Perfect World International*

is classified as a fantasy role-playing game with player-versus-player (PvP) game-play, while *Star Trek Online* is a science-fiction action game. The third forum, MMO-Champion.com, was primarily a *World of Warcraft* forum, but had subsections for other MMO games as well, including *Rift*, *Guild Wars 2*, *League of Legends*, and *Defense of the Ancients 2*, which are all multiplayer online games. One of the guild websites was dedicated to *League of Legends* as well, and is run by a university *League of Legends* team. The other two websites, run by guilds known as QQme and MINIONZ, were connected to *Perfect World Internationa*l.

Measurement Instrument. The survey consisted of twenty-seven questions (for a list of the questions, see Appendix A). Two of these where demographics and three sought information on the participants' level of game experience. The remaining questions were designed to elicit responses on participants' use of URT strategies, and desire to reduction uncertainty of both technical (game-related) and social topics. Three questions were used per strategy and five were used for desire to communicate about technical and social topics. All questions employed Likert-type scales with seven intervals, except for those on demographics and one question regarding the participants' level of game experience. The questions were randomized before distribution, with only several exceptions; demographics were left at the end of the survey, and the first 3 questions where not randomized, as they related to the instructions given at the start of the survey. Specific ages were requested, to be grouped in categories

during analysis.

Procedure. The purpose of this study was to investigate how URT functions in a game environment and what factors may influence the choosing of information-seeking strategies associated with URT. In order to test this, an online survey was used. The questionnaire was distributed from June through October of 2015 on gaming forums and three guild websites, as well as to several university classes related to gaming and game design.

Posts were made on gaming forums and websites that contained basic information on the survey and a link to the questionnaire, as well as a statement that more information could be found on the consent form (see Appendix B). Information provided in the posts included: an approximation of the number of questions, the topic of the survey (communication in games), an assurance that no personally identifiable data would be requested and that participation was voluntary and participants could withdraw at any time, and a statement that participants must be over 18. For university classes, the instructors provided students with a link to the survey through either e-mail or a post made on the course website.

For the purposes of this study, participants were not chosen based on game association. The survey asked participants to think of one MMO game they had played and use it as reference when answering the questions. By not focusing on one game, results may be more generalizable to the gaming population.

Results

Research question 1 sought to determine whether one URT strategy was used more frequently than others in game environments. The results indicated that each strategy was used with similar frequency to the others: interactive showed M=5.28, passive showed M=5.13, active showed M=4.56, and extractive showed M=4.40 (see appendix C).

Research question 2 investigated whether age and sex would influence the degree to which players' desired to reduce their uncertainty about both the game and other players. An ANOVA test was used to answer this, but results did not show significance ($F(4, 101) = 1.527$, $p = .200$) (see Appendix D).

Research question 3 asked whether age and sex might influence gamers' choice of URT strategies in a game environment. All four strategies were tested with ANOVA. No significance was found for active ($F(4, 101) = .272$, $p = .895$), passive ($F(4, 101) = .696$, $p = .596$), extractive ($F(4, 101) = .497$, $p = .738$), or interactive ($F(4, 101) = .630$, $p = .643$).

Hypothesis 1 predicted that players with less game experience would be more likely to use passive strategies to reduce uncertainty. No correlation was found between these two variables ($r(109) = .177$, $p = .063$). Additionally, there was no correlation between the level of game experience and the use of extractive strategy ($r(109) = .146$, $p = .125$).

However, two significant relationships were found between the players'

level of game experience and the other URT strategies (see Appendix E). There were positive correlations between both active and interactive strategies and level of experience, where $r(109) = .280$, $p = .003$ and $r(109) = .375$, $p = .000$ respectively.

Hypothesis 2*a* predicted that players with more game experience would have a stronger desire to reduce uncertainty about other players, in that they would seek more personal, or socioemotional, information. This correlation was supported, with $r(109) = .187$, $p = .049$.

Hypothesis 2*b* predicted that players with less game experience would have more desire for task-, or game-, related uncertainty reduction. This hypothesis predicted a negative correlation, which was not found. However, a positive correlation between game experience and the desire for more task-related, or game, information was found, $r(109) = .280$, $p = .003$.

Conclusion

Discussion. The purpose of this study was to test URT in a game environment, potentially expanding the theory, as well as to gain more information about how players communicate in games in order to both expand knowledge and possibly provide information that could lead to advances in the development of sociability functions in video games. The research questions and hypotheses that were proposed examined how age, sex, and level of game experience influenced players' choices in URT strategies, as well as how

frequently players used each of the four strategies as outlined by URT (Berger, 1979; Ramirez et al., 2002) and their desire to reduce two different types of uncertainty: task-related and socioemotional.

The results showed that all four strategies were employed by participants almost equally. Of the four, interactive had only a marginally higher score than passive, followed by active and extractive. Past studies have shown that URT strategies are used in online contexts such as social networking; Antheunis et al. (2010) found that passive strategies were the most commonly used in this context, followed by interactive and active.

Based on the current results, it appears that URT does not function in game environments similarly to how it functions in other online contexts such as social networking; therefore the current findings do not expand uncertainty reduction theory. It may be that a different theory would better apply to the context of games, or that an additional axiom is required to adapt URT to game communications, which is something that future game communication research could examine. However, some of the strategies showed relationships when tested with gamers' experience levels. Perhaps instead it is that gamers do engage in uncertainty reduction strategies but that the complexity of game environments, the fact that they include digital surroundings, graphics, audio, and avatars, leads players to use all four strategies equally.

In addition, age and sex do not appear to influence players' choices

regarding URT strategies or their desire to reduce uncertainty about task-related and social topics. This contrasts with Kuznekoff and Rose's (2013) findings of differences in voice-based game communication based on players' sex, and Emmers and Canary's (1996) findings that the sex of participants could influence URT strategy choice. However, Kuznekoff and Rose (2013) investigated how others would respond to male and female voices in an online multiplayer game. The current study did not specify a type of game communication (voice vs text-based chats), which may have affected the results.

The current results also showed no correlation between the players' level of game experience and their use of passive strategies. Antheunis et al. (2010) found that passive strategies may be used more in online social groups or social networking, both contexts which could include more cues than text-only chats. Rameriez et al. (2002) also mentioned that observation by newer members of online groups is often encouraged, although that does not appear to be true of in-game communication based on the current results.

While both Lee's (2007) and Lo's (2008) results showed that gamers may make assumptions about other players based on the appearance of their avatars, it is possible that gamers are not doing this consciously, and so could not report it. It is also possible that in game environments, which include both graphics and text-based chats, players rely more on the text-based communication elements than on character appearance and other similar cues.

But while there was no correlation between passive strategies and game experience, other strategies showed significant results when tested with experience. There was a positive relationship between the use of active strategies and players' experience. Berger (1979) identified two types of active strategies: asking others about the person of interest, and environmental structuring. It makes sense that these strategies would be used more as players gain experience in the game. As they played more, they would have more contact with other players, and most likely know more individuals to question about the person they were interested in. They would also gain the experience to structure the game environment, such as forming squads, by learning more technical aspects of the game.

Interactive strategies also showed a positive relationship with game experience. These strategies include directly questioning the individual of interest, as well as self-disclosure, (Berger, 1979). It may be that as players' increase in experience, they meet more individuals through quests and raids, or dungeons, which require squads, and are more comfortable with the games' communication options, whether that is voice- or text-based. This finding appears to contradict one of the assumptions of URT: that initial interactions have higher rates of questioning, but that the number of questions decreases as the interaction proceeds (Berger, 1979). However, the current study did not differentiate between direct questions and self-disclosure; instead several types

of interactive strategies were averaged together. It is possible that self-disclosure increases with experience, more so than direct questions. That is a difference that future studies may wish to take into account. It is also possible that this is an example of URT functioning differently in game environments than in face-to-face interactions.

In addition to these results, support was found for the last two hypotheses; correlations were found between players' level of game experience and their desire to reduce both task-related and socioemotional uncertainty. Peña and Hancock (2006) found that players with more experience were more likely to generate positive socioemotional messages. Their study also mentioned that players with more experience appeared more inclined to participate in socioemotional communication than those with less experience, although the results were not significant. While the current study did not differentiate between positive and negative messages, current results did show significance in a positive relationship between increased game experience and the desire to seek more socioemotional information. It may be that as gamers become more comfortable with the game, they become more curious about the other players they are interacting with. However, it may also be that participants count their interactions with other players as experience in the game, leading to a positive relationship between the two variables.

The final hypothesis predicted that, based on the previous hypothesis,

the opposite would be true, that players with less experience would seek more task-related information. While the results were significant, they were not as predicted. Instead, a positive correlation between experience and the desire for task-related information was found. Players with more experience are more likely to seek increased task-related information. This suggests that as players gain more experience, they may also seek to improve their game skills and game performance. It may also be that as they become more familiar with the game, they have more game-related topics to discuss with other players.

While some of the findings of this study were unexpected, and some of the hypotheses and research questions were not supported, many of the results may still benefit game designs who are seeking more information on how communication operates in games. Christou et al. (2013) identified in-game communication as a main category of sociability in games, and Frostling-Henningsson (2009) found that communication can motivate gamers to play. The supported findings in the current study were directly related to communication, particularly how game experience can influence both the strategies used and the topics about which gamers seek to reduce uncertainty as they gain experience. This could potentially help game developers better provide for the communication needs of their audience, possibly by planning events for more experienced players to demonstrate and discuss game-related strategies, or incorporating such features into the sociability structures of games.

Limitations. This study does have a number of limitations. Perhaps the most important of these is the sample size. Only 111 questionnaires were filled out completely, which limits the generalizability of the results. In addition, while age was used as a variable, the mean age of the participants in the sample was 25, and 68% of the sample was 18-25. This makes the results related to age less reliable, as there were fewer older gamers who responded. Similarly, 67% of the sample was male, which, although it is perhaps close to the ESA's (2015) finding that men make up 56% of the gaming population, is not an entirely accurate representation of the distribution of males and females in the gaming community.

In addition, while the questionnaire did not reference any games specifically, the communities from which participants were recruited were linked to specific games, which fell into the categories of science-fiction, fantasy role-playing games (RPGs), and multiplayer online battle arenas (MOBAs). Because of this, the results may not truly encompass the communication tendencies of the MMO community, as they do not include participants from other genres such as sports or social games. Some participants were also recruited from something of a captive audience, since the recruitment messages were posted on the home pages of the guilds' websites.

While the limitations of this may affect the current results, future research may seek to re-test some of the variables discussed in this study, or perhaps test

a different communication theory in a game environment. Doing so would help determine whether communication theories can be applied to game contexts, or whether perhaps new theories are required to help increase understanding of the communication phenomena that takes place in online games.

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Appendix A

Thesis Questionnaire

Game Experience:

The following questions are related to your experience with online multiplayer games that include a component that allows for communication with other players. Please think of a specific Massively Multiplayer Online (MMO) game which you have played and use it as a reference when answering the following questions in this survey.

1. How long have you been/did you play this game?
    - ○ 3 months or less
    - ○ Approximately 6 months
    - ○ 1 year
    - ○ More than 1 year

2. I consider myself an expert at this game.
    - ○ Strongly Disagree
    - ○ Disagree
    - ○ Somewhat Disagree
    - ○ Neither Agree nor Disagree
    - ○ Somewhat Agree
    - ○ Agree
    - ○ Strongly Agree

3. I would feel comfortable teaching a new player how to be successful in the game.
    - ○ Strongly Disagree
    - ○ Disagree
    - ○ Somewhat Disagree
    - ○ Neither Agree nor Disagree
    - ○ Somewhat Agree
    - ○ Agree
    - ○ Strongly Agree

URT Strategies:

Passive:

4. In a squad or guild, I would observe a text-based conversation for some time before communicating with the participants about non-game topics.
    - ○ Very Unlikely
    - ○ Unlikely
    - ○ Somewhat Unlikely
    - ○ Undecided

- Somewhat Likely
- Likely
- Very Likely

5. In a voice-based chat, such as RaidCall, TeamSpeak, or Ventrilo/Vent, I would listen to chats before communicating with other players about non-game topics.
    - Very Unlikely
    - Unlikely
    - Somewhat Unlikely
    - Undecided
    - Somewhat Likely
    - Likely
    - Very Likely

6. I would observe other players' strategies to learn about the game and develop my own strategy without directly communicating with others.
    - Very Unlikely
    - Unlikely
    - Somewhat Unlikely
    - Undecided
    - Somewhat Likely
    - Likely
    - Very Likely

Extractive:

7. If players provide enough information to run an online search, I would attempt to find out more information about other players (i.e. forum posts for other games they play, other leagues/guilds they may be in, YouTube videos, etc).
    - Very Unlikely
    - Unlikely
    - Somewhat Unlikely
    - Undecided
    - Somewhat Likely
    - Likely
    - Very Likely

8. I attempt to verify information given to me by other players through online research.
    - Very Unlikely
    - Unlikely

- Somewhat Unlikely
- Undecided
- Somewhat Likely
- Likely
- Very Likely

9. I would search online for game information and strategies instead of or before I ask other players.
    - Very Unlikely
    - Unlikely
    - Somewhat Unlikely
    - Undecided
    - Somewhat Likely
    - Likely
    - Very Likely

Active:

10. Asking another player questions regarding a third player is something I would do to get to know people
    - Very Unlikely
    - Unlikely
    - Somewhat Unlikely
    - Undecided
    - Somewhat Likely
    - Likely
    - Very Likely

11. I would specifically make/structure squads to include other players I wish to get to know.
    - Very Unlikely
    - Unlikely
    - Somewhat Unlikely
    - Undecided
    - Somewhat Likely
    - Likely
    - Very Likely

12. I would ask other players questions about the game instead of reading a guide about it.
    - Very Unlikely
    - Unlikely
    - Somewhat Unlikely

- Undecided
- Somewhat Likely
- Likely
- Very Likely

Interactive:

13. I would communicate directly with the player I would like to get to know
    - Very Unlikely
    - Unlikely
    - Somewhat Unlikely
    - Undecided
    - Somewhat Likely
    - Likely
    - Very Likely

14. I would ask questions of the player in whom I am interested
    - Very Unlikely
    - Unlikely
    - Somewhat Unlikely
    - Undecided
    - Somewhat Likely
    - Likely
    - Very Likely

15. I would search in-game guides and/or read in-game tips and hints to learn the game.
    - Very Unlikely
    - Unlikely
    - Somewhat Unlikely
    - Undecided
    - Somewhat Likely
    - Likely
    - Very Likely

Desire to Communicate:

Communicate/URT?

Social:

16. I have no desire to learn about other players in online multiplayer games/ MMOs
    - Strongly Disagree
    - Disagree
    - Somewhat Disagree

- ○ Neither Agree nor Disagree
- ○ Somewhat Agree
- ○ Agree
- ○ Strongly Agree

17. Online games are a good way to meet new people.
    - ○ Strongly Disagree
    - ○ Disagree
    - ○ Somewhat Disagree
    - ○ Neither Agree nor Disagree
    - ○ Somewhat Agree
    - ○ Agree
    - ○ Strongly Agree

18. It is fun to learn about other cultures/countries by talking to other players
    - ○ Strongly Disagree
    - ○ Disagree
    - ○ Somewhat Disagree
    - ○ Neither Agree nor Disagree
    - ○ Somewhat Agree
    - ○ Agree
    - ○ Strongly Agree

19. I enjoy discussing food preferences with other players
    - ○ Strongly Disagree
    - ○ Disagree
    - ○ Somewhat Disagree
    - ○ Neither Agree nor Disagree
    - ○ Somewhat Agree
    - ○ Agree
    - ○ Strongly Agree

20. I enjoy discussing real life events, such as sporting events, other types of competitions (i.e. dance, writing, music, etc.), or other types of events, with other players
    - ○ Strongly Disagree
    - ○ Disagree
    - ○ Somewhat Disagree
    - ○ Neither Agree nor Disagree
    - ○ Somewhat Agree
    - ○ Agree
    - ○ Strongly Agree

Technical:

21. It is necessary to communicate with other players to find out game strategies and techniques
    - ○ Strongly Disagree
    - ○ Disagree
    - ○ Somewhat Disagree
    - ○ Neither Agree nor Disagree
    - ○ Somewhat Agree
    - ○ Agree
    - ○ Strongly Agree

22. Communicating with other players is a good way to learn about the game.
    - ○ Strongly Disagree
    - ○ Disagree
    - ○ Somewhat Disagree
    - ○ Neither Agree nor Disagree
    - ○ Somewhat Agree
    - ○ Agree
    - ○ Strongly Agree

23. It is fun to discuss quests and gameplay with other players
    - ○ Strongly Disagree
    - ○ Disagree
    - ○ Somewhat Disagree
    - ○ Neither Agree nor Disagree
    - ○ Somewhat Agree
    - ○ Agree
    - ○ Strongly Agree

24. I enjoy finding out other players' opinions on game functions/design
    - ○ Strongly Disagree
    - ○ Disagree
    - ○ Somewhat Agree
    - ○ Neither Agree nor Disagree
    - ○ Somewhat Agree
    - ○ Agree
    - ○ Strongly Agree

25. I enjoy discussing in-game competitions and events, such as duels, tournaments, or other in-game happenings, with other players
    - ○ Strongly Disagree

- Disagree
- Somewhat Agree
- Neither Agree nor Disagree
- Somewhat Agree
- Agree
- Strongly Agree

Demographics:

26. What is your age?
27. Sex: M or F

Appendix B

Informed Consent

Uncertainty Reduction and Game Communication: How Does Uncertainty Reduction Theory Come into Play?

You are invited to participate in a survey study aimed at understanding communication in a game environment.

The data gathered during this survey study will provide information to the gaming community on how it might address uncertainty within video games.

You have been asked to participate because you are a member of a gaming forum.

If you decide to participate in this research you will be asked to complete a short online survey with questions focusing on your use of various types of uncertainty strategies and willingness to communicate while involved in video games. Your participation will take approximately 10 minutes.

Your participation is completely voluntary. If you decide not to participate or not to complete the survey in its entirety it will have no effect on any services, courses, or treatment you are currently receiving.

This study is anonymous. Neither your name nor any other identifiable information will be recorded. If you participate in this study, there will be no way of linking your responses to your name. We don't anticipate any risks or direct benefits to you from participation in this study. However, because this is an online survey there is always the risk of intrusion by outside agents or hackers to your survey responses. Because of this, you are encouraged to change your password frequently.

You may ask any questions about the research at any time. If you have questions about the research you should contact the principal investigator Jim TerKeurst (phone: (262) 472-1906 or email: terkeurj@uww.edu) or the student investigator, Carolyn Costa (costace16@uww.edu).

If you are not satisfied with the response of the research team, have more questions, or want to talk with someone about your rights as a research participant, you should contact Carol Katch, IRB Coordinator of the Office of Research and Sponsored Programs at 262-472-5212 or via e-mail: katchc@uww.edu.

By clicking on the button below you are acknowledging that you are at least 18 years of age, have read this consent form, had the chance to ask questions, and voluntarily consent to participate.

Appendix C

Frequency of URT strategy use:

Statistics

		Passive_stratgy	Extractive_strtgy	Active_stratgy	Interact_stratgy
N	Valid	111	111	111	111
	Missing	0	0	0	0
Mean		5.1321	4.3964	4.5556	5.2823
Std. Deviation		1.15319	1.17251	1.19031	1.36419

Passive_stratgy

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.00	2	1.8	1.8	1.8
	2.67	4	3.6	3.6	5.4
	3.00	1	.9	.9	6.3
	3.33	2	1.8	1.8	8.1
	3.67	3	2.7	2.7	10.8
	4.00	6	5.4	5.4	16.2
	4.33	6	5.4	5.4	21.6
	4.67	15	13.5	13.5	35.1
	5.00	13	11.7	11.7	46.8
	5.33	14	12.6	12.6	59.5
	5.67	14	12.6	12.6	72.1
	6.00	11	9.9	9.9	82.0
	6.33	10	9.0	9.0	91.0
	6.67	6	5.4	5.4	96.4
	7.00	4	3.6	3.6	100.0
	Total	111	100.0	100.0	

Extractive_strtgy

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2.00	2	1.8	1.8	1.8
	2.33	4	3.6	3.6	5.4
	2.67	5	4.5	4.5	9.9
	3.00	10	9.0	9.0	18.9
	3.33	8	7.2	7.2	26.1
	3.67	9	8.1	8.1	34.2
	4.00	8	7.2	7.2	41.4
	4.33	10	9.0	9.0	50.5
	4.67	12	10.8	10.8	61.3
	5.00	13	11.7	11.7	73.0
	5.33	6	5.4	5.4	78.4
	5.67	11	9.9	9.9	88.3
	6.00	6	5.4	5.4	93.7
	6.33	5	4.5	4.5	98.2
	6.67	2	1.8	1.8	100.0
	Total	111	100.0	100.0	

Active_stratgy

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.00	2	1.8	1.8	1.8
	1.33	1	.9	.9	2.7
	1.67	2	1.8	1.8	4.5
	2.33	2	1.8	1.8	6.3
	2.67	3	2.7	2.7	9.0
	3.00	3	2.7	2.7	11.7
	3.33	5	4.5	4.5	16.2
	3.67	7	6.3	6.3	22.5
	4.00	8	7.2	7.2	29.7
	4.33	10	9.0	9.0	38.7
	4.67	18	16.2	16.2	55.0
	5.00	16	14.4	14.4	69.4
	5.33	15	13.5	13.5	82.9
	5.67	6	5.4	5.4	88.3
	6.00	5	4.5	4.5	92.8
	6.33	6	5.4	5.4	98.2
	6.67	1	.9	.9	99.1
	7.00	1	.9	.9	100.0
	Total	111	100.0	100.0	

Interact_stratgy

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.00	2	1.8	1.8	1.8
	2.00	3	2.7	2.7	4.5
	2.33	1	.9	.9	5.4
	3.00	3	2.7	2.7	8.1
	3.33	5	4.5	4.5	12.6
	3.67	1	.9	.9	13.5
	4.00	3	2.7	2.7	16.2
	4.33	7	6.3	6.3	22.5
	4.67	6	5.4	5.4	27.9
	5.00	16	14.4	14.4	42.3
	5.33	11	9.9	9.9	52.3
	5.67	7	6.3	6.3	58.6
	6.00	15	13.5	13.5	72.1
	6.33	12	10.8	10.8	82.9
	6.67	3	2.7	2.7	85.6
	7.00	16	14.4	14.4	100.0
	Total	111	100.0	100.0	

Appendix D

Information on participants:

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
sex:	111	1	2	1.33	.474
age_Nominal	111	1.00	5.00	1.5135	.94258
Experience	111	1.67	6.00	4.6937	1.04266
age_yrs	111	18	72	25.37	9.867
Valid N (listwise)	111				

Age:	Sex:	N
18-25	Male	54
	Female	22
	Total	76
26-35	Male	16
	Female	7
	Total	23
36-45	Male	1
	Female	4
	Total	5
46-55	Male	1
	Female	3
	Total	4
56+	Male	2
	Female	1
	Total	3
Total	Male	74
	Female	37
	Total	111

Research Question #2 Results:

Tests of Between-Subjects Effects

Dependent Variable: Soc_tech_combo

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	5.405[a]	9	.601	1.207	.299
Intercept	606.043	1	606.043	1217.645	.000
age_Nominal	.348	4	.087	.175	.951
Q27	.623	1	.623	1.252	.266
age_Nominal * Q27	3.039	4	.760	1.527	.200
Error	50.269	101	.498		
Total	3070.650	111			
Corrected Total	55.675	110			

a. R Squared = .097 (Adjusted R Squared = .017)

Research Question #3 Results:

Tests of Between-Subjects Effects

Dependent Variable: active_stratgy

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	7.659[a]	9	.851	.580	.811
Intercept	469.678	1	469.678	320.108	.000
age_Nominal	1.323	4	.331	.225	.924
Q27	2.892	1	2.892	1.971	.163
age_Nominal * Q27	1.599	4	.400	.272	.895
Error	148.192	101	1.467		
Total	2459.444	111			
Corrected Total	155.852	110			

a. R Squared = .049 (Adjusted R Squared = -.036)

Dependent Variable: extractive_strtgy

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	5.064[a]	9	.563	.389	.938
Intercept	403.184	1	403.184	278.608	.000
age_Nominal	2.092	4	.523	.361	.835
Q27	.605	1	.605	.418	.519
age_Nominal * Q27	2.876	4	.719	.497	.738
Error	146.161	101	1.447		
Total	2296.667	111			
Corrected Total	151.225	110			

a. R Squared = .033 (Adjusted R Squared = -.053)

Dependent Variable: Interact_stratgy

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	9.026[a]	9	1.003	.518	.859
Intercept	657.355	1	657.355	339.285	.000
age_Nominal	2.455	4	.614	.317	.866
Q27	.743	1	.743	.383	.537
age_Nominal * Q27	4.879	4	1.220	.630	.643
Error	195.684	101	1.937		
Total	3301.889	111			
Corrected Total	204.711	110			

a. R Squared = .044 (Adjusted R Squared = -.041)

Dependent Variable: Passive_stratgy

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	15.941[a]	9	1.771	1.372	.211
Intercept	588.761	1	588.761	456.218	.000
age_Nominal	6.250	4	1.563	1.211	.311
Q27	.028	1	.028	.022	.883
age_Nominal * Q27	3.593	4	.898	.696	.596
Error	130.343	101	1.291		
Total	3069.889	111			
Corrected Total	146.284	110			

a. R Squared = .109 (Adjusted R Squared = .030)

Hypothesis #1 Results:

Descriptive Statistics

	Mean	Std. Deviation	N
Experience	4.6937	1.04266	111
Passive_stratgy	5.1321	1.15319	111

Correlations

		Experience	Passive_stratgy
Experience	Pearson Correlation	1	.177
	Sig. (2-tailed)		.063
	N	111	111
Passive_stratgy	Pearson Correlation	.177	1
	Sig. (2-tailed)	.063	
	N	111	111

Hypothesis #2*a* Results:

Descriptive Statistics

	Mean	Std. Deviation	N
Experience	4.6937	1.04266	111
soc_desire	4.7802	.77598	111

Correlations

		Experience	soc_desire
Experience	Pearson Correlation	1	.187*
	Sig. (2-tailed)		.049
	N	111	111
soc_desire	Pearson Correlation	.187*	1
	Sig. (2-tailed)	.049	
	N	111	111

*. Correlation is significant at the 0.05 level (2-tailed).

Hypothesis #2*b* Results:

Descriptive Statistics

	Mean	Std. Deviation	N
Experience	4.6937	1.04266	111
tech_desire	5.6432	.90228	111

Correlations

		Experience	tech_desire
Experience	Pearson Correlation	1	.280**
	Sig. (2-tailed)		.003
	N	111	111
tech_desire	Pearson Correlation	.280**	1
	Sig. (2-tailed)	.003	
	N	111	111

**. Correlation is significant at the 0.01 level (2-tailed).

Appendix E

Interactive strategy:

Descriptive Statistics

	Mean	Std. Deviation	N
Experience	4.6937	1.04266	111
Interact_stratgy	5.2823	1.36419	111

Correlations

		Experience	Interact_stratgy
Experience	Pearson Correlation	1	.375**
	Sig. (2-tailed)		.000
	N	111	111
Interact_stratgy	Pearson Correlation	.375**	1
	Sig. (2-tailed)	.000	
	N	111	111

**. Correlation is significant at the 0.01 level (2-tailed).

Active strategy:

Descriptive Statistics

	Mean	Std. Deviation	N
Experience	4.6937	1.04266	111
active_stratgy	4.5556	1.19031	111

Correlations

		Experience	active_stratgy
Experience	Pearson Correlation	1	.280**
	Sig. (2-tailed)		.003
	N	111	111
active_stratgy	Pearson Correlation	.280**	1
	Sig. (2-tailed)	.003	
	N	111	111

**. Correlation is significant at the 0.01 level (2-tailed).

Extractive strategy:

Descriptive Statistics

	Mean	Std. Deviation	N
Experience	4.6937	1.04266	111
extractive_strtgy	4.3964	1.17251	111

Correlations

		Experience	extractive_strtgy
Experience	Pearson Correlation	1	.146
	Sig. (2-tailed)		.125
	N	111	111
extractive_strtgy	Pearson Correlation	.146	1
	Sig. (2-tailed)	.125	
	N	111	111