KNOWLEDGE HIDING BEHAVIORS ACROSS CULTURES: A COMPARATIVE STUDY BETWEEN CHINESE AND GERMAN AUTOMOTIVE KNOWLEDGE WORKERS THROUGH THE USE OF A SERIOUS GAME

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Knowledge Hiding Behaviors Across Cultures: A Comparative Study Between Chinese and German Automotive Knowledge Workers Through the Use of a Serious Game (480 pp.)

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ABSTRACT

While knowledge sharing remains one of the primal objectives that organizations endeavor to achieve with every effort, the dominance of knowledge sharing studies in the academic world and the continuing interest among practitioners in figuring out efficient ways of amplifying knowledge sharing both indicate the abstruseness of this topic. More undesirably, organizational employees even hide what they know when they are requested for knowledge by coworkers. Knowledge hiding in organizations appears to impede knowledge sharing. However, simplifying the relationship between knowledge sharing and knowledge hiding will do no good to boost knowledge sharing and mitigate knowledge hiding in organizations, for they target different goals and are driven by different motivations.

The current study addresses the inadequacy of investigating knowledge sharing and knowledge hiding in isolation and encompasses these two constructs into a same research framework to unveil the mechanism behind these seemingly opposite behaviors. By examining the extent to which organizational employees share what they know and the strategies they use to avoid making what they know available to

others, the researcher aims to achieve a comprehensive insight into organizational employees' behavioral features when coworkers request knowledge. Interpersonal factors, situational factors, and factors concerning the attribute of the requested knowledge were taken into account for their potential impact on knowledge workers' responsive behavior. National culture was involved in the study and taken as a selection criterion when deciding on the sample source, for it shapes individuals' mindsets and behaviors.

Adopting a positivist position, this study employed a quasi-experimental design in the form of a serious game. Purposive sampling was used to access qualified participants from two automotive companies operating in China and Germany who fit the research purposes. Seventy-six knowledge workers from the Chinese automotive company and 187 from the German one represent the final sample. Testing the proposed hypotheses with SPSS, we found that Chinese (73.7%) and German (83.5%) knowledge workers demonstrated more sharing behavior than hiding in general. Further investigation into the extent to which they shared and the strategies they used to hide what they knew revealed that Chinese and German knowledge workers responded differently to requests for different types of knowledge made by different media and from different genders. Their different responses highlighted the usefulness of instant messaging to knowledge holders from both countries and the importance of relationships to which Chinese knowledge holders attached.

Our findings suggest that a simple categorization of knowledge sharing and knowledge hiding is insufficient to decode organizational employees' responses to colleagues' knowledge requests. Gender differences in knowledge holders' responses, the double-edged nature of instant messaging in the German work environment, and

reluctance among Chinese knowledge holders to share their established relationships are worth the management's due attention.

In this study, the researcher extended the research scope of knowledge hiding by developing a research framework comprising both knowledge sharing and knowledge hiding and empirically tested it with two samples from two different countries. The innovative use of a serious game as the data collection approach represents another novelty of the research. As explorative research, this study demonstrated the usefulness of this method. It helped build up the grounds for future international management research, particularly those with socially undesirable behavior as the research focus.

Keywords: Knowledge hiding, evasive hiding, playing dumb, knowledge sharing, full sharing, partial sharing, serious game, reciprocity, rank, gender differences, media richness, knowledge ownership, knowledge type, knowledge scarcity, China, Germany, cross-cultural, automotive industry

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I believe that everything happens for a reason. When life brings pain or struggle, it's often because the story hasn't yet reached its end. That end may not arrive as a perfect resolution or joyful conclusion, but more often, it reveals a deeper understanding—of people, experiences, or the world we inhabit. The past five and a half years of pursuing my Ph.D. have both tested and reaffirmed this belief. It has been a journey shaped by hardship and growth, challenges and transformation. Along the way, many people and moments have touched my life and deserve my deepest gratitude.

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CHAPTER 1

INTRODUCTION

1.1 Rationale and Problem Statement

The open and flexible business models nowadays have made it common for employees to communicate and collaborate through different means of communication than traditional face-to-face conversations. Such a situation has been further intensified in this era thanks to various reasons, e.g., the development of technology, heavy traffic in big cities, and the unexpected, such as the previous pandemic situation, which immensely confines people to their homes and enormously reduces face-to-face communications in a physical environment, even if they are not geographically scattered in a strict sense. Even with advancing communication/collaborative technologies, organizational employees nowadays could still face various challenges. Transferring and sharing knowledge across diverse boundaries is a prominent one among them.

Organizational knowledge has become the main strategic resource in today's complex and dynamic economic environment (de Pablos, 2004). How to reap the benefits of the existing knowledge within organizations has become one of the major concerns to both practitioners and academics. Knowledge sharing studies were found to have overwhelmed knowledge management literature (Abraham & Baral, 2018; Issac et al., 2021). However, the progress of studies on knowledge sharing has surfaced that research endeavor devoted to the sharing behavior alone does not guarantee the occurrence of knowledge transfer (Stenius et al., 2016). In some cases,

organizational employees withhold their knowledge (Webster et al., 2008) or even deliberately hide what they know when confronted with a knowledge request (Connelly et al., 2012). A systematic literature review conducted in this study, which is based on three well-acknowledged and influential databases (i.e., Scopus, Web of Science, and ProQuest) in the academic world depicts an ascending trend of knowledge hiding studies, further validating the prevalence of knowledge hiding behavior and demonstrating it as a promising research avenue.

Even though knowledge hiding is a newly emerged concept, the withholding knowledge phenomenon in the workplace has drawn research attention since long ago. Mechanic (1962) argued that withholding expert knowledge and providing incorrect information foster low-ranking participants' obtainment of power because these behaviors induce dependence, which in return potentially sabotages the organization's interests. A recent article has confirmed the detrimental effect by revealing that failing to share knowledge cost Fortune 500 companies US $31.5 billion a year (Babcock, 2004 as cited in (He, 2013)). In 2018, the losses associated with knowledge hiding behavior were reported to cost American organizations up to US$ 47 million in productivity (Nguyen et al., 2022).

Knowledge hiding has been verified as a prevalent phenomenon in the workplace (Connelly et al., 2012). The existence of knowledge hiding behavior within organizations provides an explanation for the inadequacy of a sole focus on knowledge sharing research to generate effective strategies for promoting sharing behavior among organizational employees. According to the two-factor theory, knowledge sharing and withholding are conceptually distinct constructs rather than positioned at the opposite ends of the same continuum (Kang, 2014). Therefore, in

organizational settings, knowledge withholding will not be eliminated by enhancing strategies to encourage knowledge sharing, as knowledge sharing will not necessarily be achieved by curing the symptoms of knowledge withholding. Failing to be aware that knowledge sharing and knowledge withholding are separate constructs could probably lead to strategy confusion and, hence, failure to realize optimal knowledge sharing in an organizational setting.

Knowledge sharing constituted a fundamental goal during work process in product development groups that can hardly be compromised without hurting every individual (Evans et al., 2015). Correspondingly, an underlying assumption behind knowledge hiding is that employees view knowledge as a limited resource that could be lost when shared (Bhattacharya & Sharma, 2019; Khalid et al., 2018; Tsay et al., 2014; Webster et al., 2008). It, therefore, makes sense to share some insignificant or incomplete knowledge to show compliance with the organizational norms while keeping the crucial piece(s) to maintain one's competitiveness and sustainability when one is requested knowledge by colleagues.

Shared antecedents exist, which influence knowledge sharing and knowledge hiding behavior. For example, knowledge, social, and task work characteristics all exert influence on knowledge sharing and knowledge hiding behaviors via affecting motivations (Gagné et al., 2019). When confronted with a knowledge request, an individual's decision to share or to hide their knowledge is driven by complex and, in some cases, opposite mechanisms (Bhattacharya & Sharma, 2019; Liu et al., 2020). It is nonetheless critical for management to opt for both strategies fostering knowledge sharing and the ones suppressing the occurrence of knowledge hiding behavior to achieve the ultimate knowledge sharing objective (Abubakar et al., 2019). Whereas it

is equally significant for academics and researchers to devote serious attention to uncovering the underlying mechanisms that promote knowledge sharing and those that contain knowledge hiding.

Despite the importance of taking prudence in integrating relevant theories into examining non-sharing behaviors addressed by Anaza and Nowlin (2017) and the suggestion proposed by Pan and Zhang (2018) that fresh perspectives are desired to enhance our understanding of knowledge hiding, it is noteworthy that some theories that are extensively employed in knowledge sharing studies are also widely adopted in studying knowledge hiding, such as social exchange theory, social cognition theory, social capital theory, etc. (Sun et al., 2015) as cited in (Pan & Zhang, 2018). Nevertheless, the novelty of the knowledge hiding construct and its apparent relatedness to knowledge sharing make it spontaneous for knowledge hiding studies to widely draw on those theories. Those studies did generate findings that could prove the usefulness of those theories in explaining the occurrence of knowledge hiding.

Knowledge resides within the individual, and its transfer often requires direct communication between individuals (Hislop, 2002) as cited in (Webster et al., 2008). Yet individuals can simultaneously be members of various groups (Burke & Barron, 2014). Project teams may find it easy to fall victim to knowledge hiding behavior as the interpersonal relationships among individuals working in such teams are fragile, owing to their cross-functionality and geographically dispersed nature (Zhang & Min, 2019). It has been established that knowledge hiding does occur in a team setting (Babič et al., 2019). However, we are still in the dark about whether it follows the same mechanism if the communication means vary; for example, do people hide what

they know when asked for knowledge via email, video conferencing, or instant messaging instead of through a face-to-face request?

Cross-cultural research in various disciplines is gaining important value in the increasingly integrated world. Babič et al. (2018) have evidenced that scrutinizing organizational behavior from the cultural perspective is of great value by establishing that perceived cultural tightness and uncertainty avoidance are tightly related and negatively associated with knowledge hiding. Also, recent studies started to recognize the impact of cultural diversity on knowledge management (Khan & Khan, 2015). Jackson et al. (2012) underscored the necessity of conducting a study that crosses various country boundaries, rather than a limited few, to obtain a genuine representation of the cultural variations and how they affect knowledge sharing. In knowledge sharing and knowledge transfer literature, cultural dimensions proposed by Hofstede and Hofstede (2005) have been studied extensively across diverse cultures (Asrar-ul-Haq & Anwar, 2016). Regarding knowledge hiding, literature documented that the degree of perceived appropriateness of conducting knowledge hiding might be owed to the culture of the country where the R&D team is located (Xiong et al., 2019).

1.2 Objectives of the Study

Based on the research status of the topic “knowledge hiding” and to adequately address the insufficiency of examining this behavior in isolation, this study is to be conducted to fulfill the following objectives:

Objective 1: To examine the influence of reciprocity history between the knowledge holder and the knowledge seeker on knowledge holders' responses (knowledge sharing and knowledge hiding) to the request for knowledge.

Previous studies have demonstrated that employees adopt different knowledge management behaviors (e.g., knowledge sharing or knowledge hiding) based on their orientations to different objectives (Rhee & Choi, 2017). The mechanisms can function in a complex way in an individual's decision-making process when they are in a to-share-or-to-hide dilemma. For example, two opposing feelings (i.e., feeling obliged to share knowledge and feeling envied) that are generated from high workplace status influence knowledge hiding in opposite ways in that feeling obliged limits knowledge hiding, whereas feeling envied increases it (Liu et al., 2020).

Therefore, this study intends to further investigate such opposite mechanisms that drive knowledge sharing and knowledge hiding, however, by drawing on well-established theories that are prevalently applied in deciphering knowledge sharing and knowledge hiding behaviors. Social exchange theory is one of those theories identified by the author's literature review as the most frequently adopted theoretical lens in knowledge hiding studies.

Objective 2: To investigate the influence of situational factors, i.e., rank, gender of the knowledge seekers and communication media used to request knowledge, on knowledge holders' responses (i.e., knowledge sharing and knowledge hiding) to requests for knowledge

Knowledge seeker's rank is taken as another influencing factor to be investigated, for previous literature informs that individuals displace their aggression induced by antisocial leadership styles, for example, abusive supervision, and hide

knowledge from their peer coworkers (Khalid et al., 2018; Pradhan et al., 2019). However, whether any difference exists in individuals' responses to a knowledge request from a coworker and a leader/supervisor remains unknown.

The gender of the knowledge holder was usually treated as a control variable in extant studies for the potential effect it might exert on knowledge holders' hiding behavior (Good et al., 2022; Huo et al., 2016; Yao et al., 2020; X. Zhang et al., 2021; Y. Zhang et al., 2021; Zhao & Jiang, 2021). The limitations of treating gender as a control variable in knowledge hiding studies were fully acknowledged by (Andreeva & Zappa, 2023) with the support of social role theory, backlash theory, and role congruity theories. According to the social role theory, men and women have different behavioral patterns that are influenced by social structure and social expectations (Andreeva & Zappa, 2023). Therefore, it is worth the effort to dig into the potential effect of gender on knowledge holders' responses to requests from colleagues if we need to expand our understanding of the focal behavior.

To respond to the previous call for exploring the contextual factors that might exercise influence on knowledge hiding (Connelly et al., 2012), this study will draw on media richness theory to examine if media with different richness (i.e., email, video conferencing, and instant messaging) will lead to organizational employees' different responses (i.e., knowledge sharing and knowledge hiding) to knowledge requests.

Objective 3: To investigate the influence of the factors that concern knowledge nature, i.e., knowledge ownership, knowledge type, and knowledge scarcity, on knowledge holders' responses (i.e., knowledge sharing and knowledge hiding) to requests for knowledge

Psychological ownership theory and conservation of resources theory are other theories widely used in explaining knowledge hiding incidents. However, they were mostly taken as the theoretical lenses for the researchers to propose their hypotheses. Considering the high relevance of those theories in knowledge-hiding studies, we developed independent variables in our study and manifested the essence of the two theories, "knowledge ownership" and "knowledge scarcity," respectively. While "knowledge ownership" concerns the knowledge holders' ownership of the requested knowledge acquired with a significant investment of time and effort, "knowledge scarcity" addresses knowledge holders' perceived value of the requested knowledge owing to its limited access.

By "knowledge type", we intend to deal with three common types of knowledge in work settings, i.e., documents, experience, and relationships, with the purpose of inquiring into the potential impact exerted by the different levels of complexity, codifiability, and exclusiveness of the three types of knowledge.

Objective 4: To investigate if individuals from different national cultures respond differently (to share or to hide knowledge) when requested for knowledge under various defined situations

The fact that knowledge hiding was mostly studied in a specific cultural context heavily limits the generalizability of the extant research findings. To obtain a more comprehensive insight into knowledge hiding and generate more generalizable research results, the researcher gives due consideration to the impact of national culture and invites participants from different cultural backgrounds to join the study. Furthermore, more distinctiveness between the two behaviors will be revealed by

comparing knowledge sharing and knowledge hiding behavior and their relationships to possible antecedents across cultures.

Objective 5: To explore the use of quasi-experimental design (in the form of a serious game) in investigating knowledge holders' responses (i.e., knowledge sharing and knowledge hiding) to requests for knowledge

A recent review reported that only a limited number of business and management studies have involved experimentation (Zellmer-Bruhn et al., 2016), mainly due to the impossibility of randomizing the samples in studies on international business subjects (Bartel-Radic, 2019). A small ratio of experimental designs is also the case in knowledge hiding studies – a systematic literature review on knowledge hiding conducted by the author reveals that only seven studies, out of the total 117, have employed experimental designs, representing a tiny proportion of 6%. To address this gap, this study takes advantage of a quasi-experimental design to study the relationships between the variables of interest.

1.3 Research Questions

Based on the latent research gap surfaced by the systematic literature review on knowledge hiding the author conducted for this project, this study seeks to answer the following research question:

How do reciprocity history, rank, and gender influence the responses of the knowledge workers in Automotive companies in China and Germany to knowledge requests made via various communication media by colleagues?

This research question can be broken down into more specific sub-research questions:

SRQ 1: To what extent does the *reciprocity history* between the knowledge holder and the knowledge seeker influence the knowledge holders' responses to the knowledge request?

SRQ 2: To what extent does *the knowledge seeker's rank* influence knowledge holders' responses to the knowledge request?

SRQ 3: To what extent does *the knowledge seeker's gender* influence the knowledge holders' responses to the knowledge request?

SRQ 4: To what extent does *the richness level of a communication media* used for requesting knowledge influence knowledge holders' responses to the knowledge request?

SRQ 5: To what extent does *the investment level of the requested knowledge* influence knowledge holders' responses to the knowledge request?

SRQ 6: To what extent does *the type of the requested knowledge* influence knowledge holders' responses to the knowledge request?

SRQ 7: To what extent does *the scarcity level of the requested knowledge* influence knowledge holders' responses to the knowledge request?

SRQ 8: To what extent do individuals' responses to knowledge requests differ from *culture* to culture?

1.4 Significance of the Study

This study contributes to the knowledge hiding literature, first by addressing interpersonal, situational, and factors concerning knowledge nature, which are rarely

empirically tested in previous knowledge hiding studies yet highly relevant to the topic. In addition, this study extends the research context of knowledge hiding to a cross-cultural scope. Apart from providing insight into how to reduce negative work behavior within specific organizations in a particular national culture, the findings of this study generate a better understanding of knowledge hiding and support strategies devise to help contain this undesirable behavior across cultures in general. Moreover, existing studies have inspected knowledge hiding behavior from either the employee-coworker or the leader/supervisor-follower/subordinate interaction perspective. In contrast, this current study contributes to the knowledge hiding literature by investigating the occurrence of knowledge hiding in both horizontal (between team members) and vertical/hierarchical (between a supervisor and a subordinator) interactions within an organizational context. Last but not least, the study endeavors to dig into the extent to which the same antecedent predicts separate knowledge-strategies, addressing the gap that little research attention has been devoted to separate dimensions of knowledge hiding, hence providing more in-depth knowledge about this behavior.

Secondly, this study contributes to cross-cultural organizational behavior research by involving participants operating in automotive industries from two different national cultures. By doing this, the author also strives to respond to the previous call for a larger sample of working professionals from a greater number of cultures to gain a more accurate and comprehensive insight into the influence of cultural mechanisms and values on the occurrence of knowledge hiding (Babič et al., 2018).

The third contribution is made by encompassing knowledge sharing and knowledge hiding in the same study. Few studies have attended to these two behaviors together (see (Ali et al., 2020) and (Gagné et al., 2019) for exceptions). The reason can be attributed, firstly, to the belief that the occurrence of one naturally manifests the unlikelihood of the other's emergence. However, knowledge sharing and knowledge hiding are two distinct and separate behaviors instead of positioned at the two ends of the same continuum (Kang, 2014). Therefore, each deserves adequate attention and investigation. Secondly, the novelty of the knowledge hiding concept represents another reason why research comprising both knowledge sharing and knowledge hiding is rarely seen. Even though continuous progress has been achieved in this infant research stream, limited investment of research endeavors, set by its novelty, has not yet generated conclusive research findings that could build sufficient confidence in researchers to combine the two constructs in a single study. Having both knowledge sharing and knowledge hiding in the same study helps uncover the myth of the mechanisms behind these two behaviors, facilitating our understanding of the possible similarities, differences, or overlaps of those working mechanisms.

Fourthly, this study represents an endeavor to utilize a quasi-experimental design not only in knowledge sharing and knowledge hiding studies but also in international business and management research. The employment of quasi-experiment as the research method and serious game as the data collection approach makes this study one of the pioneers in knowledge hiding studies in terms of research method and contributes to the gradually increasing number of international business and management research that employs this type of design.

For practitioners, findings generated from this study will assist them with devising appropriate human resource management practices by facilitating their understanding of the situations under which people are more likely to share knowledge and raising their consciousness of circumstances that potentially engender employees' knowledge hiding behavior, particularly in organizational settings. The cross-cultural comparison of knowledge sharing and knowledge hiding behaviors will benefit organizations that operate in the studied cultural environments, in the automotive industry in particular, and those that need to cooperate with partners from those cultural backgrounds to optimize the management of knowledge.

1.5 Definition of Terms

Knowledge Request Response refers to knowledge holders' responses to requests for knowledge, whose sub-levels are knowledge sharing and knowledge hiding.

Knowledge Sharing is the act of making knowledge available to others within the organization (Ipe, 2003). Two sub-levels of knowledge sharing are full sharing and partial sharing. *Full sharing* takes place when "the informer gives all the knowledge they feel is relevant to the recipient; relevant knowledge is not withheld for whatever reason; and there is very open communication", while *partial sharing* occurs when "only some relevant knowledge and restrictions on the knowledge to be shared (either due to confidentiality, or risk to the informer or organization)" (Ford & Staples, 2010, pp. 395,396).

Knowledge Hiding is "an intentional attempt by an individual to withhold or conceal knowledge that has been requested by another person." (Connelly et al., 2012,

p. 65) The three dimensions of knowledge hiding are *playing dumb*, "whereby the hider pretends to be ignorant of the relevant knowledge"; *evasive hiding,* where "the hider provides incorrect information or a misleading promise of a complete answer in the future, even though there is no intention to actually provide this"; and *rationalized hiding*, where "the hider is offering a justification for failing to provide requested knowledge by either suggesting he or she is unable to provide the knowledge requested or by blaming another party" (Connelly et al., 2012, pp. 75,76).

Reciprocity History is drawn on social exchange theory, referring to the previous interpersonal interactions between the knowledge holder and the knowledge seeker. Guided by the norm of reciprocity, social exchange is about the quality of the interpersonal relationships between individuals. Four sub-levels attended to in the current research context are *positive reciprocity*, *negative reciprocity*, *positive and negative reciprocity*, and *no reciprocity*.

Communication Channel Richness is based on the media richness theory, which theorizes that communication media vary markedly in their capacity to process information (Daft & Lengel, 1986). Rich media are those that are personal and involve face-to-face contact, facilitating equivocality reduction through rendering managers capable of overcoming different frames of reference and processing complex and subjective messages; media of lower richness refers to those that are impersonal and depend on rules, forms, procedures, or data bases, processing fewer cues and constraining feedback, and less appropriate for settling equivocal matters (Daft & Lengel, 1986). *Email*, *video conferencing*, and *instant messaging* are media involved in the current study for their different degrees of synchronicity and information cue density.

Knowledge Ownership is based on the psychological ownership theory. It refers to the knowledge holder's feeling of attachment to knowledge at work growing with the increase in the investment of the self they make in acquiring it. It umbrellas two sub-levels, i.e., *minimum investment* and *substantial investment*.

Knowledge Type concerns the complexity, codifiablity, and exclusiveness of the requested knowledge. Three types of knowledge involved in the study are *experience*, *documents*, and *relationships*.

Knowledge Scarcity is developed from the conservation of resources theory, addressing knowledge holders' sense induced by the belief that knowledge is a limited resource that will be lost when it is shared. Therefore, an individual is likely to reserve the knowledge of a *high-level scarcity* while being easy with the knowledge of a *low-level scarcity*.

Culture in the context of this study refers to national culture, "the collective programming of the mind that distinguishes the members of one group or category of people from others." (Hofstede & Hofstede, 2005, p. 6)

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction to Research Domains

The primary objective of the current study is to answer the research question – How do reciprocity history, rank, and gender influence the responses of the knowledge workers in Automotive companies in China and Germany to knowledge requests made via various communication media by colleagues?

Knowledge Management (KM) consists of managing the various knowledge flow sub-processes (knowledge acquisition, dissemination, storage, sharing, and application). Major KM benefits include fostering innovation (Ali et al., 2020), serving strategy devising, providing timely solutions, diffusing best practices, enabling organizations to stay ahead of the competition, and building a knowledge repository within the organization (Dalkir, 2017). For individual employees, KM helps with decision-making and problem-solving, developing a sense of bonding, keeping organizational members up to date, and creating challenges and opportunities to make a contribution (Dalkir, 2017). However, KM processes could be disrupted by limited knowledge flow that results from employees' propensity to withhold knowledge.

The important role played by knowledge sharing in organizational survival and thriving has made it a well-studied construct in both knowledge management and organizational behavior literature. Since the mid 90's, the explosion of knowledge sharing studies has been witnessed by KM researchers and practitioners (Alnaimi &

Rjoub, 2019). The KM research field was found to have been overwhelmed by studies on knowledge sharing (Abraham & Baral, 2018; Issac et al., 2021). Despite the recognized benefit of knowledge sharing and efforts invested to make it happen, it is not always the case that employees share what they know with others. The discretionary and voluntary nature of knowledge sharing (Nonaka, 1994) determines that it can neither be coerced to happen nor be driven by individuals' persistent willingness as an altruistic act. It occurs only when an individual makes up their mind to disclose.

Increasing evidence substantiates the fact that people do not cohesively share knowledge. The incidences of not sharing could occur when employees do not recognize the demand for knowledge (Silva de Garcia et al., 2020) or when they do not dedicate all possible effort to provide knowledge to others (Lin & Huang, 2010). The latter circumstance, which represents a specific form of effort withholding (Tsay et al., 2014), umbrellas two separate forms of withholding behavior, that is, knowledge hoarding and knowledge hiding (Webster et al., 2008). While knowledge hoarding captures the accumulation of knowledge that has not necessarily been requested, knowledge hiding represents a more undesirable case where employees purposively withhold or conceal their knowledge even when confronted with a request from coworkers (Connelly et al., 2012; Webster et al., 2008). Similarly, Kang (2014) categorized knowledge withholding into two separate behaviors: unintentional hoarding and intentional hiding of knowledge. The unintentional cases are formed when withholding effort is performed habitually without the withholder's extra awareness, and intentional cases are those where the withholder consciously reserves their effort (Wang et al., 2014).

There is a growing recognition that the implementation of organizational strategies/systems devised to foster knowledge sharing alone is not sufficient to make knowledge sharing a spreading practice within an organizational environment (Abubakar et al., 2019; Anaza & Nowlin, 2017; Serenko & Bontis, 2016; Xiao & Cooke, 2018). A potential paradox existing in knowledge management is that in organizations, the mechanisms that encourage knowledge sharing may simultaneously trigger knowledge withholding by raising employees' awareness of the value and relevance of the demanded knowledge (Evans et al., 2015). Furthermore, the uniqueness of the knowledge one possesses creates a specific status (e.g., irreplaceability or indispensability) for this individual, and further solidates their base in the organization by enhancing coworkers' dependency on them (Webster et al., 2008).

For many people, knowledge is power. Whether to satisfy collective interest by contributing to the public knowledge repository or to maintain one's own employment and status in the organization by sustaining one's exclusive control of knowledge represents a social dilemma of knowledge sharing (Connelly & Zweig, 2015; Rhee & Choi, 2017). Such a dilemma involves the motivational tension experienced by employees (Haas & Park, 2010; Rhee & Choi, 2017), making it a complicated decision for them to make as to whether to share their knowledge in the workplace or not. Taking into account the cost of sharing knowledge and the benefits of not sharing it, it is highly possible that individuals resort to behaviors that benefit themselves but are unhelpful or even damaging to others or to the organization. Knowledge hoarding, knowledge hiding, and knowledge withholding were identified as not sharing practices, acting as the barriers impeding knowledge sharing (Anand et al., 2020).

Considering the detrimental effect these practices may cause, it is timely and relevant to zoom in on this newly emerging research stream.

Cultural differences may contribute to the generation of different understandings of a same concept (e.g., organization) and various assumptions and expectations about how people think and act (Trompenaars & Hampden-Turner, 2011). Moreover, cultural differences influence organizational behavior, especially of those who work in teams (Cox, Lobel. & McLeod, 1991 as cited in (Babič et al., 2018)). Scrutinizing organizational behavior from the cultural perspective is of great value in that the two are tightly related (Babič et al., 2018). With that said, it will be promising to delve into the impact of national culture on organizational employees' knowledge hiding behavior.

2.2 Systematic Literature Review

A systematic literature review (SLR) was conducted in an effort to capture the panorama of the research stream. An SLR satisfies the expectation of scholarly rigor and ensures comprehensiveness by including all relevant literature (Okoli & Schabram, 2010). To ensure transparency and completeness of reporting, a strict PRISMA process has been followed.

Three academic journal databases, Scopus, Web of Science, and ProQuest, were used for identifying and retrieving relevant publications for their widely recognized credibility among the academic community. By retrieving publications from three different well-acknowledged and influential databases, the author intends to obtain a more comprehensive view of knowledge hiding studies than review studies that are based solely on literature taken from one source or rely on sources that do not

particularly differentiate the quality of the articles or the journals where they are published. To achieve a precise search result, publications need to satisfy certain criteria, as shown in Table 2.1, to be included for further analysis.

Table 2.1

Criteria for Retrieving Journal Articles

1	published until July 2020
2	went through peer review process
3	published in English language
4	encompassing the search words "knowledge hid*, "knowledge hoard*", "knowledge conceal*", and "knowledge withhold*" in the full text
5	involving no such words like "data mining", "algorithm", "itemset", and "machine learning", considering their relevance to other subject areas than business and management, for example, computer science
6	not published in subject areas irrelevant to knowledge management, such as computer science, engineering, economics, biochemistry, environmental studies and the like
7	in the type of both articles and conference proceedings

A query example demonstrating these criteria used for retrieving publications in Scopus is as follows:

TITLE-ABS-KEY(("knowledge hid*" OR "knowledge hoard*" OR "knowledge conceal*" OR "knowledge withhold*") AND NOT("data mining" OR "algorithm" OR "itemset" OR "machine learning")) AND (EXCLUDE (SUBJAREA,"COMP") OR EXCLUDE (SUBJAREA,"ENGI")) AND (EXCLUDE (SUBJAREA,"ECON") OR EXCLUDE (SUBJAREA,"MEDI") OR EXCLUDE (SUBJAREA,"BIOC") OR EXCLUDE (SUBJAREA,"ENVI") OR EXCLUDE (SUBJAREA,"MATH")) AND (LIMIT-TO (LANGUAGE,"English")) AND (EXCLUDE (SUBJAREA,"EART") OR EXCLUDE (SUBJAREA,"NURS") OR EXCLUDE (SUBJAREA,"PHYS")) AND (LIMIT-TO (DOCTYPE,"ar") OR LIMIT-TO (DOCTYPE,"cp"))

Similar queries that were in accordance with the specific search settings in Web of Science and ProQuest were applied respectively to search publications in the two databases. In total, 393 articles were retrieved, with 118 of them from Scopus, 137 from Web of Science, and 138 from ProQuest. After removing duplicates, the number was reduced to 306. The author then screened the title and abstract, further excluded 145 of them that were not related to knowledge management, 38 in which knowledge hiding, knowledge hoarding, or knowledge withholding was not involved as a main variable, 2 editorials, and 1 research summary, leaving the number to be 120. Of these eligible 120 articles, the full text of 3 was not accessible. Therefore, 117 articles constituted the final dataset for further analysis. See Figure 2.1 for the PRISMA flow diagram, an evidence-based living document covering concepts and topics relevant to any systematic review (Moher et al., 2010) that demonstrates the flow of information through the phases of this systematic review. It maps out the number of research articles identified, included, and excluded, and the criteria for exclusions.

Figure 2.1

PRISMA Flow Diagram (Process of Article Selection)

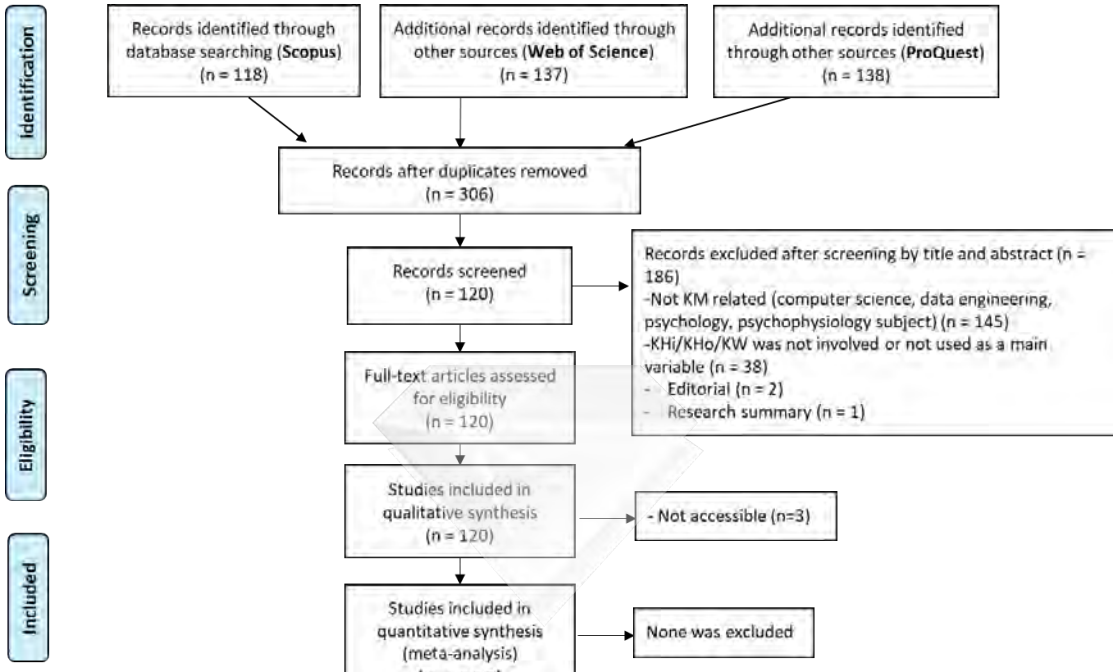
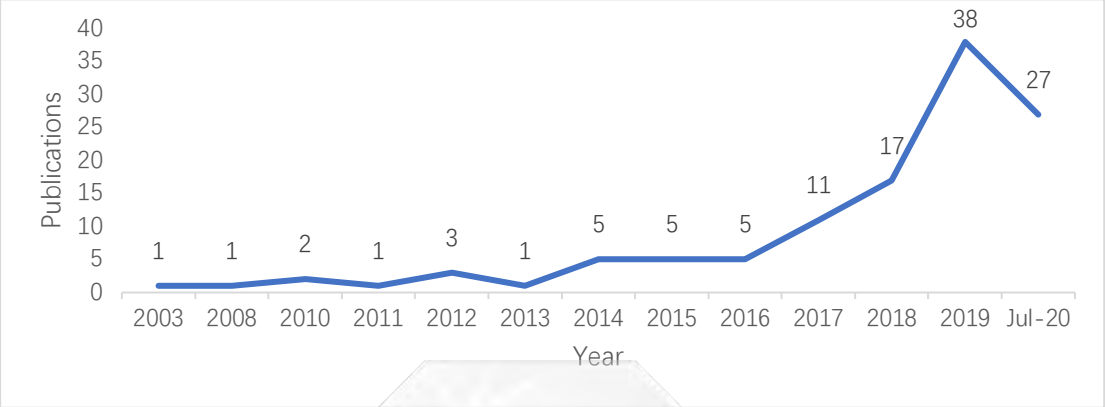


Figure 2.2 illustrates an increasing trend of research interest in the topic by presenting the number of publications on the topic in an ascending curve from the year 2003 and with a sharp increase in the year 2019. It is highly possible that the curve is still in an uptrend, given that the number of published articles has already greatly outgrown half of that of the previous year by the time of July 2020, when the publications were collected. This further confirms that knowledge hiding is a promising research stream. One thing that needs to be stressed is that when structuring queries for retrieving related articles, we left the beginning year not set. That the first research article on knowledge hiding was published in the year 2003 well indicates the novelty of this concept.

Figure 2.2

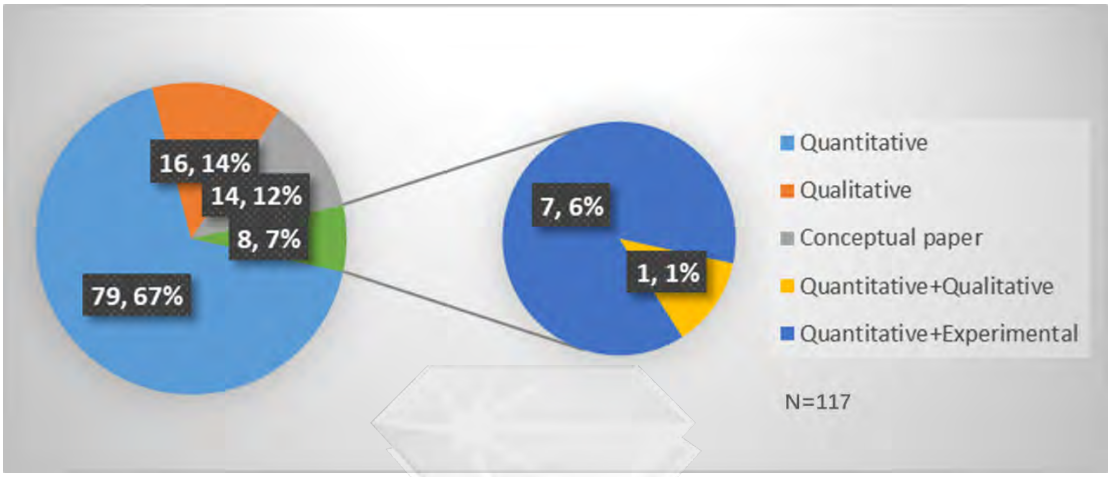
Research Trend Shown by Publication Year of Relevant Articles



An initial examination of the research method of these articles showed that of the final 117 articles, 14 were conceptual papers, occupying 12% of the total number; 79 could be categorized into quantitative research, accounting for 67%; 16 qualitative, constituting 14%; and among the rest eight articles that employed mixed-method, which represented 7%, one involved statistical analysis and interviews, the other seven were a combination of quantitative methods and experiments. It is worth mentioning that only seven articles of the total 117, securing a tiny percentage of 6%, implemented an experimental research design, while six out of the seven studies recruited students as participants. The small percentage of experimental design in conjunction with the absolute dominance of the student sample in these studies exhibits a potential research gap in knowledge hiding as a research topic. Figure 2.3 presents the research method used in these retrieved articles.

Figure 2.3

Research Methods Used in the 117 Publications



The overwhelming proportion of quantitative studies may be attributed to the fact that by employing a quantitative approach, the researcher is able to involve a large research sample and achieve more generalization of research results (Queirós et al., 2017), given that data collection can be faster and easier by administering via online surveys to reach thousands of potential respondents. In addition, it is cost-effective to conduct quantitative research in terms of budget and time, and it is easier to calculate the degree of association between variables with statistical method as compared to a qualitative approach (Queirós et al., 2017). However, the inherent shortcomings of quantitative methods, such as lack of ability to infer cause-effect correlation and to provide a conclusive reason for any correlation between variables, need to be taken into consideration when future studies dive into the topic.

Figure 2.4

Articles Sorted by Journals

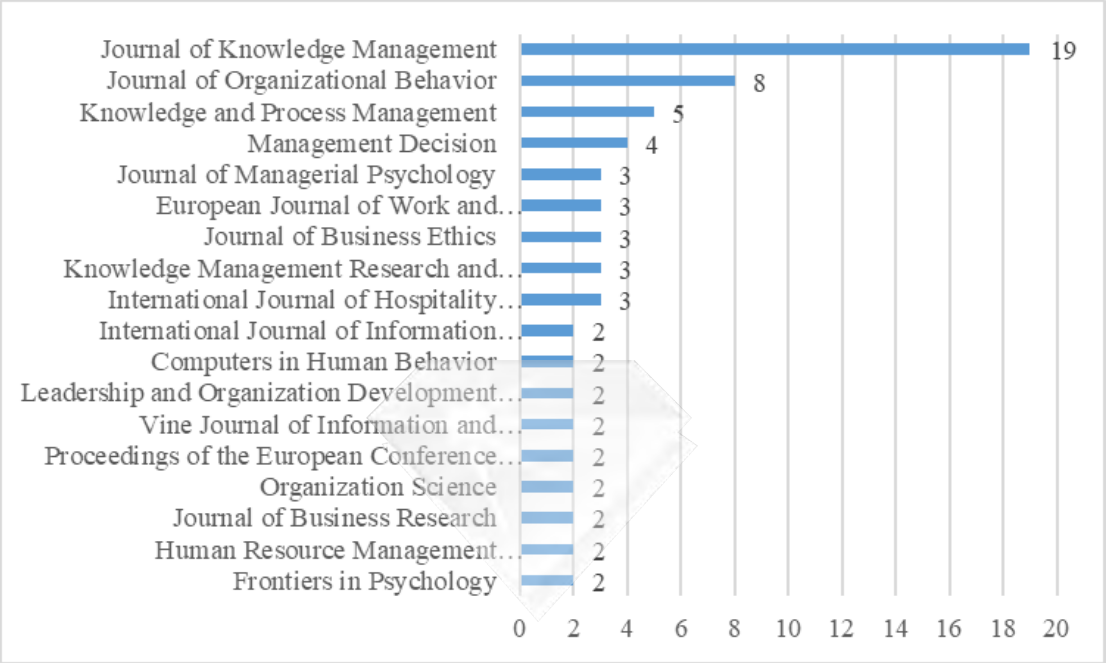


Figure 2.4 exhibits the journals in which the articles were published. Journals that published at least two related articles are included in the figure presentation. It shows that *Journal of Knowledge Management*, *Journal of Organizational Behavior*, and *Knowledge and Process Management* are the top three journals in terms of the number of publications on knowledge hiding they have published. Table 2.2 further displays the journal ranking and subject areas of the journals that published the most research papers on knowledge hiding. The top three subject areas are Management of Technology and Innovation, Applied Psychology, and Business, Management and Accounting. That most of the articles (55 out of 69) were published in Q1 journals adequately reveals the interest of the academic world in probing into this novel

concept as well as the value and significance of unveiling this behavior in organizations.

Table 2.2

Journal Ranking by Subject Areas

Subject Areas	Journal Ranking					Number of Articles	Number of Journals
	Q1	Q2	Q3	Q4	Not yet assigned Quartile		
Strategy and Management	3					3	1
Psychology (miscellaneous)	2					2	1
Organizational Behavior and Human Resources				2		2	1
Marketing	2					2	1
Management of Technology and Innovation	21		5			26	3
Decision Sciences					2	2	1
Computer Networks and Communications		2				2	1
Business, Management and Accounting	6					6	2
Business and International Management		3				3	1
Arts and Humanities (miscellaneous)	5					5	2
Artificial Intelligence	2					2	1
Applied Psychology	14					14	3
Total Number	55	5	5	2	2		

Note. Journal ranking is based on Scimago Journal & Country Rank

Further analysis of the articles provides us with more insight into this research stream. In spite of the existence of shared motivations (e.g., maintaining personal interests (Feng & Wang, 2019)) and outcomes (e.g., obstructing knowledge sharing (Qureshi & Evans, 2015)) and the fact that the terms “hoarding”, “hiding”, and “withholding” are used interchangeably (Anand et al., 2020) when researchers referring to not-sharing behaviors, the consensus that knowledge sharing and not sharing are separate behaviors seems to have been reached (Kang, 2014; Pan & Zhang, 2018; Stenius et al., 2016). In other words, there lie conceptual differences between these terms/concepts. Fundamental differences between these constructs are

to be discussed in greater detail in the following section that fully explicates the concept of knowledge hiding.

2.3 Knowledge Hiding

2.3.1 The Prevalence of Knowledge Hiding

Knowledge hiding is a widely observed behavior in organizations, prevailing across various settings (Connelly et al., 2012), and it was recognized as the biggest obstacle impeding organizational learning and the development of human resources (Issac et al., 2021). However, it is regarded as a convention and an understandable practice if the knowledge being hidden is not indispensable for the smooth operation of the team (Xiong et al., 2019), indicating an easy opportunity for employees to engage in such behavior.

Connelly et al. (2012) reported a 10 percent hiding incidents of the total knowledge transfer events from an event-based study in which employees from an organization had been asked to report on knowledge transfer events on a daily basis for five consecutive days and suggested that the employees might have under-reported their hiding incidents given the social undesirability of this behavior. The growing number of ongoing studies into this phenomenon further confirmed its existence and pervasiveness. Despite that it is a low base rate event, the economic loss it brings about can be tremendously huge. It is reported that failing to share knowledge results in a loss of at least $31.5 billion a year for Fortune 500 companies (Babcock, 2004 as cited in (He, 2013)) and that the losses associated with knowledge hiding cost American organizations up to US$ 47 million in productivity in 2018 (Nguyen et al., 2022).

Acknowledging knowledge hiding is important for organizations to devise processes and strategies to manage this phenomenon (Chang et al., 2020). Given its prevalence and the costly price it generates, it is of great significance to understand what factors will give rise to knowledge hiding and how such factors affect knowledge hiding in work settings.

2.3.2 The Uniqueness of Knowledge Hiding

2.3.2.1 Knowledge Hiding. Following the logic of the argument that positive behavior constructs are not the opposite of negative behavior constructs (Lin & Huang, 2010), knowledge hiding and knowledge sharing are neither the opposite sides of a coin (Arain et al., 2019) nor positioned at the opposite poles of a same continuum (Connelly et al., 2012). Rather, they are sharply distinct from each other in that knowledge sharing can be directed both towards an organization, driven by the feeling of responsibility, and towards an individual coworker, motivated by the feeling of altruism and prosocial intentions. In striking contrast, knowledge hiding focuses on one's self and is triggered by the feeling of egoism and self-focused intentions accompanied by a calculated assessment of the costs and benefits of taking or not taking the action (Connelly et al., 2012; Serenko & Bontis, 2016). It is, therefore, the motivation behind the two constructs and the focus of the behavior that conceptually distinguish them (Connelly et al., 2012; Serenko & Bontis, 2016). Empirically, items of knowledge sharing and knowledge hiding were proved to have loaded on two distinct factors and exhibited good discriminate validity (Connelly et al., 2012).

Extant knowledge hiding literature extensively addressed it as a manifestation of unethical (Belschak et al., 2018; Butt, 2020b; Serenko & Bontis, 2016), deviant

(Alnaimi & Rjoub, 2019; Peng et al., 2019; Singh, 2019), self-serving (Jahanzeb et al., 2019) acts, or a form of counterproductive knowledge/workplace behavior (Fong et al., 2018; Irum et al., 2020; Malik et al., 2019; Serenko & Bontis, 2016), highlighting its capability of causing damaging effects at work settings. However, all these labels actually represent an overwhelming bias of Connelly et al. (2012)'s seminal work that argued that knowledge hiding was not necessarily a negative behavior and that it could also be triggered by positive intentions and yield desirable outcomes (Connelly, 2012). It is, thus, of necessity to revisit the concept and the argument proposed by Connelly et al. (2012), who first crystalized knowledge hiding as "an intentional attempt by an individual to withhold or conceal knowledge that has been requested by another person," (p. 65), and distinguished it from other conceptually related constructs. Although there exists some overlap among these concepts, the fundamental distinctiveness between them and the uniqueness of knowledge hiding should be properly addressed.

By definition, two prerequisites of knowledge hiding have to exist for knowledge hiding to occur. First, knowledge hiding is driven by subjective factors instead of objective constraints (Xiao & Cooke, 2018), that is, an intentional attempt. Second, it occurs only when there is a second person requesting some knowledge (Silva de Garcia et al., 2020; Xiao & Cooke, 2018). The first prerequisite distinguishes knowledge hiding from lack of sharing, which can be driven by the absence of the demanded knowledge (Connelly et al., 2012). Although the two constructs could appear quite similar behaviorally, they are strikingly different from each other. Therefore, knowledge hiding excludes cases where an organizational member fails to make knowledge available to others by mistake or by accident

(Connelly et al., 2012). The second prerequisite separates it from knowledge hoarding. The distinction between knowledge hiding and knowledge hoarding will be discussed in detail in the next section.

Another important characteristic of knowledge hiding behavior that differentiates it from several other related constructs is that knowledge hiding does not involve any intention to cause harm. While the employee who engages in counterproductive workplace behavior, workplace aggression, social undermining, and work incivility harbors the intention to bring a harmful effect to either the organization or individuals, the one who chooses to hide knowledge does not necessarily intend to harm others. Conversely, in some cases, individuals may perform knowledge hiding to protect themselves or someone's feelings or to preserve the confidentiality of the knowledge (Connelly et al., 2012). Furthermore, knowledge hiding distinguishes itself from other related constructs by being multi-dimensional. The three dimensions of knowledge hiding are playing dumb, evasive hiding, and rationalized hiding (Connelly et al., 2012). Playing dumb occurs when an individual professes to be unaware of the relevant knowledge requested by a coworker and not be able to provide aid, even though the ignorance is feigned. For example, the knowledge hider may provide a false remark "I have no idea of what you are asking for." Evasive hiding involves such instances whereby an individual provides irrelevant knowledge instead of what has been requested or promises to provide the comprehensive knowledge sometime in the future but actually has no intention to follow through with such a promise. These two dimensions both, to some extent, involve deception. However, rationalized hiding does not necessarily involve deceiving the knowledge seeker. Therefore, individuals who engage in rationalized

hiding will consider their behaviors as honest, altruistic, and indicative of competence (Connelly & Zweig, 2015).

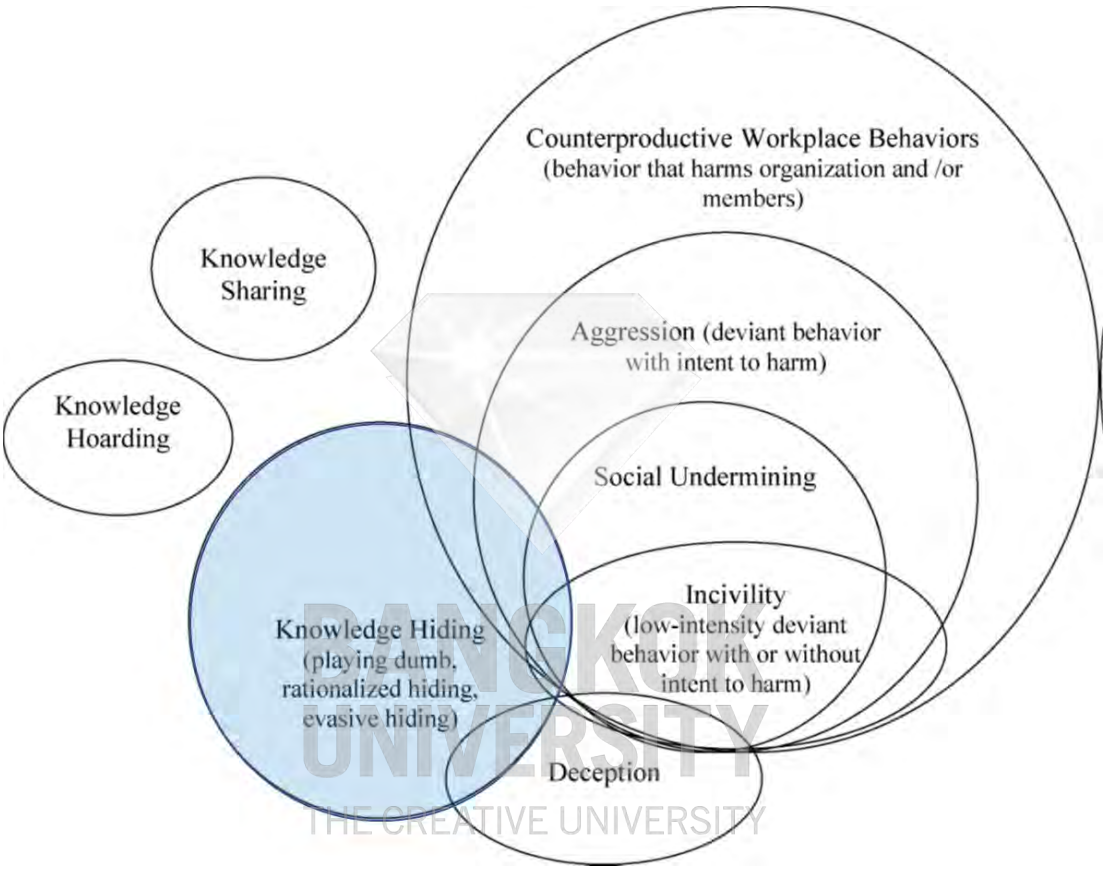
Figure 2.5 displays the relationship of knowledge hiding to other related constructs.

In addition, knowledge hiding is dyadic (Connelly et al., 2012), occurring at the individual level only (Boz Semerci, 2019). The target of knowledge hiding is the immediate coworker who approaches the knowledge holder with a request for specific knowledge. This dyadic feature also differentiates it from counterproductive workplace behavior, which can take place with individuals or the organization as the target (Connelly et al., 2012).

Furthermore, knowledge hiding distinguishes itself from other related constructs by being multi-dimensional. The three dimensions of knowledge hiding are playing dumb, evasive hiding, and rationalized hiding (Connelly et al., 2012). Playing dumb occurs when an individual professes to be unaware of the relevant knowledge requested by a coworker and not be able to provide aid, even though the ignorance is feigned. For example, the knowledge hider may provide a false remark “I have no idea of what you are asking for.” Evasive hiding involves such instances whereby an individual provides irrelevant knowledge instead of what has been requested or promises to provide the comprehensive knowledge sometime in the future but actually has no intention to follow through with such a promise. These two dimensions both, to some extent, involve deception. However, rationalized hiding does not necessarily involve deceiving the knowledge seeker. Therefore, individuals who engage in rationalized hiding will consider their behaviors as honest, altruistic, and indicative of competence (Connelly & Zweig, 2015).

Figure 2.5

Knowledge Hiding and Other Behaviors in Organizations (extended from Pearson et al., 2004) (Connelly et al., 2012)



In the case of rationalized hiding, the individual who confronts a request for knowledge from a coworker presents a rational justification explaining their inability to provide the demanded knowledge or transferring the blame onto a third party for their failure in providing it, suggesting that they withhold the knowledge our of an objective reason. Two mechanisms behind rationalized hiding are norms of the organization and care and consideration from the affective perspective (Zhao et al., 2019). The former is concerned with the protection of information confidentiality, whereas the latter the third party's interests and emotions. The instance of rationalized

hiding suggests that under some circumstances, hiding behavior is unavoidable and that it does not always cause detrimental outcomes. It is, therefore, imperative to acknowledge that knowledge hiding is not a uniformly harmful behavior. And the multi-dimensional nature of knowledge hiding entails that it has a broader scope than other related constructs.

2.3.2.2 Knowledge Hoarding and Knowledge Hiding. Knowledge hoarding is defined as the simple withholding of knowledge, which has not been requested by any specific individual (Webster et al., 2008). Knowledge hoarding and knowledge hiding are two prominent representatives of not sharing behaviors (Holten et al., 2016). Although knowledge hoarding shares some characteristics with knowledge hiding in that employees do not necessarily engage in knowledge hoarding out of malevolent purposes or conflicting interests with the organization (Webster et al., 2008). Knowledge hoarding and knowledge hiding were empirically proved in Connelly et al. (2012)'s study to be two separate constructs that demonstrated discriminant validity. Knowledge hoarding involves less intentionality than knowledge hiding by being a customary practice involving no strong intent to turn down any specific individual (Anaza & Nowlin, 2017; Silva de Garcia et al., 2020). Retaining knowledge without realizing its value to others constitutes one of the occasions of knowledge hoarding (Kang, 2014). The focus of knowledge hoarding is the acquisition of knowledge rather than utilizing knowledge at work (Anaza & Nowlin, 2017).

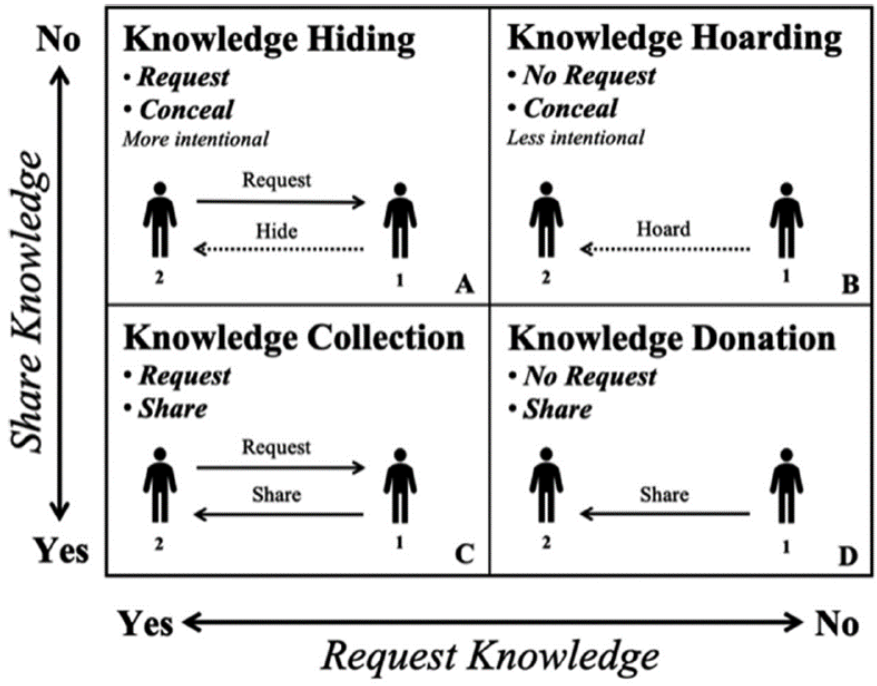
Knowledge hoarding is fundamentally different from knowledge hiding not only in the degree of intentionality but also in the criterion of request (Serenko &

Bontis, 2016). A request is not mandatory in the case of knowledge hoarding (Butt, 2020b; Connelly et al., 2012; Silva de Garcia et al., 2020; Webster et al., 2008), as shown in Figure 2.6. In other words, knowledge hoarding does not clarify whether the hoarded knowledge is desired by others (Serenko & Bontis, 2016).

Moreover, the outcome of the two behaviors could be very different in that the victim of knowledge hiding may embrace more negative thoughts than the target of knowledge hoarding if they capture the sense that the knowledge holder intentionally withholds the requested knowledge and probably decides to retaliate with similar conduct in the future.

Figure 2.6

Knowledge Hiding, Hoarding, Collection and Donation Framework (Silva de Garcia et al., 2020)



2.3.2.3 Knowledge Hoarding and Knowledge Withholding. The relations and distinctions between knowledge hoarding and knowledge withholding are another key issue that needs to be clarified for a complete understanding of not-sharing behaviors.

Two perspectives on the relationship between knowledge withholding and knowledge hoarding can be concluded from existing literature. The first perspective conceptualizes them as two constructs positioned on the same continuum, varying in the degree of intentionality and acquisition volume (Anaza & Nowlin, 2017). The fact that the increase in knowledge withholding leads to knowledge hoarding makes the former the pre-condition of the latter, which involves more strategy and forethought (Anaza & Nowlin, 2017). Knowledge withholding leads to knowledge hoarding in that knowledge hoarding occurs when the initial withholding behavior progresses into a routine (Anaza & Nowlin, 2017). The second perspective views knowledge withholding as an umbrella term comprising knowledge hiding and knowledge hoarding (Connelly et al., 2012; Kang, 2014; Webster et al., 2008).

Notably, some studies used the term “knowledge withholding” to represent the knowledge hiding concept (see (He & Pierce, 2015) for an example).

2.3.3 Knowledge Hiding Supporting Theories

Different perspectives viewing knowledge hiding led to employing varying theoretical lenses to probe into this behavior. These perspectives provide theoretical bases for understanding knowledge hiding as organizational behavior. Among them, social exchange theory, psychological ownership theory, conservation of resources theory, social learning theory, and displaced aggression theory are found to have

been widely adopted to explain individuals' intention to hide their knowledge in work settings.

2.3.3.1 Social Exchange Theory and Norm of Reciprocity. Interpersonal relationship plays an essential role in social exchange. Good relationships help develop mutual trust and respect, which encourage individuals to share knowledge in work settings. Previous studies repeatedly prove that people hide knowledge from those they do not trust or when there is a lack of reciprocity between themselves and others (Kumar Jha & Varkkey, 2018).

Social exchange theory (Blau, 1964), guided by the norm of reciprocity (Gouldner, 1960), is the dominant theory used to explain knowledge hiding. Social exchange posits that people are motivated by self-interest (Holten et al., 2016; Serenko & Bontis, 2016) and that the formation of all interpersonal relationships is based on a cost-benefit calculation and the comparison of alternatives (Wang et al., 2014). The exchange is an ongoing process where an immediate "pay-off" is not necessary (Babič et al., 2019). However, the norm of reciprocity determines the appropriate way the focal parties should act in their exchange process (Pradhan et al., 2019). Whenever one benefits from others' contribution, they are expected to reciprocate the favor (Lin & Huang, 2010). In other words, individuals are involved in a give-and-take process (Khalid et al., 2018) when interacting with others in diverse contexts, where positive acts will generate favorable reactions from others.

Following this logic, once one party involved in the social exchange initiates mistreatment, a downward spiral of behavior that will bring about negative outcomes is likely to result. In this sense, it provides a rationale for retaliation (Lin & Huang,

2010). Therefore, it is understandable that someone is likely to hide knowledge in retaliation when requested by the one who, as they perceive, has hidden knowledge from them. That is to say, the quality of past interpersonal interactions creates the tone for future interactions (Holten et al., 2016). More undesirably, this effect could be contagious because the individual might not only hide knowledge from the one who has rebuffed their knowledge request but also habitually extend the act to whoever requests knowledge from them (Anand et al., 2020).

2.3.3.2 Psychological Ownership and Territoriality Theories. Psychological ownership theory (Pierce et al., 2001) is another theoretical perspective widely utilized to explain why individuals hide knowledge from each other in work settings. Rather than representing a rational while meticulous calculus of benefits and costs, the felt attachment to things at work that gives rise to knowledge withholding behavior actually reflects naturally developed psychological mechanisms (Webster et al., 2008). Time and effort invested in acquiring knowledge, especially complex and tacit knowledge, may develop a sense of ownership in an individual's mind over the hard-earned knowledge.

According to psychological ownership theory, the degree of organizational members' feelings of ownership over the target grows with the increase in the amount of their control over it, the level of their familiarity with it, and the investment of the self they make in acquiring it (Pierce et al., 2001). It was reasoned that the individuals' intimacy to the specific piece of knowledge developed along the process in which they create or acquire it invokes a sense that the knowledge is an extension of themself and constitutes their territories (Webster et al., 2008). Once an individual develops a sense of possession of a piece of knowledge, they would subsequently be

prone to withhold it (He, 2013). A previous study established that individuals who developed knowledge-based psychological ownership exhibited knowledge hiding behavior when requested by others (He, 2013).

Territoriality originates from psychological ownership and was validated as more proximal to knowledge hiding, mediating the relationship between knowledge-based psychological ownership and knowledge hiding (He, 2013). As a behavioral expression of one's feelings of psychological ownership, territorial behavior can be classified into marking and defending behaviors (Kang, 2014).

2.3.3.3 Conservation of Resources Theory. Some researchers consider knowledge hiding as a kind of behavior motivated by a willingness to protect one's knowledge resource. As the conservation of resources theory suggests, the gain or loss of resources influences one's behavior (Hobfoll, 1989). Based on the conservation of resources theory, knowledge hiding can be understood as a behavior to prevent losing resources and knowledge sharing to invest for new resource (Feng & Wang, 2019). Individuals who consider knowledge as a limited resource that is better to be reserved turn to knowledge hiding when under time pressure (Škerlavaj et al., 2018). However, they would choose to provide the requested knowledge as a strategy aiming for more resource gains in the future (Anser et al., 2021).

Individuals who have less access to resources are more vulnerable to losing resources and less likely to invest more resources, which will result in further losses (Feng & Wang, 2019). When being threatened by damage to one's resources, individuals take knowledge hiding as a counteracting attempt to protect their existing resource bases (Jahanzeb, Clercq, et al., 2020). In this sense, intentionally withholding

one's own knowledge can be translated into a self-defense action, particularly when an individual perceives themselves as involved in conflicts in the workplace (Boz Semerci, 2019).

Drawing on the conservation of resources theory, Feng and Wang (2019) argued that abusive supervision could induce job insecurity and, in turn, increase employees' knowledge hiding behaviors toward coworkers. And Yao, Zhang, et al. (2020) found that employees exposed to workplace bullying will tend to hide their knowledge to avoid resource loss.

2.3.3.4 Social Learning Theory and Displaced Aggression Theory. Social learning theory and displaced aggression theory are explanatory frameworks particularly employed to interpret the influence of leadership style on subordinates' knowledge hiding behavior.

As indicated by social learning theory, individuals can learn through vicarious experiences, that is, by observing and emulating behaviors of those whom they see as role models in their environment (Bandura, 1977; Men et al., 2018; Offergelt et al., 2019); and when they address feedback they draw from the social environment as a basis to evaluate their behavior (Offergelt et al., 2019).

The role-modeling process suggested by social learning theory manifested in two ways in the literature regarding leadership style and knowledge hiding behavior. On the one hand, previous literature found that prosocial leadership styles generally mitigate followers' knowledge hiding behavior. For example, individual-focused empowering leadership is negatively linked to followers' knowledge hiding (Lin et al., 2020). And ethical leadership breeds homogeneous behavior at the subordinates'

end, limiting their knowledge hiding behavior (Men et al., 2018). On the other hand, antisocial leadership styles may impart negative beliefs to subordinates and engender their negative reaction, e.g., knowledge hiding. For example, social learning theory provides the theoretical foundation for predicting subordinates' engagement in knowledge hiding prompted by leader-signaled knowledge hiding (Offergelt et al., 2019). Supervisors hiding knowledge from supervisees undermines supervisees' self-efficacy as such behavior frames negative role models of the supervisor for supervisees, triggering them to replicate the same act (Arain et al., 2019). In a similar vein, self-serving leadership induced team knowledge hiding by delivering self-serving values and behaviors (Peng et al., 2019).

The usefulness of the displaced aggression theory has been highlighted by several studies probing into subordinates' knowledge hiding behavior. Displaced aggression theory refers to "redirection of a person's harm-doing behavior from a primary to a secondary target or victim" (Tedeschi and Norman, 1985, p. 30 as cited in (Pradhan et al., 2019)). As it suggested, employees who are under mistreatment, or at least harbor the perception of mistreatment, from their supervisor, will try to get even with an easy target in the workplace instead of venting their anger towards the direct stimulus of aggression, i.e., the supervisor, due to the fear of further retaliation (Khalid et al., 2018; Pradhan et al., 2019). In this sense, knowledge hiding is undertaken as an act of revenge but displaced on one's peer coworkers who are less powerful, a substitute for supervisor-targeted retribution (Jahanzeb et al., 2019; Khalid et al., 2018).

Table 2.3

Summary Table of the Top Four Theories Used to Study Knowledge Hiding

Knowledge Hiding Supporting Theories	Premise	How hiders view knowledge hiding	Motivation
Social Exchange Theory and Norm of Reciprocity	history of interpersonal relationship (lack of trust / lack of reciprocity); a cost-benefit calculation; a give-and-take process	a retaliation; having contagious effect	negative reciprocity
Psychological Ownership and Territoriality Theories	felt attachment to the knowledge; knowledge being the extension of oneself or constituting one's territories	marking and defending of one's territory	investment of the self
Conservation of Resources Theory	knowledge being a limited resource	a counteracting attempt to protect their existing resource bases; a self-defense action to prevent resource loss	willingness to protect one's knowledge resource
Social Learning Theory and Displaced Aggression Theory	role modeling process	an act of revenge	intention to get even when experiencing antisocial leadership

2.3.4 Antecedents and Motivations of Knowledge Hiding

Compared with knowledge sharing, which has been one of the dominating themes in existing knowledge management studies, knowledge hiding is far more underexplored (Issac et al., 2021). However, in recent decades, an increasing number of studies have delved into this research stream, documenting the personal, interpersonal, and situational antecedents and motivations that gave rise to knowledge hiding. The following sections will describe those antecedents and motivations in more detail.

2.3.4.1 Personal Factors.

2.3.4.1.1 Personality Traits. Knowledge hiding behavior can be influenced by intrinsic attributes, for instance, individuals' personality traits. It was revealed that buying and supplying firms' managers with five specific traits, i.e., self-monitoring, self-efficacy, professional commitment, intrinsic motivation to share knowledge, and developing friendships, seldomly engaged in knowledge hiding with their counterpart from the industry (Butt, 2020a). Previous literature documented that trait

competitiveness was a predictor of evasive hiding (Hernaus et al., 2019) and that employees with high proving goal orientation have stronger intention to turn to knowledge hiding (Rhee & Choi, 2017). Machiavellianism, narcissism, and psychopathy, the three personality traits that compose the dark triad, were found to be positively related to knowledge hiding (Pan et al., 2018).

Moreover, individual personality disposition can act as contingent factors to promote or to buffer the impact of the antecedent on knowledge hiding. For example, employees who score high on Machiavellianism would be more likely to engage in knowledge hiding under a low level of ethical leadership (Belschak et al., 2018), and those who score high on neuroticism were found more prone to reciprocate uncivil treatment with knowledge hiding (Arshad & Ismail, 2018).

2.3.4.1.2 Affective/Emotional Factors. Negative affective states predict employees' knowledge hiding behaviors (Zhao & Xia, 2019). For instance, emotional exhaustion was found to be positively correlated with knowledge hiding (Yao, Zhang, et al., 2020). When people deal with fear, they utilize knowledge hiding as a coping strategy (Fang, 2017). In contrast, leveraging positive affectivity or general disposition to activate positive emotions can reduce the negative influence of perceived psychological contract breaches on knowledge hiding (Jahanzeb, Clercq, et al., 2020). Individuals with higher emotional intelligence may be less likely to demonstrate knowledge hiding (Geofroy & Evans, 2017). More specifically revealed by an additional study, emotional intelligence acts as a key driving factor of knowledge hiding in an occidental cultural context (Issac & Baral, 2020).

2.3.4.1.3 Personal Perceptions. Positive and negative feelings or perceptions induced by the surrounding work environment prompt individuals to hide what they know. On the one hand, psychological entitlement (Alnaimi & Rjoub, 2019; Khalid et al., 2020), and job engagement (L. Wang et al., 2019) motivates individuals to hide knowledge. On the other hand, individuals engage in knowledge hiding when they feel envied (Liu et al., 2020), concerned with privacy (Zhai et al., 2020), are under time pressure (Škerlavaj et al., 2018) or job tension (Riaz et al., 2019), get exhausted and burned out at work (Ali et al., 2020), when they perceive that the organization has failed to fulfill its promises or obligations (Jahanzeb, Clercq, et al., 2020) or that the sharing of specific knowledge will lead to reduced competitive advantage and put their job at stake (job (in)security) (Butt, 2019b; Serenko & Bontis, 2016), or simply because they are not confident about their knowledge (Kumar Jha & Varkkey, 2018).

In contrast, when individuals feel obligated to share knowledge (Liu et al., 2020) or have strong identified feelings for the organization (organizational identification) (Yao, Zhang, et al., 2020)., they may be less likely to resort to knowledge hiding.

In addition, if an individual develops a sense of ownership of the knowledge and considers the knowledge as their personal asset, they are more likely to hide it from others; however, when one's sense of ownership of the specific quantum of knowledge is converted to the organization, the undesired knowledge hiding could be minimized (He, 2013). Territoriality plays a mediating role in the relationship between psychological ownership and knowledge hiding, also serving as an antecedent of knowledge hiding (He, 2013; Huo et al., 2016).

2.3.4.2 Interpersonal Dynamics. Knowledge hiding could also be predicted by the quality of interpersonal relationships among peers (Connelly et al., 2012). It can happen simply because the individual does not like the knowledge seeker (Atif Saleem & Ahmad Bayiz, 2019). Previous studies also revealed that distrust triggered knowledge hiding (Connelly et al., 2012; Issac & Baral, 2020; Kumar Jha & Varkkey, 2018). Similarly, trust deficit (Atif Saleem & Ahmad Bayiz, 2019; Butt, 2019b) and lack of interpersonal trust encourages employees to resort to hiding behavior (Issac et al., 2020).

Reciprocity acts as another prominent antecedent of knowledge hiding. The rejection of the knowledge holder to a knowledge request will lead to further knowledge hiding from the initial knowledge seeker (Atif Saleem & Ahmad Bayiz, 2019; Kumar Jha & Varkkey, 2018; Serenko & Bontis, 2016). In another words, individuals hide knowledge as a reciprocation to others' knowledge hiding behavior.

Mistreatment from coworkers in work environment experienced by individuals activate their knowledge hiding behavior. When individuals are alienated in work settings (workplace ostracism) (Issac et al., 2020; Riaz et al., 2019; Shah & Hashmi, 2019; Zhao et al., 2016), or experience workplace incivility (Arshad & Ismail, 2018; Shah & Hashmi, 2019), workplace bullying (Yao, Zhang, et al., 2020), employee cynicism (Aljawarneh & Atan, 2018), negative workplace gossip (Yao, Luo, et al., 2020), or interpersonal conflicts (Akhlaghimofrad & Farmanesh, 2021), they are likely to engage in knowledge hiding.

On the contrary, interdependencies/reliance among coworkers will discourage knowledge hiding at workplace (Butt & Ahmad, 2020). However, other researchers demonstrated that task interdependence was positively related to knowledge hiding,

specifying that in some particular cultural contexts, for example, in China and Australia, individuals feel pressured when they perceive reliance from others will resort to knowledge hiding (Gagné et al., 2019).

Not only does horizontal dyadic exchange relationship influence individuals' knowledge hiding behavior, the vertical exchange between leader-subordinate interaction is also documented as an antecedent of it. Leader-member exchange (LMX) reduces knowledge hiding independently (Abdillah et al., 2020; Babič et al., 2019; Zhao et al., 2019), or when interacting with collective prosocial motivation (Babič et al., 2019), which was established to negatively affect knowledge hiding (Babič et al., 2018), and moderate the perceived time pressure and knowledge hiding relationship via perspective taking (Škerlavaj et al., 2018).

2.3.4.3 Situational Factors.

2.3.4.3.1 Organizational Environment/Atmosphere. Rather than being an intentionally harmful behavior occurring in work settings, knowledge hiding is more of a responsive act to a given context (Khalid et al., 2018). Employees vary their strategies to hide knowledge with situations (Connelly et al., 2012).

Organizational culture significantly influences knowledge hiding behavior (Shah & Hashmi, 2019). Employees engage in knowledge hiding to comply with organizational norms and expectations (Atif Saleem & Ahmad Bayiz, 2019). On the one hand, a positive corporate knowledge culture limits intra-organizational knowledge hiding (Serenko & Bontis, 2016). If individuals experience interactional justice in the workplace, they may be more likely to refrain from knowledge hiding behaviors (Ghani et al., 2020). On the other hand, individuals who experience

organizational injustice choose to engage in knowledge hiding (Abubakar et al., 2019; Jahanzeb, De Clercq, et al., 2020). The organizational climate that tolerates workplace incivility positively relates to knowledge hiding (Aljawarneh & Atan, 2018). When individuals perceive the work setting as politically charged (Malik et al., 2019), or when they know that they will gain no recognition in return for their knowledge contribution (Kumar Jha & Varkkey, 2018), they are more likely to engage in knowledge hiding. Besides, a complex hierarchy within an organization, a strict performance appraisal process with a particular focus on evaluating employees' knowledge sharing, and formal and professional interaction during office hours only induce knowledge hiding practicing (Butt, 2020b; Butt & Ahmad, 2020). Internal competition fosters knowledge withholding (Anaza & Nowlin, 2017). In order to outperform their competitors in the organization, individuals will choose to hide knowledge (Atif Saleem & Ahmad Bayiz, 2019).

2.3.4.3.2 Leadership Style. Knowledge hiding occurs not just between fellow coworkers at horizontal levels but also between superiors and subordinates, crossing hierarchical layers. Studies exploring the influence of leadership style on knowledge hiding provide us meaningful insight. Subordinates will engage in knowledge hiding when their leaders demand it (Atif Saleem & Ahmad Bayiz, 2019) and be less likely to hide knowledge when they work under leaders who avoid signaling knowledge hiding (leader-signaled knowledge hiding) (Offergelt et al., 2019).

In addition to the argument that transformational leadership will influence employees to refrain from the knowledge hiding behavior (Ladan et al., 2017), empirical studies demonstrated an inverted U-shaped relationship between knowledge

leadership and knowledge hiding, suggesting that lower and higher levels of knowledge leadership are more desirable than moderate level to limit knowledge hiding (Xia et al., 2019).

Furthermore, literature informs that prosocial leadership style, for example, altruistic leadership (Abdillah et al., 2020) and ethical leadership are negatively associated with knowledge hiding directly and indirectly through psychological safety, meaningful work (Men et al., 2018) and relational social capital (Abdullah et al., 2019). However, although prosocial leadership behavior benefits individuals in most cases, it may not equally favor the group as a whole. Empowering leadership is one such exception. On the one hand, individual-focused empowering leadership engenders subordinate's psychological safety, which, in turn, diminishes knowledge hiding; on the other hand, differentiated empowering leadership contributes to group relational conflict, which, in turn, positively links to knowledge hiding (Lin et al., 2020).

In a converse manner, antisocial leadership predicts knowledge hiding. For example, abusive supervision is positively and directly related to knowledge hiding (Jahanzeb et al., 2019; Khalid et al., 2018; Pradhan et al., 2019) and indirectly through interpersonal justice (Khalid et al., 2018), job insecurity (Feng & Wang, 2019), and self-serving leadership induces team knowledge hiding (Peng et al., 2019).

Prior studies also suggest that leadership style can be utilized as a managerial intervention (Anser et al., 2021), deterring employees' engagement in knowledge hiding. This assumption was further validated by Zhao and Xia (2019), who found that ethical leadership attenuated the indirect effect of negative affective states on knowledge hiding via moral disengagement. In a similar vein, ethical leader behavior

can act as a remedy, counteracting knowledge hiding propensities of those employees who score high on Machiavellianism (Belschak et al., 2018).

2.3.4.3.3 Characteristics of Requested Knowledge. Characteristics of the requested knowledge stand as a prominent determinant of knowledge hiding behavior. It has been repeatedly acknowledged that the complexity or the type of the requested knowledge would relate to individuals' knowledge hiding behavior. For example, tacit knowledge, compared with explicit knowledge, could be easier for individuals to hide (He, 2013). Additionally, tacit knowledge hiding could be more widespread than explicit knowledge hiding, given that tacit knowledge is more closely related to individuals' competitive advantages (He, 2013). However, previous literature on knowledge hiding rarely addressed this antecedent and mostly focused on the general categorization of knowledge, for example, tacit and explicit knowledge, without further clarification and differentiation. Some exceptions are discussed as follows.

It is documented that task-relatedness knowledge negatively affects rationalized hiding and positively affects evasive hiding (Connelly et al., 2012). In addition, when the knowledge under request is complicated, the employees are more likely to engage in evasive hiding (Connelly et al., 2012; Issac & Baral, 2020; Pan & Zhang, 2014). In a study concerning knowledge type, academics are found to hide more tacit than explicit knowledge (Hernaus et al., 2019).

Although few studies dug into the relationship between the characteristics of the requested knowledge and individuals' knowledge hiding behavior, extant studies widely addressed the act of not separating knowledge type as a research limitation and called for future endeavor to examine particularly tacit and explicit knowledge hiding

scenarios and to obtain more in-depth implications (e.g., (Jahanzeb, De Clercq, et al., 2020; Zhang & Min, 2019)).

To summarize, previous studies on knowledge hiding have inspected the antecedents of knowledge hiding from personal, interpersonal, and situational aspects. Numerous independent variables have been proven to be linked to this novel concept. Table 2.4 presents those variables that are related to knowledge hiding behavior.

Table 2.4

Antecedents and Motivations of Knowledge Hiding

Personal factors	Interpersonal dynamics	Situational factors
Personality traits • trait competitiveness • proving goal orientation • dark triad (Machiavellianism, narcissism, psychopathy) **Affective/emotional factors** • emotional exhaustion • fear • positive emotion • emotional intelligence **Personal perceptions** • psychological entitlement • job engagement • feeling envied • privacy concern • time pressure • job tension • burnout • perceived contract breach • job insecurity/perceived career insecurity • lack of confidence • felt obligation to share • organizational identification • psychological ownership • territoriality	• distrust/trust deficit/lack of trust • reciprocity/reciprocation • workplace ostracism • workplace incivility • workplace bullying • employee cynicism • negative workplace gossip • interpersonal conflicts • interdependencies/reliance • leader-member exchange (LMX)	**Organizational environment/atmosphere** • organizational culture/ organizational climate/ organizational norms and expectations • organizational injustice • organizational politics, lack of recognition • hierarchy • strict performance appraisal process • formal and professional interaction in office hour • internal competition • organizational defensive routines **Leadership style** • leader-signaled knowledge hiding • transformational leadership • knowledge leadership • ethical leadership • empowering leadership • abusive supervision • self-serving leadership **Characteristics of requested knowledge** • tacit/explicit knowledge • task-relatedness knowledge • knowledge complexity

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2.3.5 Outcomes of Knowledge Hiding Behavior

The uniform manifestation of knowledge hiding is that the requested knowledge is not forthcoming, regardless of which strategy the hider resorts to. The negative

influence exerted by knowledge hiding spreads at individual, interpersonal, and organizational levels.

Knowledge hiding occurs at the individual level (Connelly et al., 2012), in addition to contributing to an individual's lessened job satisfaction (Offergelt et al., 2019), reduced levels of creative performance (Bogilovic et al., 2017; Butt, 2019a; Černe et al., 2014; Connelly & Zweig, 2015; Malik et al., 2019; Rhee & Choi, 2017), decreased innovative work behavior (Cai & Wen, 2018; Černe et al., 2017) and extra-role behavior (Alnaimi & Rjoub, 2019), and lowered productivity (Butt, 2019a) and task performance (Singh, 2019), it increases turnover intention (Butt, 2019b; Offergelt et al., 2019; Serenko & Bontis, 2016) as well as workplace deviance (Singh, 2019). Top-down knowledge hiding (i.e., supervisors' knowledge hiding from supervisees) discourages supervisees' innovative work behavior (Arain et al., 2019).

Knowledge hiding can result in harmed interpersonal relationships (Connelly & Zweig, 2015). Besides giving rise to distrust (Ghulam Ali Arain, Zeeshan Ahmed Bhatti, Ashraf Naeem, et al., 2020), knowledge hiding of an employee could initiate a distrust loop and result in the knowledge seeker's reciprocal knowledge hiding (Abubakar et al., 2019; Černe et al., 2014; Černe et al., 2012).

Although employees belong to a same team are supposed to collaborate to achieve shared goals, they do hide knowledge from one another (Babič et al., 2019). At the team level, perceived knowledge hiding jeopardizes team viability (Y. Wang et al., 2019), team creativity (Bari et al., 2019; Bogilovic et al., 2017; Fong et al., 2018; Peng et al., 2019), and project team performance (Zhang & Min, 2019), and encourages organizational deviance at the organizational level (Singh, 2019).

Furthermore, it is argued that knowledge hiding also poses a major obstacle for organizations to innovate (Labafi, 2017).

Beyond that knowledge hiding damages the interests of coworkers, the team, and the organization, it can backfire, resulting in the perpetrator's diminished creative performance (Černe et al., 2012; Jahanzeb et al., 2019), lowered job performance (Jahanzeb, Clercq, et al., 2020), damaged psychological safety and workplace thriving (Zhou et al., 2019), and increased loneliness (Garg & Anand, 2020) and self-conscious moral emotions (i.e., guilt and shame) (Burmeister et al., 2019). Supervisors hiding knowledge from subordinates induce subordinates' moral disengagement, further leading to the subordinates' decreased organizational citizenship behavior and enhanced silence towards the supervisor (G. A. Arain et al., 2020).

The knowledge hiding outcomes at the personal, interpersonal, and organizational levels are summarized in Table 2.5. It can be readily noticed that the widely researched was negative outcomes of knowledge hiding while the positive ones have been far more under-researched.

Table 2.5

Knowledge Hiding Outcomes

Individual level	Interpersonal level	Organizational level
• (-) job satisfaction • (-) creative performance • (-) innovative work behavior • (-) extra-role behavior • (-) productivity • (-) task/job performance • (-) turnover intention • (-) workplace deviance • (-) psychological safety • (-) workplace thriving • (+) loneliness • (+) emotions (guilt and shame) • (+) moral disengagement • (-) organizational citizenship behavior • (+) silence	• (-) distrust	• (-) team viability • (-) team creativity • (-) project team performance • (+) organizational deviance • (-) organizational innovation

Note. "(-)" indicates a negative relationship between knowledge hiding and the outcome variable, whereas "(+)" a positive one

2.3.6 Varying Antecedents and Outcomes of Three Knowledge Hiding Strategies

Although knowledge hiding is a behavior involving multi-dimensions, extant studies generally examine knowledge hiding as a holistic construct. However, studies that delved into the separate dimensions inform that behind different strategies of knowledge hiding exists different antecedents or motivations and that different dimension leads to different outcomes.

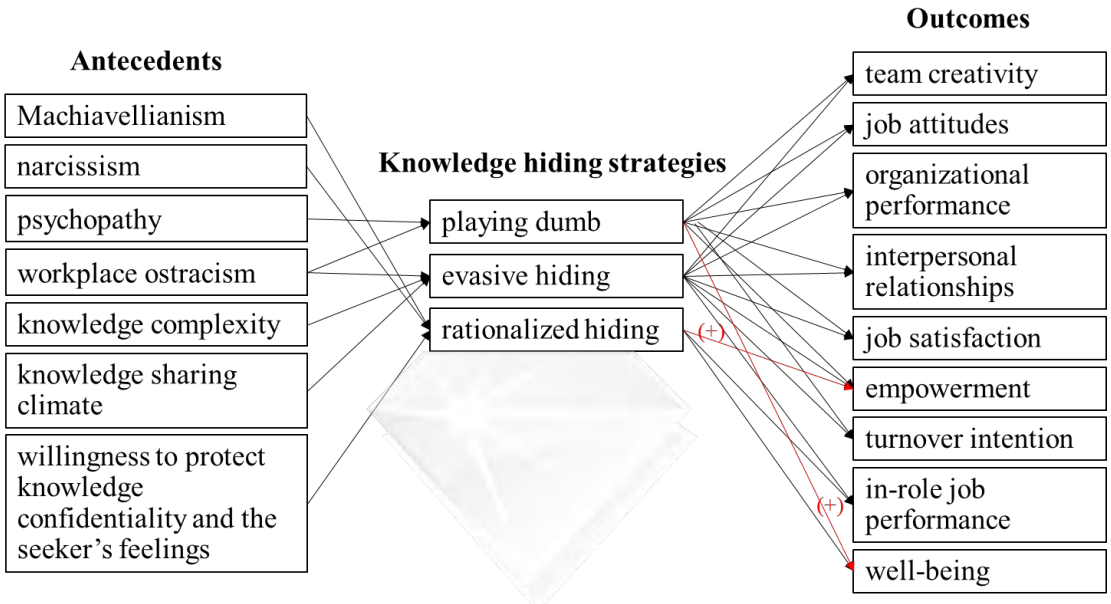
It was found that Machiavellianism was most strongly related to the evasive hiding strategy, narcissism was most strongly associated with the rationalized hiding strategy, and psychopathy was most strongly associated with the playing dumb strategy (Pan et al., 2018). The adoption of knowledge hiding strategies is situation-dependent (Connelly et al., 2012). In other words, individuals vary their knowledge hiding strategies under different situations. Employees opt for evasive hiding if the requested knowledge is complex, and they are less likely to engage in evasive

knowledge hiding when the organization is of stronger knowledge sharing climates (Connelly et al., 2012). When employees are ostracized in the workplace, they are more likely to play dumb and to hide evasively but not to rationalize their hiding (Riaz et al., 2019; Zhao et al., 2016). Rationalized hiding is used when the requested information is supposed to be kept confidential and when the knowledge holder wants to protect the seeker's feelings (Connelly et al., 2012).

On the other hand, different outcomes result from the three strategies utilized to hide knowledge. For example, while evasive hiding discourages in-role job performance, playing dumb encourages in-role job performance (Khoreva & Wechtler, 2020). Evasive hiding and playing dumb have a significant negative influence on team creativity (Bari et al., 2019) and job attitudes (Offergelt et al., 2019); however, rationalized hiding does not significantly affect team creativity and job attitudes. In addition, playing dumb and evasive hiding can lead to reduced organizational performance due to the knowledge interruptions and duplications caused by deception (Černe et al., 2014), harmed interpersonal relationships between employees (Connelly & Zweig, 2015), lessened job satisfaction, decreased empowerment, but increased turnover intentions (Offergelt et al., 2019). In contrast, rationalized hiding yields positive outcomes, i.e., improved empowerment, benefiting employees and the organization by making the victim an impression that the knowledge holder is trying to be cooperative and that they do not intend to undermine the shared social norms (Offergelt et al., 2019). However, even though it involves no deception, rationalized hiding can still create a psychologically heavy burden for individuals to bear and thus leads to decreased well-being, to which evasive hiding has no relation and playing dumb is positively related (Khoreva & Wechtler, 2020).

Figure 2.7

Antecedents and Outcomes of Separate Knowledge Hiding Strategies



Note. To maintain clarity, only positive relationships between knowledge hiding strategies and outcomes are highlighted with "(+)"

Figure 2.7 exhibits antecedents and outcomes of knowledge hiding that have been identified by the studies investigating three knowledge hiding strategies. These findings further validated the distinctiveness of each of the three dimensions of knowledge hiding and exemplified that not all knowledge hiding equally brings about detrimental effects (Connelly & Zweig, 2015). It was revealed that a variable (e.g., workplace ostracism or team creativity) that was linked to knowledge hiding as a whole might not relate to a particular sub-dimension (i.e., rationalized hiding) at all, which further demonstrated the complexity of the concept. When inspecting three separate knowledge hiding strategies, prior studies put more effort into uncovering outcomes than probing into antecedents. Again, positive outcomes of knowledge hiding were far more under-investigated, as presented in the figure.

2.3.7 Measuring Knowledge Hiding

The involvement of intentionality to conceal makes it difficult to observe knowledge hiding or to confirm the perception of this behavior. Taking into account such difficulty and the socially undesirable nature as well as the sensitivity of the topic, extant studies generally measured knowledge hiding with self-report scales. Among the commonly used measurement of knowledge hiding, the three-dimensional 12-item scale developed by Connelly et al. (2012) was the one that was extensively used in previous literature, which was proved to possess good internal consistency and validated by numerous studies. Another two repeatedly employed scales are the one developed by Serenko and Bontis (2016) and He (2013)'s scale, which was originally designed to measure knowledge withholding, both of which are three-item scales. However, it is disputable to measure knowledge hiding with a scale that may fail to reflect the distinctive characteristics of knowledge hiding (Xiao & Cooke, 2018), given that knowledge withholding and hiding are actually different in their conceptual essence as discussed earlier.

Despite the optimistic observation that self-report data can reach a broader subset of knowledge hiding than those reported by others (Černe et al., 2014) and that it generates more accurate evaluation compared with other-report data because no one is more clear about the employees' attitude and behavior than oneself, single-source bias represents a prominent problem of self-report scales (Zhao et al., 2019). When all the data is generated from the same source, biases associated with common method variance, and illusionary correlations will become unavoidable.

Besides, the possibility of under-reporting, caused by knowledge hiding behavior's inherent social undesirable nature, should be properly addressed. The

underreporting nature of self-report measurement, particularly when studying socially undesirable behavior was repeatedly addressed as a research limitation by previous studies (e.g., (Hernaus et al., 2019)). Existing literature documented under-reporting of self-report instruments employed to rate knowledge hiding behavior. Employees under-reported their own knowledge hiding behavior to appear socially desirable, and they believed that they hid knowledge from their colleagues less often than their colleagues did from them (Serenko & Bontis, 2016).

Furthermore, the predominant employment of cross-sectional data across the extant knowledge hiding literature landscape signals a knowledge gap to be filled in terms of data collection. Cross-sectional data represents one of the most noted limitations in previous literature, for it fails to infer causality between variables. Most studies that addressed this shortcoming made a clear call for future experimental designs (e.g., (Babič et al., 2018; Huo et al., 2016)).

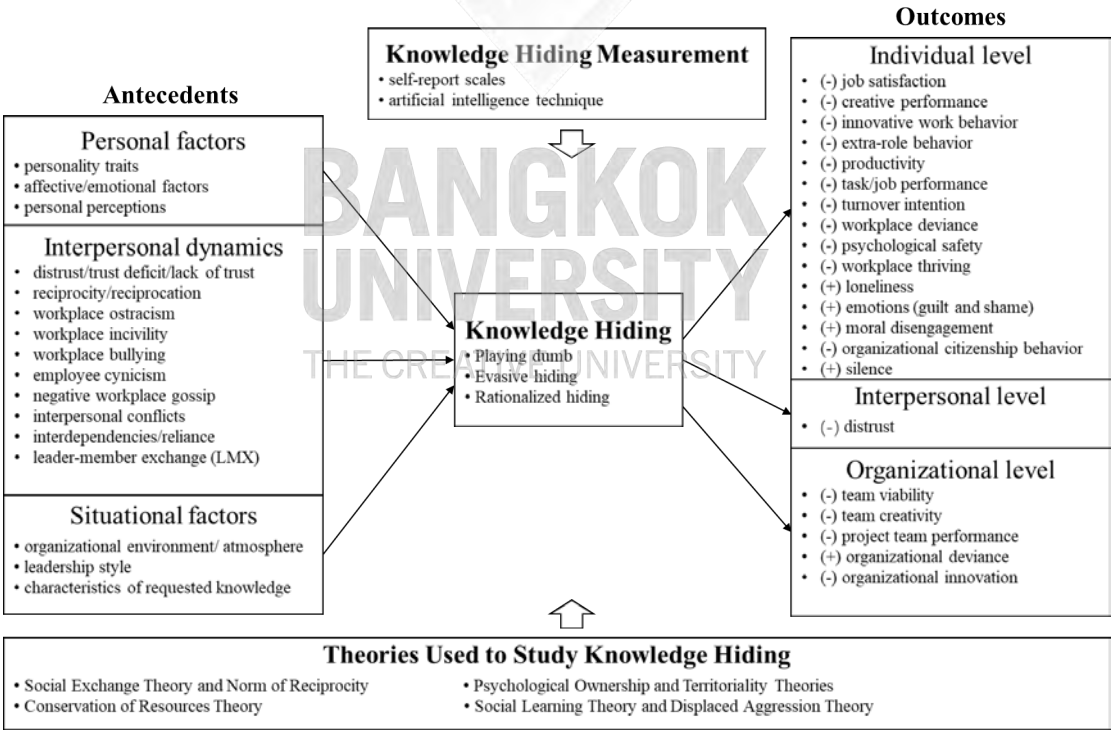
Moving forward, sophisticated and advanced statistical techniques, such as artificial intelligence techniques, to be specific, artificial neural networks, came into serving the study of this arising research stream by being employed to examine the causal relationship between its predictor and knowledge hiding behavior and to overcome the common method bias problem relying on its complex nature and ability to identify linear and non-linear relationships (Abubakar et al., 2019). It was demonstrated to have unique benefits in examining this sensitive issue (Abubakar et al., 2019).

Figure 2.8 summarizes what had been done in existing knowledge hiding studies, involving its antecedents and outcomes, the measurements, and the theories adopted to examine this organizational behavior.

In this era, when the world is hugely more integrated than ever, cross-cultural research is gaining increasing value and importance. The author views cultural differences as an aspect that researchers in business and management cannot afford to ignore and expects that the differences across cultures also manifest in individuals' knowledge hiding behavior. Therefore, the author reviews the literature on cultural differences.

Figure 2.8

Summary Figure of Knowledge Hiding Studies



2.4 Cultural Differences

2.4.1 An Overview

Culture is a collective phenomenon (Hofstede, 2011). It can be acquired and shared at least by a part of people who live in the same social context (Hofstede & Hofstede, 2005). It is one of the "fault lines" that divide the planet (Ronen & Shenkar, 2013). With the growing extent of globalization and the expanding reach of the media, there seems to be an assumption that cultural differences and conflicts are decreasing. Going beyond conceptual and anecdotal grounds, Ronen and Shenkar (2013)'s test disclosed great stability in cluster membership over two decades, implying a slow transformation in work-related national culture. This finding appears to be supportive of the perspective that cultural differences and divergence will remain an influencing factor in work settings for at least decades before withering away.

Corporate culture was found to have manifested cultural differences across its global subsidiaries. IBM is one of those examples (Hofstede & Hofstede, 1984), even though it is featured with a strong organizational culture. This might be attributed to the fact that organizational culture is shaped and determined by the cultural preferences of the leaders and employees working in the organization (Trompenaars & Hampden-Turner, 2011). In this sense, any organizational behavior has its cultural implications, unique to the context where it takes place.

The work environment has dramatically shifted from a physical workplace to a virtual setting where organizational employees develop their reliance on various online tools to get their work done nowadays, particularly after the experience of the

pandemic situation, where things keep changing rapidly. The “new normal” developed during that period is becoming or has already become a routine. In an organizational context, while members are expected to share their knowledge to facilitate work progress, it is likely that they hide knowledge from others, merely directed by the values they have developed in a broader context, that is, the cultural context in which they were brought up (Trompenaars & Hampden-Turner, 2011). When social expectations conflict with personal preference, tensions will arise.

Across numerous frameworks on culture and cultural differences, Hofstede’s perspective on culture remains the most attractive and central to business and management studies for its parsimony (Khan & Khan, 2015). Hofstede (2011), drawing on the progress of their studies that have started since 1980’, labeled the six dimensions of national culture as “power distance”, “uncertainty avoidance”, “individualism/collectivism”, “masculinity/femininity”, “long/short term orientation”, and “indulgence/restraint”. Power distance identifies the degree to which people accept status and power domination; uncertainty avoidance refers to a society’s tolerance to something ambiguous, unexpected, or unknown; individualism/collectivism clarifies whose goal(s) or interest(s) are to be prioritized, an individual’s one(s) or the collective one(s); masculinity/femininity is related to the societal characteristic that highlights the distribution of values between men and women; long/short term orientation associates with the preferential focus to which people devote their effort, the past and present or the future; and indulgence/restraint explores the extent to which a society allows the citizens to fulfill their desires (Hofstede, 2011).

Trompenaars and Hampden-Turner (2011) identified seven orientations that could be used to explain how people deal with each other. Universalism versus particularism orientation tells how much attention is paid to societal codes; individualism versus communitarianism orientation informs people's conception of themselves as primarily being an individual or part of a community; neutral versus emotional orientation offers an insight into people's choice to be objective and detached or to be emotion expressive during interaction; specific versus diffuse orientation notifies people's attitudes towards a business relationship – if it is a personal contact or the one subjected to a contract; achievement versus ascription orientation can be used to explain how people evaluate each other – by what they accomplished or by their status (attributed by birth, age, and connections, etc.) (Trompenaars & Hampden-Turner, 2011). They further pointed out that people in different societies had different perspectives on time and nature/environment (Trompenaars & Hampden-Turner, 2011).

A closer look reveals that the two frameworks bear some resemblance. For example, individualism/collectivism and individualism/communitarianism are similar in that both of them are associated with the decision to prioritize the individual's interests or the community's, and uncertainty avoidance and neutral/emotional orientation resemble each other in that they both are concerned with a society's collective attitude towards feelings expressing. Similarities could also be found between power distance and achievement/ascription, and between long/short term orientation and people's view on time.

Another paradigm involving the application of cultural dimensions is GLOBE (Global Leadership and Organizational Behavior Effectiveness) project, conceived by

U.S. management scholar Robert J. House in 1991 with the original focus on leadership. Expanding from Hofstede's paradigm, GLOBE encompasses nine dimensions by further dividing collectivism into institutional collectivism and in-group collectivism, and masculinity/femininity into assertiveness and gender egalitarianism, and adding two more dimensions, humane orientation and performance orientation. However, the strong correlations among the dimensions across countries and the echoes of Hofstede model in its structure, reflected by its data, make it a source of dispute (Hofstede & Hofstede, 2005). In addition, same terms are used in the project, following Hofstede's model, but conveyed different meanings. For example, it maintained the two labels "power distance" and "uncertainty avoidance" but used different measurements that failed to assess the same thing (Hofstede & Hofstede, 2005). Such confusion further complicates the interpretation of its results.

Despite the existence of the frameworks that generally use country boundaries as the criteria to distinguish cultures, other school holds that observing and theorizing cultural differences in a geographical scope may not hold enough ground (Ronen & Shenkar, 2013). Synthesizing clustering studies on cultural differences related to work, Ronen and Shenkar (2013) drew up a cluster pie that involves 96 countries spanning three levels. Based on the ecocultural perspective, which considers that culture is constantly influenced and adapted to the ecological and sociopolitical context, and individual psychological characteristics are adaptive to their cultural context (Berry, 1976), Ronen and Shenkar (2013)'s study revealed great stability in cluster membership and suggested that convergence existed among country members within a certain cluster, which presented divergence from the other clusters.

The previous literature on cultural differences and the ongoing efforts devoted to unveiling the impact of cultural differences on various aspects in human society have jointly underlined the significance of cross-culture studies. The presence of cultural differences is something worth due consideration when scholars and researchers are setting out to dig into organizational behavior, as stated by (Hofstede & Hofstede, 2005):

> Managers and leaders, as well as the people they work with, are part of national societies. If we want to understand their behavior, we have to understand their societies. (p.25)

2.4.2 Cultural Differences and Knowledge Management

Across the research regarding knowledge management, the word "culture" has two possible references, organizational culture and societal/national culture (Liebowitz, 2008). Recent studies establish that societal/national culture has a profound effect on knowledge management (e.g., the implementation of knowledge management initiatives and the success of the initiatives), considering that societal/national culture is likely to exert influence on organizational culture and business strategy that is aligned with knowledge management (Greiner et al., 2007). Previous research also documents the impact of cultural differences on knowledge management practices in specific business (e.g., in construction (Jacks et al., 2012)).

More specifically as to knowledge management sub-processes, differences in national culture have been identified as one of the barriers to knowledge sharing (Jackson et al., 2012). Such differences could lead to different online knowledge sharing behavior of participants from different countries (Li, 2010), and explain the

direction of knowledge flow within a multi-cultural setting (Ford & Chan, 2003). It was argued that differences in cognitive bases between minority and majority groups would disrupt knowledge transfer and assimilation, creating knowledge stickiness in multi-ethnic organizations (Khan & Khan, 2015). Whereas a case study found that cultural differences could produce a positive effect on knowledge transfer in that differences in national culture provided potential for knowledge transfer in international acquisition (Sarala & Vaara, 2010).

Besides, previous literature informed the relationship between cultural dimensions and knowledge management sub-processes. For example, one study observed a negative relationship between vertical individualism orientation and knowledge sharing and a positive and significant relationship between vertical collectivism orientation and knowledge sharing (Wolfe & Loraas, 2008). An additional study discovered that power distance could hinder the knowledge transfer process because it could deter or extinguish communication or make information filtered through several levels (Khan & Khan, 2015).

Owing to cultural/ethnic groups' reaction to perceived infringement and procurement of political say, cultural divergence is likely to grow over time (Ronen & Shenkar, 2013). The relationship between differences in national culture and knowledge management processes and practices established by previous studies provides substantial grounds for us to expect that national cultural differences will remain a focal aspect that deserves adequate attention and effort in studies concerning knowledge management.

2.4.3 Cultural Differences and Knowledge Hiding

Although how culture impacts knowledge hiding has been rarely explored (Xiong et al., 2019), prior literature imparted the potential effect of national culture on knowledge hiding. To begin with, employees' nationality appears to be a sensitive issue regarding knowledge hiding behavior in some specific cultural contexts, as Arain et al. (2019) found that self-efficacy ("people's beliefs of their capabilities to organize and execute the courses of action required to manage prospective situations" (Bandura, 1995, p. 2 as cited in (Arain et al., 2019)) conditionally mediated the relationship between supervisors' knowledge hiding from supervisees and innovative work behavior in that the mediating effect was weaker when supervisee and supervisor had different nationality than when they had the same nationality. Similarly, Xiong et al. (2019) suggested that the culture of the country where the R&D team operated contributed to the degree of perceived appropriateness of conducting knowledge hiding. For example, the R&D team members located in countries that is individualism oriented appear to be rarely affected by others' opinions and behaviors (Xiong et al., 2019). Additionally, Akhlaghimofrad and Farmanesh (2021) suggested that the relationship between interpersonal conflict and knowledge hiding could be mediated by employee cynicism in a different cultural research environment than the one in which they conducted research.

Secondly, increasing recognition of the potential impact of cultural norms and values on knowledge hiding behavior was manifested in several studies. Gagné et al. (2019) suggested that the same antecedent, i.e., cognitive job demands, may trigger different reactions across cultural contexts, leading to different knowledge hiding frequencies, and therefore, future studies should explore cultural norms around

knowledge-hiding behaviors. The finding that within a high-power distance cultural context (i.e., Pakistani society), abusive supervision exerts a weaker impact on employees' knowledge hiding behaviors in the presence of high levels of Islamic work ethics indicates that particular cultural values may have the potential to limit the utterance of knowledge hiding behavior (Khalid et al., 2018). He and Pierce (2015) observed for the first time that organization-based psychological ownership led to reduced knowledge withholding, whereas job-based psychological ownership had no influence on knowledge withholding and suggested that Confucian philosophy could be the explanation of the different effects produced by knowledge withholding. This conclusion indicated the possible influence of cultural values on the emergence of knowledge withholding. However, the result that the "my and mine" sense of ownership operated in a similar way to that in western and dominantly individualistic context confounded the general assumption that individualism/collectivism paradigm exert different influence on individuals' perception and practice within organizations (He & Pierce, 2015).

Thirdly, the assumption that conflicting findings could be a consequence of the variation in cultural contexts has been acknowledged by numerous studies that called for investigating knowledge hiding in various cultural contexts. For example, the inconsistency in whether others' reliance encourages the knowledge holder to share knowledge (Butt & Ahmad, 2020) or to hide knowledge (Gagné et al., 2019) was attributed to cultural factors (Butt & Ahmad, 2020), that is, individuals' decision to prioritize their work or others'. Besides, the finding that a same strategy (i.e., incentive policy) is able to foster knowledge sharing and simultaneously decline knowledge hiding among organizational members indicates that extrinsic motivation

can prompt managers to share knowledge and hide knowledge at the same time (Butt, 2020b). The inconsistency between this finding and the previous one that extrinsic motivation did not play a significant role in contributing to the sharing of knowledge (Serenko & Bontis, 2016) leads to an assumption that extrinsic rewards function differently in different cultural contexts (Butt, 2020b). However, such assumptions have not been verified with empirical evidence.

Furthermore, the potential impact of cultural dimensions on employees' knowledge hiding behavior was noted by some studies, even though not yet empirically investigated. For example, Jahanzeb et al. (2019) suggested that high power distance culture in Pakistan might contribute to subordinates' less voiced retributive reactions (i.e., knowledge hiding) towards their supervisor. However, the role the power distance values plays in the association remained unexplored. Likewise, in Michailova and Husted (2003)'s study, although "power distance" dimension was not addressed explicitly, the researchers discussed that in Russian context where people place extremely high importance on hierarchy and power, knowledge hoarding was preferred by both employees who considered it imperative to demonstrate their respect to the supervisors by acting less knowledgeably and supervisors who didn't believe they can learn from their subordinates. Another study exhibited that the propensity to hide knowledge would be set in by the seniority of the individuals who have moved up to the top position within the organizational hierarchy, and suggested that the consequent power distance and isolation perceived by the subordinates could make a contribution to such disposition (Issac et al., 2020). These findings, in a similar vein, engendered an implicit assumption that "power distance" could exert influence on knowledge hiding behavior.

Another cultural dimension that attracted research attention is individualism/collectivism. For example, an endeavor was devoted to decrypting the role of culture in determining knowledge hiding propensity through involving two contrasting cultures– USA as a representative of individualistic culture versus India collectivistic culture (Issac & Baral, 2020). Peng et al. (2019) suggested that the individualism/collectivism index may have a different impact on team members' response to self-serving leadership. To be more specific, people in individualistic cultural contexts may be less likely to engage in knowledge hiding as retaliation to self-serving leadership than those working in collectivist cultural contexts, considering that this particular leadership style strongly goes against collectivist employees' expectations concerning leadership (Peng et al., 2019). Alnaimi and Rjoub (2019) explained that the possible reason why an individual employee was less intended to engage in knowledge hiding, when even with low perceived organizational support, could be that in Jordanian culture people were more inclined to make collective decisions. L. Wang et al. (2019) suggested that future studies should investigate the possible influence of collectivism and individualism on psychological ownership, a predictor of knowledge hiding.

Although studies on how culture influences knowledge hiding is still in its infancy, initial empirical studies have proved that culture did have a role to play in influencing knowledge hiding behavior. Research with an emphasis on national culture's impact on individuals' perceptions showed that the interaction term of two cultural factors (cultural tightness and uncertainty avoidance) associated negatively with knowledge hiding (Babič et al., 2018). Boz Semerci (2019)'s study is another one of the initials that investigated the association between individualism/collectivism

and knowledge hiding and establishes that employees' individualistic or collectivistic values play a moderating role in the relationship between perceived task conflict and knowledge hiding behaviors.

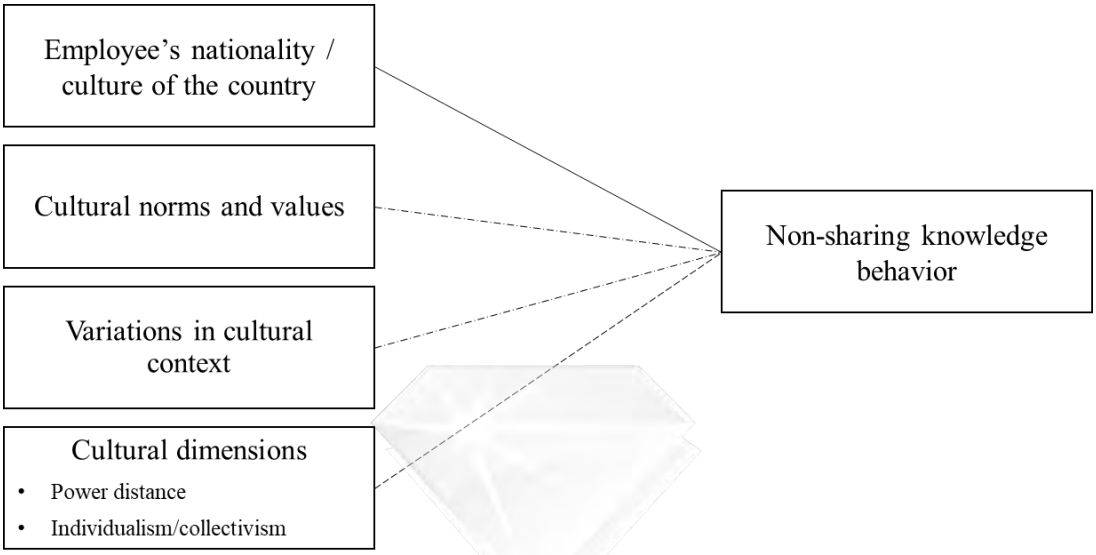
In addition, researchers argued that high power distance, high uncertainty avoidance, masculinity, and in-group collectivism scenario might nourish organizational members' knowledge hoarding behavior for them to acquire power and maintain the status quo (Khan & Khan, 2015). The arguments, combined with the empirical evidence of the influence of cultural aspects on knowledge hiding, provide a foundation for the current study to take the initiative in probing into the potential influences of culture on knowledge hiding behavior and empirically examining if the antecedents of knowledge hiding follow the same working mechanism across cultures.

The author's review of previous literature on knowledge hiding informs another potential gap concerning the cultural aspect that very few studies involved participants across cultures. In most cases, knowledge hiding has been studied in one specific cultural context, which heavily limits the generalizability of the findings and conclusions generated from those studies.

Figure 2.9 summarizes the cultural factors that relate to non-sharing knowledge behavior.

Figure 2.9

Cultural Factors Related to Non-sharing Knowledge Behavior



Note. The solid line indicates an established relationship between the two connected variables whereas the dotted line represents a potential relationship suggested by existing literature.

2.5 The Media Richness Theory

Nowadays, teams purely communicate face-to-face become rare in organizations in the current technology environment (Griffith et al., 2003). Organizations are facing a growing demand for enhanced productivity and dynamics and increasingly rely on online communication means. Newly emergent challenges, the previous pandemic, for example, involved corporates and organizations in difficult trials and experiences by considerably forcing them to go virtual, relocating their employees from a physical work environment to an online setting, and boosting their reliance on technological tools.

While the advancement of technology allows for organizational employees to collaborate to accomplish a common task without working in proximity, defined as

"the physical distance between project team members" in the project context (Bond-Barnard et al., 2018), the degree of collaboration between team members might not be satisfying. Not surprisingly, interaction in computer-mediated communication environments is more impersonal and task-oriented than in face-to-face settings (Schmidt et al., 2001), which creates complexity and uncertainty in predicting organizational employees' behavior/responses during their technology- mediated communication and interaction with their coworkers. With due respect to organizational employees' increasing use/reliance on technology-mediated communication, this study seeks to investigate how organizational employees respond to others' requests made via different technology-mediated means.

Media richness theory (MRT) was originally used to determine the "best" medium for an individual or organization to communicate a message. It was conceived in an effort to facilitate information processing within an organizational setting, addressing the equal importance of equivocality reduction to uncertainty management (Daft & Lengel, 1986). Uncertainty exists when adequate information is not available and can be reduced by acquiring more information; equivocality arises from the situation where multiple and conflicting interpretations have the potential to create confusion and lack of understanding. MRT theorizes that communication media vary markedly in their capacity to process information; rich media are those that are personal and involve face-to-face contact, facilitating equivocality reduction through rendering managers capable of overcoming different frames of reference and processing complex and subjective messages (Daft & Lengel, 1986). Media of lower richness refers to those that are impersonal and depend on rules, forms, procedures, or databases, processing fewer cues and constraining feedback, and less appropriate for

settling equivocal matters (Daft & Lengel, 1986). It is the number of cues a medium is able to pass and its capability of giving feedback that defines the extent of its richness (Gerritsen, 2009).

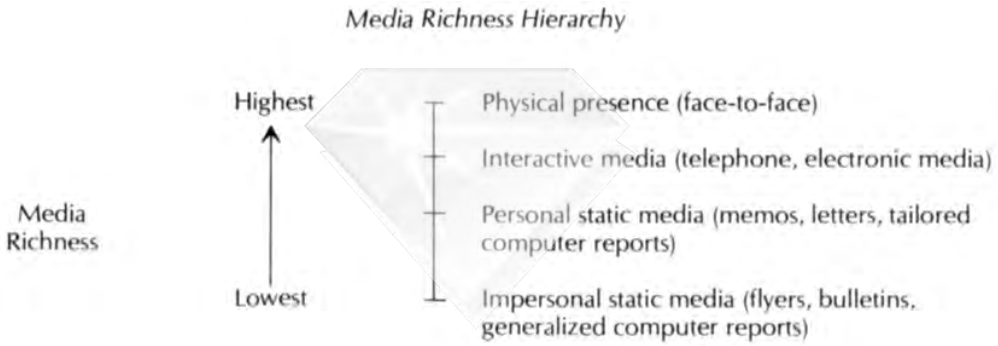
A media richness hierarchy (Figure 2.10) has been illustrated to represent a continuous scale of communication media in order of the type and amount of information each media could convey, comprising impersonal static media, personal static media, interactive media, and physical presence, from the lowest richness to the highest (Lengel & Daft, 1988). With different tasks at hand to be dealt with, different media are of different degrees of preference. MRT theorizes that utilizing richer media for equivocal tasks and leaner media for non-equivocal tasks would be able to improve task performance (Daft & Lengel, 1986). A case study reports that email is the most used tool among employees whereas face to face communication the most effective tool in terms of information sharing (Jackson et al., 2012). It is upheld that deciding an appropriate communication medium for a specific task deserves adequate consideration, for a mismatch between media choice and task to be performed might either lead to resources waste when the richness of the media used outweighs the technology required by the task, or result in failure to accomplish the task when a highly equivocal task is assigned with media that is not of particular richness (Kydd & Ferry, 1994).

When taking cultural factors into account, things seem to become complicated. Gerritsen (2009)'s study revealed that employees from different cultures had different media preferences when it came to receiving messages via media, despite the fact that, generally, richer media enjoyed far more popularity across cultures. Lee (2000) discovered that in the context of a Confucian virtual workplace where showing

respect is essential, the capability of conveying cultural protocol outperformed media richness when individuals were deciding which media would be employed for communication.

Figure 2.10

Media Richness Hierarchy (Lengel & Daft, 1988)



With the progress in research related to MRT, studies pointed out that advocates of the theory generally had focused on the hypothetical fitness of media choice other than inspecting the actual performance outcomes of media use, and empirically evidenced that matching media richness to task equivocality did not lead to improved performance for the new media (e.g., computer-mediated and video communication), questioning the usefulness of MRT for explaining the impact of the use of new media on task performance (Dennis & Kinney, 1998). Researchers acknowledged that the rank of media in order of their richness was inappropriate in that it failed to take the context into account and that there existed no absolute "richest" medium but only the one which best provided the demanded set of capabilities required by a given situation (Dennis & Valacich, 1999).

Furthermore, an additional study revealed that even though users' perception about the richness was in accordance with what MRT proposed, actual communication effectiveness remained constant across various media that have been employed. That is, using different channel for communicating did not generate different communication outcomes, suggesting that a growing sense of naturalness towards the new media might have been developed among the users, which enabled them to make good use of any particular media regardless of its pros and cons (Lisiecka et al., 2016). Similarly, Blau et al. (2017) concluded that with the advancement in technology, the differences between online and face-to-face learning might not be as clear-cut as it had been assumed since no evidence was found regarding the superiority of any learning conditions (i.e., video conferencing and face-to-face).

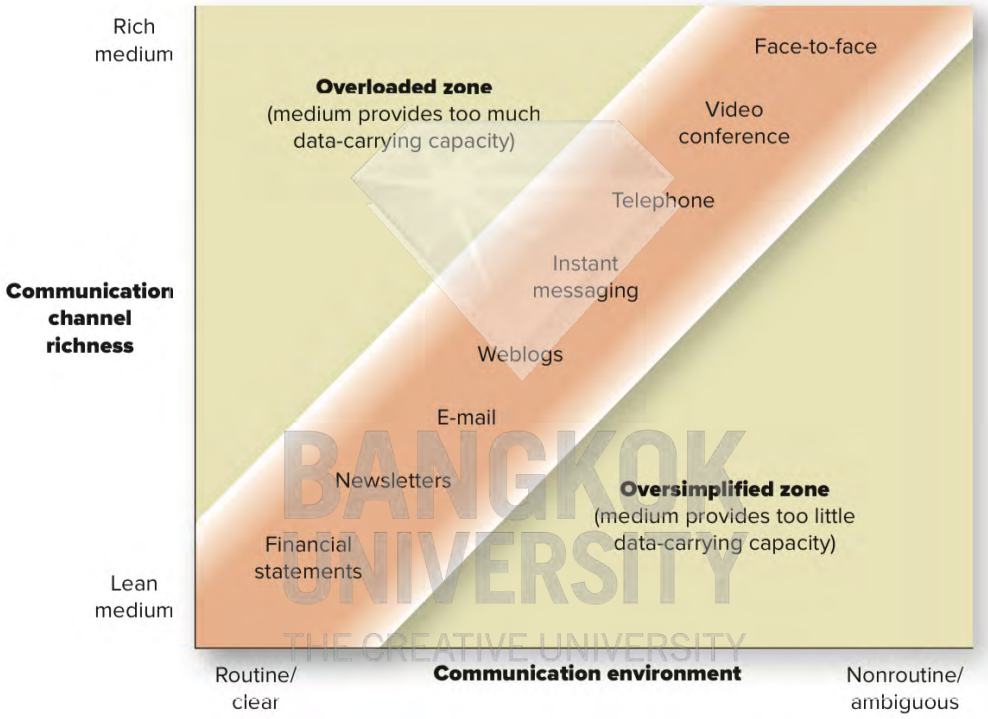
These findings, to some extent, built a ground for the proposition that the way individuals behave in technology-mediated settings could be similar to how they act in reality, and therefore, no prominent variation between the outcomes generated from face-to-face and from online communication would result. More importantly, these findings demonstrated contradicting evidence to MRT's theorization that a good fit of communication medium to task type will produce the intended effect, highlighting the significance of digging into the role played by new media that was not an original category in the richness hierarchy concerning communication within organizations.

With that said, MRT, as a theory developed decades ago, is now faced with several challenges despite its high face validity. On the one hand, the development of technology brought up questions about its applicability to the newly developed media. On the other hand, existing empirical studies documented conflicting or even

provocative findings, calling for theory extension and adaptation. Figure 2.11 presents an updated version of the Media Richness Hierarchy.

Figure 2.11

Media Richness Hierarchy (Updated) (McShane & Glinow, 2017)



Communication has been identified as a key factor in knowledge sharing (Jackson et al., 2012; Liebowitz, 2008), and especially so in the organization's geographically dispersed department (Jackson et al., 2012). It is not uncommon nowadays that individuals collaborating to fulfill a task communicate via diverse mediums that involve various technologies. It was established that the use of richer media results in increased levels of trust (Burgoon et al., 2002). Likewise, video conferencing is of far more promising than email for virtual project team facilitator to

build relationship (Pauleen & Yoong, 2001). Correspondingly, previous studies on knowledge hiding suggested that this behavior might be affected by communication technologies employed in the organization because some technologies may impede the development of individuals distrust in each other, and that the employment of lean communication system (i.e., not face-to-face communication) might bring about unpredictable consequences (Connelly et al., 2012). This is consistent with the argument that the occurrence of knowledge withholding was more likely to be observed in online settings where people loosely connected with each other (Shen et al., 2019; Wu, 2020) and the finding that participants using video conferencing system enjoyed a lower level of interpersonal trust and loyalty than in face-to-face settings (Kydd & Ferry, 1994). Even though in the latter study, the author considered video conferencing as a moderate communication medium in terms of richness, somewhat between audio-only systems and face-to-face communication, and found that it worked better for reducing uncertainty (e.g., information transfer) than for resolving equivocality (e.g., brainstorming or debate) (Kydd & Ferry, 1994).

Given that the quality of the interpersonal relationships and their past interactions with the other individual may influence their decision to hide knowledge (Černe et al., 2014; Connelly et al., 2012), and that certain communication media may serve to facilitate or to deter the building of trust, loyalty, and relationship (Kydd & Ferry, 1994), it will be relevant to adopt the Media Richness Theory as a theoretical lens to investigate knowledge hiding behavior. This notion was further encouraged by Bryant et al. (2009)'s study that exhibited that the availability of additional cues and communication channels in a richer medium enables it to involve more social presence and thus decrease perceived social loafing in virtual teams.

Also, results generated from knowledge hiding studies have established grounds for the employment of MRT in examining this behavior. For example, a recent study revealed that in online contexts (i.e., mobile social networking applications), people manipulated mechanisms to conceal information in ways that might require more effort in face-to-face contexts (Fang, 2017). For example, individuals engaged in rationalized hiding by limiting access to shared documents in the context of mobile social networking applications, they played dumb by turning off their chat room function, and they evasively hid what they knew by disclosing knowledge that is not applicable (Fang, 2017). Other researchers suggested that the outcome of knowledge hiding strategies might vary in different communication channels, such as online or written exchanges (Offergelt et al., 2019).

Consequently, incorporating Media Richness Theory into investigating knowledge hiding behavior will enable the author to provide further insight into the theory, meanwhile, to respond to the previous call for exploring the influence of contextual antecedents (e.g., media richness of online communication systems) on knowledge hiding and the outcomes of using lean communication systems in organizations (Connelly et al., 2012; Xiao & Cooke, 2018).

2.6 Conceptual Model and Hypotheses

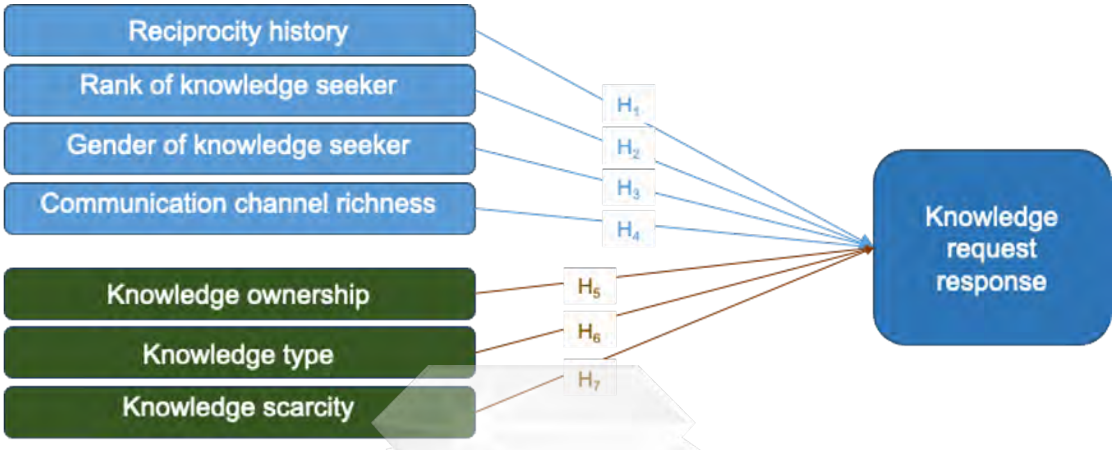
This study sets out to study knowledge sharing and knowledge hiding in an organizational setting where the employees communicate and collaborate via various technological communication means. It aims to investigate further the usefulness and applicability of the well-established theories that were widely adopted in previous knowledge hiding studies for explaining both knowledge sharing and knowledge

hiding incidence. Moreover, the influence of communication channel richness, rank of the knowledge seeker, and gender of the knowledge seeker on the knowledge holder's response to the request are to be explored, responding to the previous call for considering what and how contextual factors may influence employees' knowledge hiding behavior (Babič et al., 2018; Connelly et al., 2012; Xiao & Cooke, 2018). Additionally, in sync with Babič et al. (2018) study, the author strives to compare the behavioral responses of organizational employees operating in two countries when confronted with requests for knowledge from coworkers.

In other words, this study intends to investigate the impact of a series of intriguing factors on organizational employees' responses to knowledge requests from coworkers. The factors involved comprise interpersonal ones (i.e., reciprocity histories between the knowledge seeker and the knowledge holder), situational ones (i.e., rank and gender of the knowledge seeker and richness of the communication channels used to forward a knowledge request), and the ones concerning the nature of the requested knowledge (i.e., knowledge type and knowledge scarcity), including resulted personal perceptions from knowledge properties (i.e., knowledge ownership). Figure 2.12 exhibits the relationships between the independent and dependent variables of interest in the current study.

Figure 2.12

Research Model

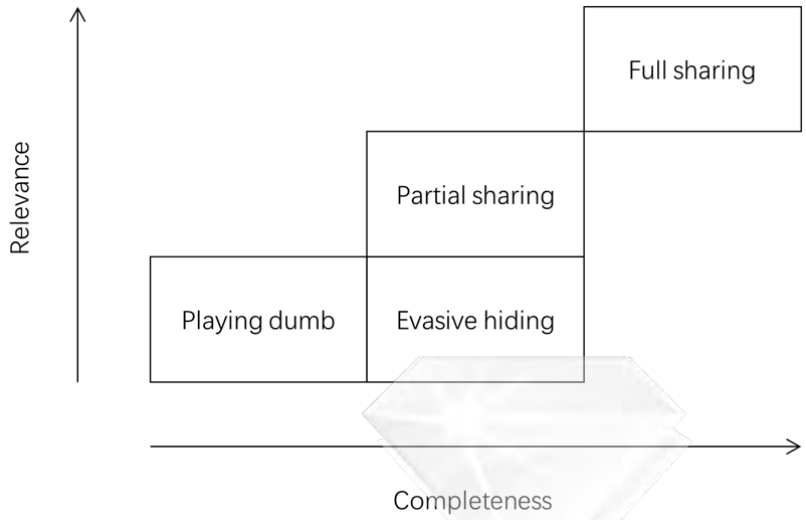


2.6.1 Knowledge Request Response

Confronted with knowledge requests from colleagues, those who hold the exact knowledge (i.e., knowledge holders) respond by sharing or hiding what they know. However, knowledge sharing and knowledge hiding can happen simultaneously (Bari et al., 2019; Pandey et al., 2021). Consider, for example, those cases where the knowledge holder shares insignificant knowledge while concealing indispensable knowledge from the knowledge seeker. More specifically, they can respond by fully sharing what they believe is relevant to the requestor, sharing some relevant knowledge, or not sharing what they know at all by pretending to be ignorant or by providing irrelevant knowledge. The extent to which the knowledge holder provides relevant and complete knowledge distinguishes these four responses from each other, as illustrated in Figure 2.13.

Figure 2.13

Relationships of Four Levels of Knowledge Request Response



Three strategies used to hide what one knows when requested by others are playing dumb, evasive hiding, and rationalized hiding (Connelly et al., 2012). Encompassing two dimensions of knowledge hiding (i.e., playing dumb and evasive hiding) in our research is consistent with previous studies. It was suggested that those forms of knowledge hiding behaviors are unethical and contagious to stimulate the bystanders' knowledge hiding (Zhao et al., 2023) and that they are more pertinent to the dark side of psychological entitlement due to their deceptive nature (Khalid et al., 2020). Researchers took these two forms of knowledge hiding as research focus, but not "rationalized hiding", because these two represent deceptive forms of knowledge hiding and are more damaging for long-term employee and firm performance (Donate et al., 2022; Venz & Nesher Shoshan, 2022). Moreover, the literature provides evidence that the relationships between the other focal constructs and playing dumb and evasive hiding are usually consistent, which are different from those between those constructs and rationalized hiding. For example, territorial feelings positively

influenced evasive hiding and playing dumb but not rationalized hiding (Guo et al., 2022).

In addition, not incorporating rationalized hiding in the theoretical framework of the current study is also out of the consideration that one of the differences between these two dishonest knowledge hiding tactics, i.e., playing dumb and evasive hiding, and rationalized hiding is whether or not a deliberate intent is involved when an employee withholds what they know upon a request for knowledge. For example, when a potential knowledge holder replies to a knowledge request by saying they are not the best person to ask for the specific piece of knowledge, they are playing dumb if they do possess the requested knowledge (Sulistiawan et al., 2022) or at least interpreted as playing dumb by the one who makes the request and believes they have what is demanded. Although this response can be possibly perceived as dodging the request, the truth could be that the one who is approached for knowledge is providing the rationale for their not-sharing behavior with no intention to hide anything. That is, they genuinely know nothing about what is requested. In other words, it is only the requested person who knows exactly if they are hiding or not. If they do not possess what is requested, they are not hiding at all. Therefore, conducting this research focusing on the perspective of a knowledge holder, we see it more practical and less ambiguous to separate rationalized hiding from the research framework.

2.6.2 Reciprocity History and Knowledge Request Response

The dyadic interactions at the workplace are governed by an unspoken social exchange between coworkers (Blau, 1964). Knowledge holder's responses (i.e., sharing knowledge and hiding knowledge) will never be fully understood without

paying respect to those interpersonal relationships that help nurture and contain the knowledge sharing and knowledge hiding relationships among organizational members (Su, 2020). Not surprisingly at all, the most prevalent theory adopted in knowledge hiding literature is the social exchange theory about interpersonal relationships.

Reciprocity is the theme in social exchange, determining how the parties involved should respond in their continuous interaction. Relationships between employees set the tone for in-organization collaboration. Previous literature informs that collaborative work requires knowledge exchange between team members (Dietrich et al., 2010) as cited in (Bond-Barnard et al., 2018). A cost-benefit calculation indicates that prosocial activities will generate future favor in return, while mistreatment will bring back retaliation. Considering the complexity of personal interaction between the knowledge holder and the knowledge seeker as organizational employees, varying responses of knowledge holders can be predicted. Based on the assumption that reciprocity history directs the following reactions from each of the two parties involved in the exchange towards the other, the author hypothesizes that:

$H1_a$: Knowledge holders are likely to respond differently to knowledge requests made by different colleagues with whom they shared different past knowledge exchange experiences.

Associated Null Hypothesis:

$H1_0$: Knowledge holders are likely to respond similarly to knowledge requests made by different colleagues with whom they shared different past knowledge exchange experiences.

In real work settings, reciprocity between organizational employees involves four basic different scenarios. First, the knowledge holder could be the beneficiary in the previous knowledge exchange with the current knowledge seeker. Since they once have received favor from the other person, based on social exchange theory, the knowledge holder will help the current knowledge seeker in return when they have the opportunity. Therefore, confronted with a knowledge request from this previous helper, the knowledge holder will be likely to share instead of hiding what they know from the knowledge seeker. The second scenario is the opposite of the first one, where the knowledge holder ended up not getting what they needed in the previous knowledge exchange with the now knowledge seeker. The previous unfavorable interaction would lead to their unhelping behavior (i.e., knowledge hiding) rather than prosocial behavior (i.e., knowledge sharing). Thus, the author subdivided the overall hypothesis into the following:

$H1_{1a}$: Knowledge holders are likely to share (to different extents) knowledge with the one they had at least one past positive knowledge exchange while likely to hide knowledge from the one they had at least one past negative knowledge exchange.

Associated Null Hypothesis:

$H1_{10}$: Knowledge holders are likely to respond similarly to the one they had at least one past positive knowledge exchange and the one they had at least one negative knowledge exchange.

In addition to these two scenarios that caught the previous researchers' attention, there are another two ignored but realistic situations in real organizational settings that deserve research attention. The third scenario is a complicated one, where the knowledge holder experienced both positive and negative reciprocity with the

knowledge seeker across their previous knowledge exchanges. Long organizational tenure in the same organization opens up possibility for the experience of mixed positive and negative reciprocity. This kind of history might complicate the knowledge holder's feelings for the knowledge seeker and for the relationships with them, which will be projected onto their response to the present request for knowledge forwarded by the knowledge seeker. The last scenario is that the knowledge holder and the knowledge seeker did not know each other and did not have any interaction at all in the past time prior to the current knowledge request. This is particularly true in large organizations of various functionalities supported by a great number of employees.

Compared with the impact of a mere positive or negative knowledge exchange between the knowledge holder and the knowledge seeker, the combined effect of previous positive and negative exchanges on the knowledge holder's present response is more complicated to predict. However, it is plausible that the experience of additional negative reciprocity will create an extra negative impact on the knowledge holder and divert them to the hiding direction. Therefore, we hypothesize that

$H1_{2a}$: Knowledge holders are likely to share (to different extents) knowledge with the one they had at least one past positive knowledge exchange while likely to hide knowledge from the one they had past positive and negative knowledge exchanges.

Associated Null Hypothesis:

$H1_{20}$: Knowledge holders are likely to respond similarly to the one they had at least one past positive knowledge exchange and the one they had past positive and negative knowledge exchanges.

However, past exchanges can build and further relationships between the knowledge holder and the knowledge seeker and help create a sense of relatedness and closeness for them. The experience of a positive knowledge exchange helps relieve the unpleasant effect of the negative experience and works for the benefit of the current knowledge seeker. Thus, compared with a mere negative exchange history, the mixed positive and negative exchange experience will probably divert the knowledge holder to the sharing direction. Therefore, we hypothesize that

$H1_{3a}$: Knowledge holders are likely to hide knowledge from the one they had at least one past negative knowledge exchange while likely to share (to different extents) knowledge with the one they had past positive and negative exchanges.

Associated Null Hypothesis:

$H1_{30}$: Knowledge holders are likely to respond similarly to the one they had at least one past negative knowledge exchange and the one they had past positive and negative knowledge exchanges.

Another intriguing scenario is no past exchange between the knowledge holder and the knowledge seeker. Individuals' responsive behavior under such a scenario seems more possibly influenced by various contextual factors and, therefore, is difficult to predict. Placing the knowledge holder's response in this scenario under comparisons with other scenarios helps unravel the mystery. Given the positive effect of the past positive reciprocity, it is reasonable to hypothesize that.

$H1_{4a}$: Knowledge holders are likely to share (to different extents) knowledge with the one they had at least one past positive knowledge exchange while likely to hide knowledge from the one they had no past exchange.

Associated Null Hypothesis:

$H1_{40}$: Knowledge holders are likely to respond similarly to the one they had at least one past positive knowledge exchange and the one they had no past exchange.

Oppositely, a negative exchange is socially and personally undesirable and likely to prevent the perpetrator (the current knowledge seeker) from having favorable replies in return. We, therefore, hypothesize that

$H1_{5a}$: Knowledge holders are likely to hide knowledge from the one they had at least one past negative knowledge exchange while likely to share (to different extents) knowledge with the one they had no past exchange.

Associated Null Hypothesis:

$H1_{50}$: Knowledge holders are likely to respond similarly to the one they had at least one negative positive knowledge exchange and the one they had no past exchange.

For the last pairwise comparison, we proposed that the established connectedness created by past exchanges would engage the knowledge holder in helping behavior (e.g., knowledge sharing), as compared to zero interaction history. We, therefore, hypothesize that

$H1_{6a}$: Knowledge holders are likely to share (to different extents) knowledge with the one they had past positive and negative exchanges while likely to hide knowledge from the one they had no past exchange.

Associated Null Hypothesis:

$H1_{60}$: Knowledge holders are likely to respond similarly to the one they had both positive and negative knowledge exchanges and the one they had no past exchange.

2.6.3 Situational Factors and Knowledge Request Response

2.6.3.1 Knowledge Seeker's Rank and Knowledge Request Response. The term "coworker" is used to refer to anyone with whom an employee works in the organization, including those at higher, same, and lower ranks, and "peers" are coworkers who are of the same rank and possess no formal authority over each other (Fatima et al., 2021). In accordance with this classification, Kmieciak (2021) categorized knowledge withholding into horizontal withholding (withholding of knowledge from peer co-workers) and vertical withholding (withholding of knowledge between a subordinate and a supervisor).

Knowledge hiding literature is found to have addressed both prosocial and antisocial leadership styles, involving them as deterrents/ motivators or moderators. However, to the author's best knowledge, no study so far has attended to the potential influence of the knowledge seeker's rank on knowledge hiding. Whether knowledge holders vary their responses to requests for knowledge from coworkers of different hierarchical positions (e.g., a superior and a fellow coworker) still remains in the dark.

In addition to leadership style, another concept closely related to "rank" involved in knowledge hiding is "social status" (of the knowledge holder), which was documented to have had a role to play in organizational settings. For example, employees' social status has a significant moderating effect on the relationship between knowledge hiding behavior and organizational performance (Wen & Ma, 2021), and social status accentuates the negative relationship between knowledge hiding and employee creativity (Rhee & Choi, 2017)

In view of different power distributions to positions in an organization and co-opetition among employees of the same rank, employees may deliberately vary their communication styles with colleagues from different hierarchal levels (such as supervisors and peer co-workers). In this sense, the knowledge seeker's rank has the potential to exert an impact on the knowledge holder's response to the knowledge request. Considering that superiors are usually the ones who are in charge of resource allocation in the unit and even in the organization and have the influence on such vital decisions as those concerning employees' promotion and compensation, the following hypotheses are proposed:

$H2_a$: Knowledge holders are likely to share (to different extents) knowledge with knowledge seekers of a higher rank while likely to hide knowledge from knowledge seekers of the same rank.

Associated Null Hypothesis:

$H2_0$: The knowledge seeker's rank does not predict the knowledge holder's responses.

In the current study, we aim to compare knowledge holders' responses to different ranks in two "extreme" situations. The first "extreme" situation is the one where the knowledge holder experienced a past negative knowledge exchange with the seeker, and the second is the one where the knowledge seeker requests for high-level scarcity knowledge the holder possess. Hence, H2 can be subdivided into the following ones:

$H2_{1a}$: In the extreme situation where a past negative knowledge exchange happened between the knowledge seeker and the knowledge holder, the knowledge holder is more likely to share (to different extents) knowledge with the knowledge

seeker of a higher rank while likely to hide knowledge from the knowledge seeker of the same rank.

Associated Null Hypothesis:

$H2_{10}$: In the extreme situation where a past negative knowledge exchange happened between the knowledge seeker and the knowledge holder, the knowledge seeker's rank does not predict the knowledge holder's responses.

$H2_{2a}$: In the extreme situation where the knowledge seeker requests for high-level scarcity knowledge the knowledge holder has, the knowledge holder is more likely to share (to different extents) knowledge with the knowledge seeker of a higher rank while likely to hide knowledge from the knowledge seeker of the same rank.

Associated Null Hypothesis:

$H2_{20}$: In the extreme situation where the knowledge seeker requests for high-level scarcity knowledge the knowledge holder has, the knowledge seeker's rank does not predict the knowledge holder's responses.

2.6.3.2 Knowledge Seeker's Gender and Knowledge Request Response. Previous research on knowledge hiding suggested that the knowledge holder could adjust their hiding behavior based on the gender of the knowledge seeker (Andreeva & Zappa, 2023), highlighting the significance of investigating if knowledge holders respond differently to different genders. However, "gender" (of the knowledge holder) in knowledge hiding studies was usually treated as a control variable in extant studies for the potential effect it might exert on knowledge holders' hiding behavior (Good et al., 2022; Huo et al., 2016; Yao et al., 2020; X. Zhang et al., 2021; Y. Zhang et al., 2021; Zhao & Jiang, 2021). Another exception was made by Hayat et al.

(2021), who found front-line employees' gender varies the effect of knowledge hiding. Likewise, Yang and Ribiere (2020)'s study revealed that females in academia were more likely to distrust their colleagues and that they were more concerned about interpersonal relationships and used evasive hiding strategy more often than men, indicating differences exist in male and female behaviors.

The identified effect of gender on knowledge hiding exposes the limitations of taking it as a control variable in studying knowledge hiding. Digging into the impact of gender is worth more research effort in consideration of different social expectations placed on different genders. Regulated by social norms and expectations, women tend to be more concerned about the maintenance of relationships, whereas men are often instrumental in achieving their goals (Y. Zhang et al., 2021). Interacted with the two different communication styles, knowledge holders varied responses would become possible. Therefore, we hypothesize the following:

$H3_a$: Knowledge holders are likely to share (to different extents) knowledge with female knowledge seekers while likely to hide knowledge from male knowledge seekers.

Associated Null Hypothesis:

$H3_0$: The knowledge seeker's gender does not predict knowledge holders' responses.

Taking knowledge holder's perspective into account, we further expected that

$H3_{1a}$: Female knowledge holders are likely to share (to different extents) knowledge with female knowledge seekers while likely to hide knowledge from male knowledge seekers.

Associated Null Hypothesis:

$H3_{10}$: The knowledge seeker's gender does not predict female knowledge holders' responses.

$H3_{2a}$: Male knowledge holders are likely to share (to different extents) knowledge with female knowledge seekers while likely to hide knowledge from male knowledge seekers.

Associated Null Hypothesis:

$H3_{20}$: The knowledge seeker's gender does not predict male knowledge holders' responses.

2.6.3.3 Communication Channel Richness and Knowledge Request Response. Computer-mediated communication makes it easier to trace and document an individual's work and contribution (Martins et al., 2004). The indispensability of different communication media in the work environment nowadays arouses the author's curiosity about the responses organizational employees will make when a request for knowledge is made via different means. To better unveil the effect of different mediums used in the work setting communication, Media Richness Theory is adopted as the theoretical lens to make according comparison. Three communication styles investigated in this study are email, video conferencing, and instant messaging. The rationale for differentiating them as different communication channels utilized by organizational employees is their (in)ability to allow for synchronicity and the involved density of information cues. We hypothesize that

$H4_a$: Knowledge holders are likely to share (to different extents) their knowledge when a request is made through a rich communication channel while

likely to hide their knowledge when a request is made through a lean communication channel.

Associated Null Hypothesis:

$H4_0$: The richness level of the communication channel used to make a knowledge request does not predict knowledge holders' responses.

Due to decreasing contextual cues, the information provided by email was comparably self-absorbed, less status differentiated, and much of the information was not the same as that would have been conveyed through other mediums (Sproull & Kiesler, 1986). In contrast, verbal communications are more personal, and helpful to create a supportive and inspirational climate (Burke & Barron, 2014). While email allows more time for employees to consider the knowledge request before deciding how to respond, video conferencing provides the opportunity for timely communication and coordination and presents more cues for information processing during interactions. Therefore, the following hypotheses are suggested:

$H4_{1a}$: Knowledge holders are likely to share (to different extents) their knowledge when a request is made through video conferencing while likely to hide their knowledge when a request is made through email.

Associated Null Hypothesis:

$H4_{10}$: Knowledge holders do not vary their responses to knowledge requests made through video conferencing or through email.

Instant messaging use is in an in-between situation. Instant messaging represents a less formal style of communication as compared to email in terms of language use and syntactical features. In addition, it shuns an immediate response for knowledge holders and protects them from disclosing their real intentions (whenever

they need to) as it reveals nothing more than verbal cues. Based on these distinguished features of instant messaging as a communication media to request knowledge, we hypothesize that

$H4_{2a}$: Knowledge holders are likely to share (to different extents) their knowledge when a request is made through video conferencing while likely to hide their knowledge when a request is made through instant messaging.

Associated Null Hypothesis:

$H4_{20}$: Knowledge holders do not vary their responses to knowledge requests made through video conferencing or through instant messaging.

and that

$H4_{3a}$: Knowledge holders are likely to share (to different extents) their knowledge when a request is made through instant messaging while likely to hide their knowledge when a request is made through email.

Associated Null Hypothesis:

$H4_{30}$: Knowledge holders do not vary their responses to knowledge requests made through instant messaging or through email.

2.6.4 Factors Concerning Knowledge Nature and Knowledge Request Response

2.6.4.1 Knowledge Ownership and Knowledge Request Response.

Psychological ownership theory deciphers the psychological mechanism behind knowledge hiding behavior in work settings as it brings to the foreground one's felt attachment to things at work (Webster et al., 2008). The investment in acquiring the requested knowledge develops a sense of ownership in knowledge holders' mind. Knowledge involving minimum investment (e.g., of time or effort) induces less

ownership sense to the knowledge holder and hence is likely to be made available to others when requested. In contrast, hard-earned knowledge that involves substantial investment will generate more felt attachment for the knowledge holder and be likely to be withheld. Therefore, the following hypothesis is proposed:

$H5_a$: Knowledge holders are likely to share (to different extents) the knowledge acquired with minimum investment while likely to hide the knowledge acquired with substantial investment.

Associated Null Hypothesis:

$H5_0$: The investment knowledge holders made in acquiring the requested knowledge does not predict their responses to the request for the knowledge.

2.6.4.2 Knowledge Type and Knowledge Request Response. Knowledge complexity significantly defines employees' hiding practice (Peng et al., 2019). Our act of taking knowledge type as one of the independent variables that might predict knowledge holders' different responsive behaviors is inspired by the findings revealed from previous studies that involved the complexity of knowledge and evidenced this knowledge attribute's positive effect on knowledge hiding (Sulistiawan et al., 2022; Yuan et al., 2020).

Researchers suggested that it was essential to examine the complexity of the knowledge that can drive employees to engage in knowledge hiding behavior (Ghulam Ali Arain, Zeeshan Ahmed Bhatti, Naeem Ashraf, et al., 2020). It was found that employees concealed detailed knowledge because addressing the request for such knowledge demanded a significant amount of time and effort, hindering employees' and coworkers' ability to attain their personal goals (Issac et al., 2020). While simple

knowledge is easy to acquire and share, the acquisition of complex knowledge requires more time and effort investment, individuals are more likely to hide sophisticated knowledge (Connelly & Zweig, 2015). When encountering request for complex knowledge, specific hiding tactic (i.e., evasive hiding) was preferrable (Kumar Jha & Varkkey, 2018). Based on these previous research findings, we therefore, hypothesized that

$H6_a$: Knowledge holders are likely to share (to different extents) explicit knowledge (i.e., documents) while likely to hide the knowledge that was acquired over time and difficult to codify (i.e., experience) and the one developed over time or more personal (i.e., relationships).

Associated Null Hypothesis:

$H6_0$: The type of the requested knowledge does not predict knowledge holders' responses.

This hypothesis can be further divided into the subsequent ones based on the complexity, codifiability, and exclusiveness of specific types of knowledge:

$H6_{1a}$: Knowledge holders are likely to share (to different extents) their knowledge when they are requested for explicit knowledge (i.e., documents) while likely to hide knowledge when they are requested for the knowledge that was acquired over time and difficult to codify (i.e., experience).

Associated Null Hypothesis:

$H6_{10}$: Knowledge holders are likely to respond similarly to requests for explicit knowledge (i.e., documents) and to those for the knowledge that was acquired over time and difficult to codify (i.e., experience).

$H6_{2a}$: Knowledge holders are likely to share (to different extents) their knowledge when they are requested for explicit knowledge (i.e., documents) while likely to hide knowledge when they are requested for the knowledge developed over time or more personal (i.e., relationships).

Associated Null Hypothesis:

$H6_{20}$: Knowledge holders are likely to respond similarly to requests for explicit knowledge (i.e., documents) and to those for the knowledge developed over time or more personal (i.e., relationships).

$H6_{3a}$: Knowledge holders are likely to share (to different extents) their knowledge when they are requested for the knowledge that was acquired over time and difficult to codify (i.e., experience) while likely to hide knowledge when they are requested for the knowledge developed over time or more personal (i.e., relationships).

Associated Null Hypothesis:

$H6_{30}$: Knowledge holders are likely to respond similarly to requests for the knowledge that was acquired over time and difficult to codify (i.e., experience) and to those for the knowledge developed over time or more personal (i.e., relationships).

2.6.4.3 Knowledge Scarcity and Knowledge Request Response. From the conservation of resources theory perspective, knowledge can be considered as a limited resource that is better reserved for oneself. Some knowledge, particularly those held only by very few people and those even determine one's survival, might provide the knowledge holder a unique status within the organization and create their sustainability and irreplaceability. The scarcity of knowledge represents in some way

the knowledge value. When the knowledge is known or accessible to many people, its value perceived by the knowledge holder will be low. Therefore, they are likely to share it when they are requested for this knowledge. However, if the knowledge requested by the seeker is rare and hardly available, the knowledge holder will be likely to conserve it as a valuable resource for their own benefits. The researcher expects that the knowledge holder will not grant due consideration to their colleagues' requests when they believe sharing the knowledge will lead to their resource loss. Instead, they will prioritize their own benefit by withholding the knowledge so that they are able to maintain their competitive advantage. The relevant hypotheses are as follows:

$H7_a$: Knowledge holders are likely to share (to different extents) low-level scarcity knowledge while likely to hide high-level scarcity knowledge.

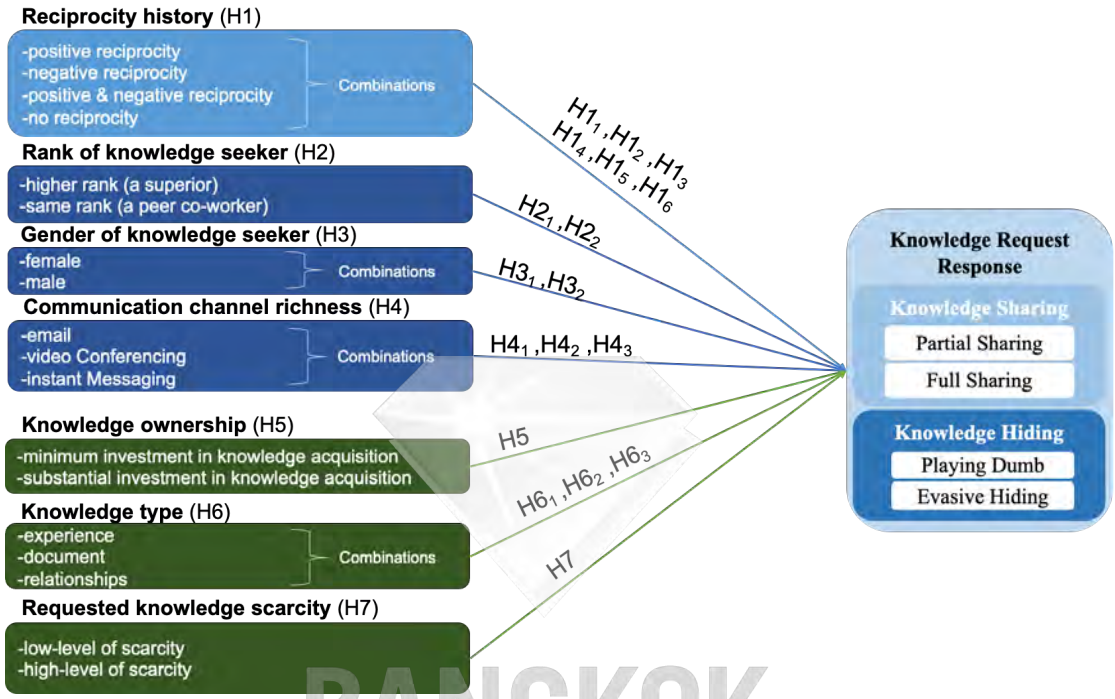
Associated Null Hypothesis:

$H7_0$: The scarcity level of knowledge does not predict knowledge holders' responses.

Figure 2.14 specifies the sub-dimensions of all focal variables.

Figure 2.14

Research Model with Variable Sub-dimensions



CHAPTER 3

METHODOLOGY

This chapter elaborates on the rationale for basing this study on positivist assumptions and employing a quasi-experimental design to examine the possible predictors of knowledge sharing and knowledge hiding in an organizational context. Moreover, the sampling design and the data collection approach adopted in the current study are detailed in this chapter.

3.1 Research Philosophy

Research philosophy refers to the beliefs and assumptions in the process of developing knowledge, and it involves assumptions about how a researcher views the world (Saunders et al., 2016). Philosophical ideas exercise influence on research practice and need to be clarified (Creswell & Creswell, 2017).

Three major types of assumptions a research philosophy makes are ontological, epistemological, and axiological. The differences in these assumptions distinguish research philosophies from one another. Ontological assumptions involve the ones about reality, which determines the objects in research and how to approach them; epistemological assumptions are those about knowledge, which determine the contribution to knowledge to be made; axiological assumptions refer to those manifesting the extent to which a researcher's values and ethics influence the research process (Saunders et al., 2016).

The five main research philosophies in business and management research are positivism, critical realism, interpretivism, postmodernism, and pragmatism (Saunders

et al., 2016). Table 3.1 depicts the respective ontological, epistemological, and axiological assumptions of the five philosophies and the typical methods that are likely to be adopted under each research philosophy.

Table 3.1

Comparison of Five Research Philosophies in Business and Management Research (Saunders et al., 2016, pp. 136,137)

Ontology (nature of reality or being)	**Epistemology** (what constitutes acceptable knowledge)	Axiology (role of values)	**Typical methods**
	Positivism		
Real, external, independent One true reality (universalism) Granular (things) Ordered	Scientific method Observable and measurable facts Law-like generalisations Numbers Causal explanation and prediction as contribution	Value-free research Researcher is detached, neutral and independent of what is researched Researcher maintains objective stance	Typically deductive, highly structured, large samples, measurement, typically quantitative methods of analysis, but a range of data can be analysed
	Critical realism		
Stratified/layered (the empirical, the actual and the real) External, independent Intransient Objective structures Causal mechanisms	Epistemological relativism Knowledge historically situated and transient Facts are social constructions Historical causal explanation as contribution	Value-laden research Researcher acknowledges bias by world views, cultural experience and upbringing Researcher tries to minimise bias and errors Researcher is as objective as possible	Retroductive, in-depth historically situated analysis of pre-existing structures and emerging agency. Range of methods and data types to fit subject matter
	Interpretivism		
Complex, rich Socially constructed through culture and language Multiple meanings, interpretations, realities Flux of processes, experiences, practices	Theories and concepts too simplistic Focus on narratives, stories, perceptions and interpretations New understandings and worldviews as contribution	Value-bound research Researchers are part of what is researched, subjective Researcher interpretations key to contribution Researcher reflexive	Typically inductive. Small samples, in-depth investigations, qualitative methods of analysis, but a range of data can be interpreted

Table 3-1 (continued)

Comparison of Five Research Philosophies in Business and Management Research (Saunders et al., 2016, pp. 136,137)

Ontology (nature of reality or being)	Epistemology (what constitutes acceptable knowledge)	Axiology (role of values)	Typical methods
Postmodernism			
Nominal Complex, rich Socially constructed through power relations Some meanings, interpretations, realities are dominated and silenced by others Flux of processes, experiences, practices	What counts as 'truth' and 'knowledge' is decided by dominant ideologies Focus on absences, silences and oppressed/repressed meanings, interpretations and voices Exposure of power relations and challenge of dominant views as contribution	Value-constituted research Researcher and research embedded in power relations Some research narratives are repressed and silenced at the expense of others Researcher radically reflexive	Typically deconstructive – reading texts and realities against themselves In-depth investigations of anomalies, silences and absences Range of data types, typically qualitative methods of analysis
Pragmatism			
Complex, rich, external 'Reality' is the practical consequences of ideas Flux of processes, experiences and practices	Practical meaning of knowledge in specific contexts 'True' theories and knowledge are those that enable successful action Focus on problems, practices and relevance Problem solving and informed future practice as contribution	Value-driven research Research initiated and sustained by researcher's doubts and beliefs Researcher reflexive	Following research problem and research question Range of methods: mixed, multiple, qualitative, quantitative, action research Emphasis on practical solutions and outcomes

This study is based on the positivist assumptions that there is a single true reality that is independent of human cognition and that law-like generalizations can be achieved through using scientific and highly structured methods, typically quantitative ones that originated from natural science, which thus establishes the quantifiable observations as the research emphasis and statistical analysis the means to obtain the solutions to research questions (Saunders et al., 2016).

In the business and management research context, a positivist researcher sees organizations and behavior/events in organizations in the same way as natural scientists view physical objects and natural phenomena. That is, organizations and behavior/events exist externally from the human being, therefore, a positivist researcher endeavors to unveil patterns and constant relationships that can be used to explain and predict behavior in organizational settings on the basis of credible and solid data generated by means of discovering observable and measurable facts. Adopting a positivist position, the researcher takes a neutral and objective stance, remaining detached from the research and data to make sure that no influence of personal values to be exerted on the findings.

The focus of the current study is to examine if the variables of interest suggested by previous literature hold true in predicting knowledge sharing and knowledge hiding behavior in organizations, fitting well in the "reductionistic" feature of positivism, meaning that it intends "to reduce the ideas into a small, discrete set to test, such as the variables that comprise hypotheses and research questions" (Creswell & Creswell, 2017, p. 6). As determinism suggests, "examining the relationships between and among variables is central to answering questions and hypotheses through surveys and experiments" (Creswell & Creswell, 2017). With respect to the objectivity of both the collected data and the respondents from whom the data was generated, the researcher excluded her own values, stayed external to the data collection process, and concluded answers to the research questions relying upon quantifiable measurements.

3.2 Research Design

The objectives of this study are to attain a more comprehensive insight into the predictors of knowledge workers' knowledge hiding behavior through a comparison made between two cultures and to explore the use of serious games in data collection. The focus of WHAT sets its explorative nature.

Different from interpretivists or constructivists, who believe meanings are socially constructed, positivists see the world as an objective being (Creswell & Creswell, 2017; Saunders et al., 2016). They hold a deterministic philosophy, in the belief that causes (probably) determine effects and outcomes, and they deem it paramount to develop numeric measurements to study individuals' behavior (Creswell & Creswell, 2017). Therefore, a researcher taking a positivist stance typically resorts to quantitative methods of analysis, which usually involves a deductive approach (Saunders et al., 2016), for positivist assumptions are more applicable for quantitative research than qualitative research (Creswell & Creswell, 2017).

Experiment and survey are two research strategies that are exclusively associated with a quantitative research design (Saunders et al., 2016). The purpose of an experiment is to examine the probability of a change in an independent variable causing a change in a dependent variable (Saunders et al., 2016). Experimental research designs are particularly useful when the objective of the research is to establish the causal relationships between independent and dependent variable(s) (Podsakoff & Podsakoff, 2019).

Despite its overwhelming advantages, for example, it allows researchers to make inferences about the causality of the proposed relationship, reduces research noise, and eases the concerns of reverse causality, an experimental research design

represents a rare case in extant business and management studies. According to a recent review, less than 1% of more than 900 empirical studies published in the *Journal of International Business Studies* used an experimental design (Zellmer-Bruhn et al., 2016). The small proportion of the use of experimental designs in international business research is in striking contrast to that in other fields, such as economics, psychology, and marketing, where the use of experimental research designs is not just in an increasing trend but has almost reached a mandatory extent for high-level publications (Bartel-Radic, 2019).

The systematic literature review on knowledge hiding conducted for this study revealed an unsurprisingly similar situation where only seven studies employed experimental designs out of the total 117 published research papers, accounting for a tiny percentage of 6%. Due to the difficulty in observing and capturing knowledge hiding behavior, which is a socially undesirable behavior and, therefore, very often hidden and invisible, self-report measurement is deemed to be the most appropriate method (Connelly et al., 2012). However, given that experimental design allows the strongest statements of causality, it could be very useful in assessing people's willingness to share knowledge and measuring their resistance to others who modify their ideas (Webster et al., 2008). Researchers working on knowledge hiding have repeatedly called for the utilization of experiments in investigating this behavior (e.g., (Babič et al., 2018; Huo et al., 2016)).

Experimental research designs include laboratory experiment (also called clinical experiment), field experiment, and quasi experiment. In both laboratory/clinical experiment and field experiment, participants are randomly assigned into either the experimental group, where they are exposed to some form of

intervention(s), or the control group, where no intervention is made. With other external factors remaining constant, any change to the dependent variable will only be attributed to the intervention(s).

As the term implies, a laboratory/clinical experiment is the one that operates in a dedicated place, usually an artificial reproduction of a real situation. A laboratory/clinical experiment enjoys greater internal validity than a field experiment for it allows for controlling contextual variables, which is not possible in field experiments (Bartel-Radic, 2019). However, laboratory experiments are often criticized for the created artificial settings that lack realism, the likelihood that they will lead to an increase in participants' reactivity, and their inability to generate generalizability, as compared with field experiments and quasi experiments (Saunders et al., 2016).

Despite the shared strength that both field experiments and quasi experiments take place in real organizational settings, which refrains them from criticisms about artificiality and reduces participants' awareness of the experimental conditions and thus containing their reactivity to these conditions, the lack of control over the external environment in filed experiments and quasi experiment raises concerns about the construct validity of the manipulations (Podsakoff & Podsakoff, 2019; Saunders et al., 2016). Another drawback of field experiments lies in their demanding requirement for time and resources in implementation, making them costlier (Bartel-Radic, 2019), resulting in rare cases of them in business and management research.

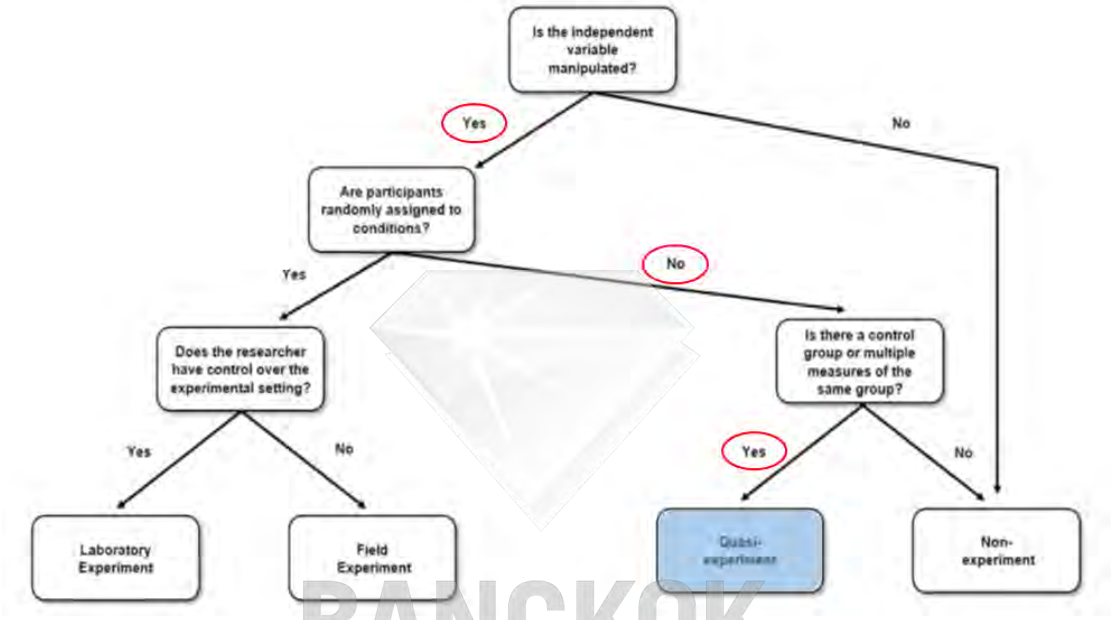
The fundamental difference distinguishing quasi-experimental designs from the other two types is that they follow a unique route where participants are not randomly assigned into separate groups. Figure 3.1 specifies conditions under which an

experimental design is selected for research. In this research, the independent variables will be manipulated to create dedicated scenarios for participants to experience. Limited by sample size, multiple groups randomly assigned to different conditions will not be feasible. However, the participants will need to go through a series of scenarios that are used to measure their responses to colleagues' knowledge requests made under multiple conditions. This design is in agreement with the route of quasi-experiments.

It is not what to research that makes science but how to research it, and the method employed to collect information is commanded by the properties of the information (Bartel-Radic, 2019). To answer the research question proposed in this study and to respond to the call for more experimental research in international business and management, the researcher employs a quasi-experimental design as the research strategy, for this type of research design strengthens causal inference when a random assignment of participants is not possible, and it enjoys high external validity (Podsakoff & Podsakoff, 2019).

Figure 3.1

Decision Tree for Classifying Experimental Research Designs (adapted from (Podsakoff & Podsakoff, 2019, p. 15))

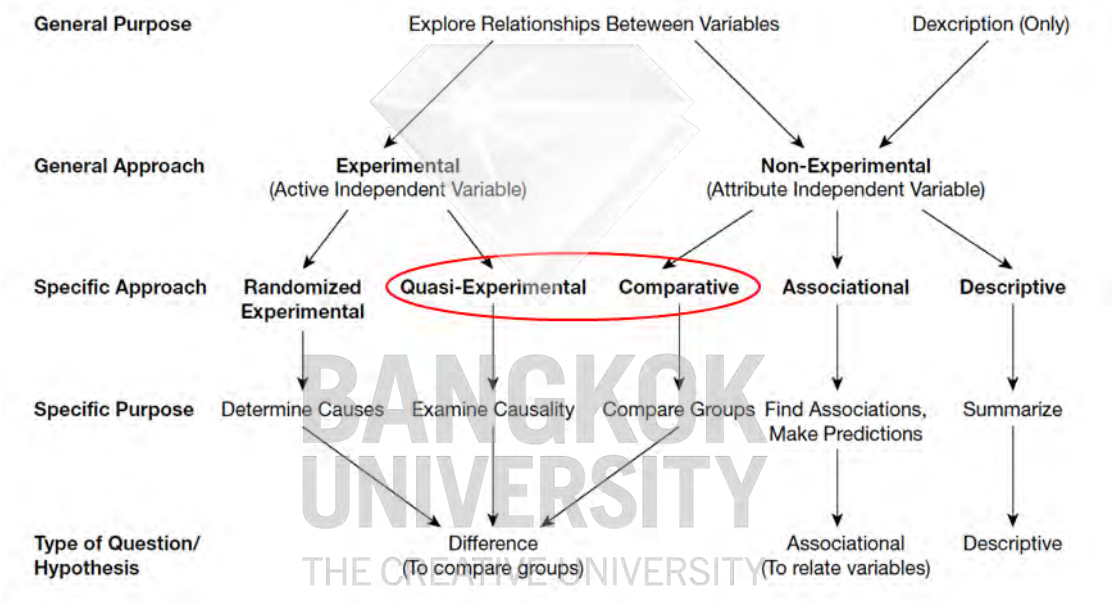


In addition to examining organizational employees' knowledge sharing and knowledge hiding behavioral responses with a quasi-experimental design, the comparative nature of the study extends it to a broader scope. This study seeks to make a comparison of the responses between employees from two different groups, where "the groups are based on an attribute independent variable" (Gliner et al., 2016, p. 12), that is, the culture of the country. The comparative approach, although rarely provides adequate support for causality, could provide suggestions about possible causes and related variables (Gliner et al., 2016). Therefore, the prospect of the study is promising, guaranteed by the combination of a quasi-experimental design and the comparative nature (as presented in Figure 3.2) that aims at revealing the potential

causality and more possible causes that lead to organizational employees' possibly varying responses to knowledge requests from colleagues.

Figure 3.2

Schematic Diagram of How the General Type of Research Question Corresponds to the Purpose and Approach of the Study (Gliner et al., 2016, p. 15)



The decision to employ a quasi-experimental design to dig into what drives knowledge workers to engage in knowledge hiding behavior coupled with a comparative approach echoes and addresses the explorative nature of the study.

3.3 Population and Sampling

3.3.1 Target Population

This study aims to examine if any differences exist in the behavioral responses of organizational knowledge workers from two different national cultures to

knowledge requests from their coworkers. The researcher turns to Hofstede (2005)'s cultural dimension paradigm as the foundation and criteria for deciding the research population. Table 3.2 to Table 3.7 present the ranks of the selected countries in terms of cultural dimensions.

Considering participant accessibility and the intended culture variety set by the research objectives, the target population of this study is knowledge workers in the automotive industry from China and Germany. The fact that the two countries are not only dispersed in the geographic sense but scattered in their rankings in terms of several cultural dimensions, including power distance, individualism, uncertainty avoidance, and indulgence versus restraint, could well evidence their representativeness as cultures discrete from each other. More importantly, representing the largest economies and also the biggest motor vehicle production countries of Asia and Europe, respectively, China and Germany will be able to play an active context for knowledge management and management research at large to yield multiple conceptual and practical implications.

The existing knowledge hiding literature involves a broad range of industries and fields. Manufacturing and processing industry (Černe et al., 2017; ČErne et al., 2014; Peng et al., 2019), telecommunication organizations and banks (Jahanzeb et al., 2019), informational technology (Peng et al., 2019), high-technology organizations (Courpasson & Younes, 2018; Fong, Men, Luo, & Jia, 2018), and higher education/academia (Demirkasimoglu, 2016; Ghani et al., 2019; Hernaus, Cerne, Connelly, Poloski Vokic, & Škerlavaj, 2019) are major sample sources for previous knowledge hiding studies. To the best of the researcher's knowledge, Mahmood et al. (2023)'s study is the only one that recruits participants from the automotive industry.

Given the requirement of technological and industrial knowledge for working in the automotive industry, employees from automotive companies will act as qualified knowledge workers for our study.

Table 3.2

Power Distance Index (PDI) Values for 76 Countries and Regions Based on Three Items in the IBM Database Plus Extensions (Hofstede & Hofstede, 2005)

TABLE 3.1 Power Distance Index (PDI) Values for 76 Countries and Regions Based on Three Items in the IBM Database Plus Extensions

RANK	AMERICA C/S	EUROPE S/SE	EUROPE N/NW ANGLO WORLD	EUROPE C/E EX-SOVIET	MUSLIM WORLD M.E & AFRICA	ASIA EAST ASIA SE	INDEX
1–2						Malaysia	104
1–2				Slovakia			104
3–4	Guatemala						95
3–4	Panama						95
5						Philippines	94
6				Russia			93
7				Romania			90
8				Serbia			86
9	Suriname						85
10–11	Mexico						81
10–11	Venezuela						81
12–14					Arab ctrs		80
12–14						Bangladesh	80
12–14						China	80
15–16	Ecuador						78
15–16						Indonesia	78
17–18						India	77
17–18					Africa W		77
19						Singapore	74
20				Croatia			73
21				Slovenia			71
22–25				Bulgaria			70
22–25					Morocco		70
22–25			Switzerland Fr				70
22–25						Vietnam	70
26	Brazil						69
27–29		France					68
27–29						Hong Kong	68
27–29				Poland			68
30–31			Belgium Fr				67
30–31	Colombia						67
32–33	El Salvador						66
32–33		Turkey					66
34–36					Africa E		64
34–36	Peru						64
34–36						Thailand	64
37–38	Chile						63
37–38		Portugal					63
39–40			Belgium Nl				61
39–40	Uruguay						61
41–42		Greece					60
41–42						S Korea	60
43–44					Iran		58
43–44						Taiwan	58
45–46				Czech Rep.			57
45–46		Spain					57
47		Malta					56
48					Pakistan		55
49–50			Canada Quebec				54
49–50						Japan	54
51		Italy					50
52–53	Argentina						49
52–53					S Africa (wte)		49
54	Trinidad						47
55				Hungary			46
56	Jamaica						45
57				Latvia			44
58				Lithuania			42
59–61				Estonia			40
59–61			Luxembourg				40
59–61			United States				40
62			Canada total				39
63			Netherlands				38
64			Australia				38
65–67	Costa Rica						35
65–67			Germany				35
65–67			Great Britain				35
68			Finland				33
69–70			Norway				31
69–70			Sweden				31
71			Ireland				28
72			Switzerland Ge				26
73			New Zealand				22
74			Denmark				18
75					Israel		13
76			Austria				11

Table 3.3

Individualism Index (IDV) Values for 76 Countries and Regions Based on 14 Items in the IBM Database Plus Extensions (Hofstede & Hofstede, 2005)

TABLE 4.1 Individualism Index (IDV) Values for 76 Countries and Regions Based on Factor Scores from 14 Items in the IBM Database Plus Extensions

RANK	AMERICA C/S	EUROPE S/SE	EUROPE N/NW ANGLO WORLD	EUROPE C/E EX-SOVIET	MUSLIM WORLD M.E & AFRICA	ASIA EAST ASIA SE	INDEX
1			United States				91
2			Australia				90
3			Great Britain				89
4–6			Canada total				80
4–6				Hungary			80
4–6			Netherlands				80
7			New Zealand				79
8			Belgium Nl				78
9		Italy					76
10			Denmark				74
11			Canada Quebec				73
12			Belgium Fr				72
13–14		France					71
13–14			Sweden				71
15–16			Ireland				70
15–16				Latvia			70
17–18			Norway				69
17–18			Switzerland Ge				69
19			Germany				67
20					S Africa (wte)		65
21			Switzerland Fr				64
22			Finland				63
23–26				Estonia			60
23–26				Lithuania			60
23–26			Luxembourg				60
23–26				Poland			60
27		Malta					59
28				Czech Rep.			58
29			Austria				55
30					Israel		54
31				Slovakia			52
32		Spain					51
33						India	48
34	Suriname						47
35–37	Argentina						46
35–37						Japan	46
35–37					Morocco		46
38					Iran		41
39–40	Jamaica						39
39–40				Russia			39
41–42					Arab ctrs		38
41–42	Brazil						38
43		Turkey					37
44	Uruguay						36
45		Greece					35
46				Croatia			33
47					Philippines		32
48–50				Bulgaria			30
48–50	Mexico						30
48–50				Romania			30
51–53					Africa E		27
51–53		Portugal					27
51–53				Slovenia			27
54						Malaysia	26
55–56						Hong Kong	25
55–56				Serbia			25
57	Chile						23
58–63						Bangladesh	20
58–63						China	20
58–63						Singapore	20
58–63						Thailand	20
58–63						Vietnam	20
58–63					Africa W		20
64	El Salvador						19
65						S Korea	18
66						Taiwan	17
67–68	Peru						16
67–68	Trinidad						16
69	Costa Rica						15
70–71						Indonesia	14
70–71					Pakistan		14
72	Colombia						13
73	Venezuela						12
74	Panama						11
75	Ecuador						8
76	Guatemala						6

Table 3.4

Masculinity Index (MAS) Values for 76 Countries and Regions Based on Factor Scores from 14 Items in the IBM Database Plus Extensions (Hofstede & Hofstede, 2005)

TABLE 5.1 Masculinity Index (MAS) Values for 76 Countries and Regions Based on Factor Scores from 14 Items in the IBM Database Plus Extensions

RANK	AMERICA C/S	EUROPE S/SE	EUROPE N/NW ANGLO WORLD	EUROPE C/E EX-SOVIET	MUSLIM WORLD M.E & AFRICA	ASIA EAST ASIA SE	INDEX
1				Slovakia			110
2						Japan	95
3				Hungary			88
4			Austria				79
5	Venezuela						73
6			Switzerland Ge				72
7		Italy					70
8	Mexico						69
9–10			Ireland				68
9–10	Jamaica						68
11–13						China	66
11–13			Germany				66
11–13			Great Britain				66
14–16	Colombia						64
14–16						Philippines	64
14–16				Poland			64
17–18					S Africa (wte)		63
17–18	Ecuador						63
19			United States				62
20			Australia				61
21			Belgium Fr				60
22–24			New Zealand				58
22–24			Switzerland Fr				58
22–24	Trinidad						58
25–27				Czech Rep.			57
25–27		Greece					57
25–27						Hong Kong	57
28–29	Argentina						56
28–29						India	56
30						Bangladesh	55
31–32					Arab ctrs		53
31–32					Morocco		53
33			Canada total				52
34–36			Luxembourg				50
34–36						Malaysia	50
34–36					Pakistan		50
37	Brazil						49
38						Singapore	48
39–40					Israel		47
39–40		Malta					47
41–42						Indonesia	46
41–42					Africa W		46
43–45			Canada Quebec				45
43–45						Taiwan	45
43–45		Turkey					45
46	Panama						44
47–50			Belgium Nl				43
47–50		France					43
47–50					Iran		43
47–50				Serbia			43
51–53	Peru						42
51–53				Romania			42
51–53		Spain					42
54					Africa E		41
55–58				Bulgaria			40
55–58				Croatia			40
55–58	El Salvador						40
55–58						Vietnam	40
59						S Korea	39
60	Uruguay						38
61–62	Guatemala						37
61–62	Suriname						37
63				Russia			36
64						Thailand	34
65		Portugal					31
66				Estonia			30
67	Chile						28
68			Finland				26
69	Costa Rica						21
70–71				Lithuania			19
70–71				Slovenia			19
72			Denmark				16
73			Netherlands				14
74				Latvia			9
75			Norway				8
76			Sweden				5

Table 3.5

Uncertainty Avoidance Index Values for 76 Countries and Regions Based on Three Items in the IBM Database Plus Extensions (Hofstede & Hofstede, 2005)

TABLE 6.1 Uncertainty Avoidance Index (UAI) Values for 76 Countries and Regions Based on Three Items in the IBM Database Plus Extensions

RANK	AMERICA C/S	EUROPE S/SE	EUROPE N/NW ANGLO WORLD	EUROPE C/E EX-SOVIET	MUSLIM WORLD M.E & AFRICA	ASIA EAST ASIA SE	INDEX
1		Greece					112
2		Portugal					104
3	Guatemala						101
4	Uruguay						100
5			Belgium Nl				97
6		Malta					96
7				Russia			95
8	El Salvador						94
9–10			Belgium Fr				93
9–10				Poland			93
11–13						Japan	92
11–13				Serbia			92
11–13	Suriname						92
14				Romania			90
15				Slovenia			88
16	Peru						87
17–22	Argentina						86
17–22	Chile						86
17–22	Costa Rica						86
17–22		France					86
17–22	Panama						86
17–22		Spain					86
23–25				Bulgaria			85
23–25						S Korea	85
23–25		Turkey					85
26–27				Hungary			82
26–27	Mexico						82
28					Israel		81
29–30	Colombia						80
29–30				Croatia			80
31–32	Brazil						76
31–32	Venezuela						76
33		Italy					75
34				Czech Rep.			74
35–38			Austria				70
35–38			Luxembourg				70
35–38					Pakistan		70
35–38			Switzerland Fr				70
39						Taiwan	69
40–41					Arab ctrs		68
40–41					Morocco		68
42	Ecuador						67
43–44			Germany				65
43–44				Lithuania			65
45						Thailand	64
46				Latvia			63
47–49						Bangladesh	60
47–49			Canada Quebec				60
47–49				Estonia			60
50–51			Finland				59
50–51					Iran		59
52			Switzerland Ge				56
53	Trinidad						55
54					Africa W		54
55			Netherlands				53
56					Africa E		52
57–58			Australia				51
57–58				Slovakia			51
59			Norway				50
60–61			New Zealand				49
60–61					S Africa (wte)		49
62–62			Canada total				48
62–63						Indonesia	48
64			United States				46
65						Philippines	44
66						India	40
67						Malaysia	36
68–69			Great Britain				35
68–69			Ireland				35
70–71						China	30
70–71						Vietnam	30
72–73						Hong Kong	29
72–73			Sweden				29
74			Denmark				23
75	Jamaica						13
76						Singapore	8

Table 3.6

Long Term Orientation (LTO) Index Values for 93 Countries and Regions Based on Factor Scores from Three Items in the World Values Survey (Hofstede & Hofstede, 2005)

TABLE 7.4 Long-Term Orientation (LTO) Index Values for 93 Countries and Regions
Based on Factor Scores from Three Items in the World Values Survey

SCORES ARE BASED ON THE MOST RECENT WVS DATA FROM THE PERIOD 1995–2004; NINE COUNTRIES MARKED WITH AN ASTERISK (*) WERE ADDED USING 2005–08 DATA.

RANK	AMERICA C/S	EUROPE S/SE	EUROPE N/NW ANGLO WORLD	EUROPE C/E EX-SOVIET	MUSLIM WORLD M.E & AFRICA	ASIA EAST ASIA SE	INDEX
1						S Korea	100
2						Taiwan	93
3						Japan	88
4						China	87
5				Ukraine			86
6			Germany				83
7–9				Estonia			82
7–9			Belgium				82
7–9				Lithuania			82
10–11				Russia			81
10–11				Belarus			81
12			Germany E				78
13				Slovakia			77
14				Montenegro			75
15			Switzerland				74
16						Singapore	72
17				Moldova			71
18–19				Czech Rep.			70
18–19				Bosnia			70
20–21				Bulgaria			69
20–21				Latvia			69
22			Netherlands				67
23				Kyrgyzstan			66
24			Luxembourg				64
25		France					63
26–27						Indonesia	62
26–27				Macedonia			62
28–32				Albania			61
28–32		Italy					61
28–32				Armenia			61
28–32						Hong Kong*	61
28–32				Azerbaijan			61
33			Austria				60
34–35				Croatia			58
34–35				Hungary			58
36						Vietnam	57
37			Sweden				53
38–39				Serbia			52
38–39				Romania			52
40–41			Great Britain				51
40–41						India	51
42						Pakistan	50
43				Slovenia			49
44		Spain					48
45–46						Bangladesh	47
45–46		Malta					47
47		Turkey					46
48		Greece					45
49	Brazil						44
50						Malaysia*	41
51–54			Finland				38
51–54				Georgia			38
51–54				Poland			38
51–54					Israel		38
55–56			Canada				36
55–56					Saudi Arabia		36
57–58			Denmark				35
57–58			Norway				35
59–60					Tanzania		34
59–60					S Africa		34
61			New Zealand				33
62						Thailand*	32
63	Chile						31
64					Zambia*		30
65–66		Portugal					28
65–66			Iceland				28
67–68					Burkina Faso*		27
67–68						Philippines	27
69–71	Uruguay						26
69–71					Algeria		26
69–71			United States				26
72–73	Peru						25
72–73					Iraq		25
74–76			Ireland				24
74–76	Mexico						24
74–76					Uganda		24
77			Australia				21
78–80	Argentina						20
78–80					Mali*		20
78–80	El Salvador						20
81					Rwanda*		18
82–83					Jordan		16
82–83	Venezuela						16
84					Zimbabwe		15
85–86					Morocco		14
85–86					Iran		14
87–90	Colombia						13
87–90	Dominican Rep.						13
87–90					Nigeria		13
87–90	Trinidad*						13
91					Egypt		7
92					Ghana*		4
93	Puerto Rico						0

Table 3.7

Indulgence versus Restraint Index Scores for 93 Countries and Regions Based on Factor Scores from Three Items in the World Values Survey (Hofstede & Hofstede, 2005)

TABLE 8.1 Indulgence Versus Restraint (IVR) Index Scores for 93 Countries and Regions Based on Factor Scores from Three Items in the World Values Survey

RANK	AMERICA C/S	EUROPE S/SE	EUROPE N/NW ANGLO WORLD	EUROPE C/E EX-SOVIET	MUSLIM WORLD M.E & AFRICA	ASIA EAST ASIA SE	INDEX
1	Venezuela						100
2	Mexico						97
3	Puerto Rico						90
4	El Salvador						89
5					Nigeria		84
6	Colombia						83
7	Trinidad						80
8			Sweden				78
9			New Zealand				75
10					Ghana		72
11			Australia				71
12–13		Cyprus					70
12–13			Denmark				70
14			Great Britain				69
15–17			Canada				68
15–17			Netherlands				68
15–17			United States				68
18			Iceland				67
19–20			Switzerland				66
19–20		Malta					66
21–22		Andorra					65
21–22			Ireland				65
23–24					S Africa		63
23–24			Austria				63
25	Argentina						62
26	Brazil						59
27–29			Finland				57
27–29						Malaysia	57
27–29			Belgium				57
30			Luxembourg				56
31			Norway				55
32	Dominican Rep.						54
33	Uruguay						53
34–35					Uganda		52
34–35					Saudi Arabia		52
36		Greece					50
37–38						Taiwan	49
37–38		Turkey					49
39–40		France					48
39–40				Slovenia			48
41–43	Peru						46
41–43					Ethiopia		46
41–43						Singapore	46
44						Thailand	45
45–46				Bosnia			44
45–46		Spain					44
47–48					Jordan		43
47–48					Mali		43
49–51					Zambia		42
49–51						Philippines	42
49–51						Japan	42
52–53			Germany				40
52–53					Iran		40
54				Kyrgyzstan			39
55–56					Tanzania		38
55–56						Indonesia	38
57					Rwanda		37
58–59						Vietnam	35
58–59				Macedonia			35
60			Germany E				34
61–62		Portugal					33
61–62				Croatia			33
63–64					Algeria		32
63–64				Georgia			32
65				Hungary			31
66		Italy					30
67–69						S Korea	29
67–69				Czech Rep.			29
67–69				Poland			29
70–72				Slovakia			28
70–72				Serbia			28
70–72					Zimbabwe		28
73						India	26
74					Morocco		25
75						China	24
76				Azerbaijan			22
77–80				Russia			20
77–80				Montenegro			20
77–80				Romania			20
77–80						Bangladesh	20
81				Moldova			19
82					Burkina Faso		18
83–84						Hong Kong	17
83–84					Iraq		17
85–87				Estonia			16
85–87				Bulgaria			16
85–87				Lithuania			16
88–89				Belarus			15
88–89				Albania			15
90				Ukraine			14
91				Latvia			13
92					Egypt		4
93					Pakistan		0

A more recent scaling – *The Culture Map* (Meyer, 2014) illustrates a similar scattering array of the two countries based on a different paradigm, as shown in Figure 3.3 to Figure 3.6, providing further support for the researcher's selection of the two countries as the sampling source.

Figure 3.3

Communicating Scale (Meyer, 2014)

Figure 3.4

Evaluating Scale (Meyer, 2014)

Figure 3.5

Trusting Scale (Meyer, 2014)

Figure 3.6

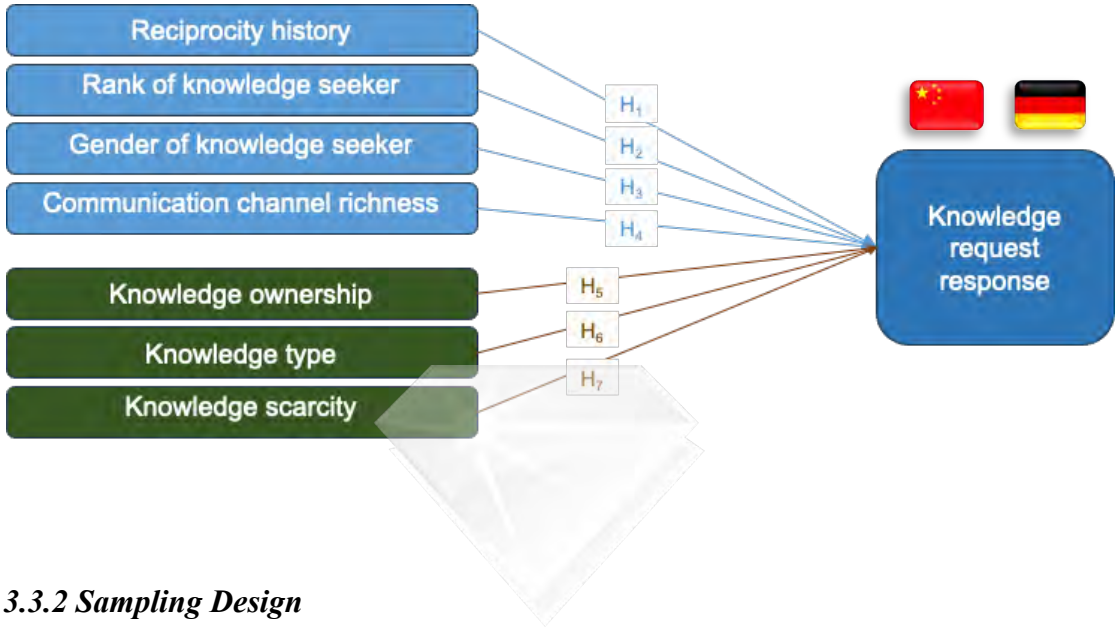
Disagreeing Scale (Meyer, 2014)

To be specific, the target population of this study is decided for two considerations: (a) previous studies on knowledge hiding have made it clear that inviting participants from diverse cultural backgrounds and conducting research on knowledge hiding across various cultural contexts will be meaningful research avenues for it will bring about more comprehensive insight into this research stream; (b) recruiting working professionals from industries as the research subjects will overcome the shortcomings caused by student samples in previous studies and generate more generalizable findings to occupational employees in business organizations.

For comparison purposes, therefore, the research model developed in this study is to be tested with participants from the aforementioned two countries, i.e., China and Germany, as shown in Figure 3.7.

Figure 3.7

Comparing Knowledge Request Responses Between China and Germany



3.3.2 Sampling Design

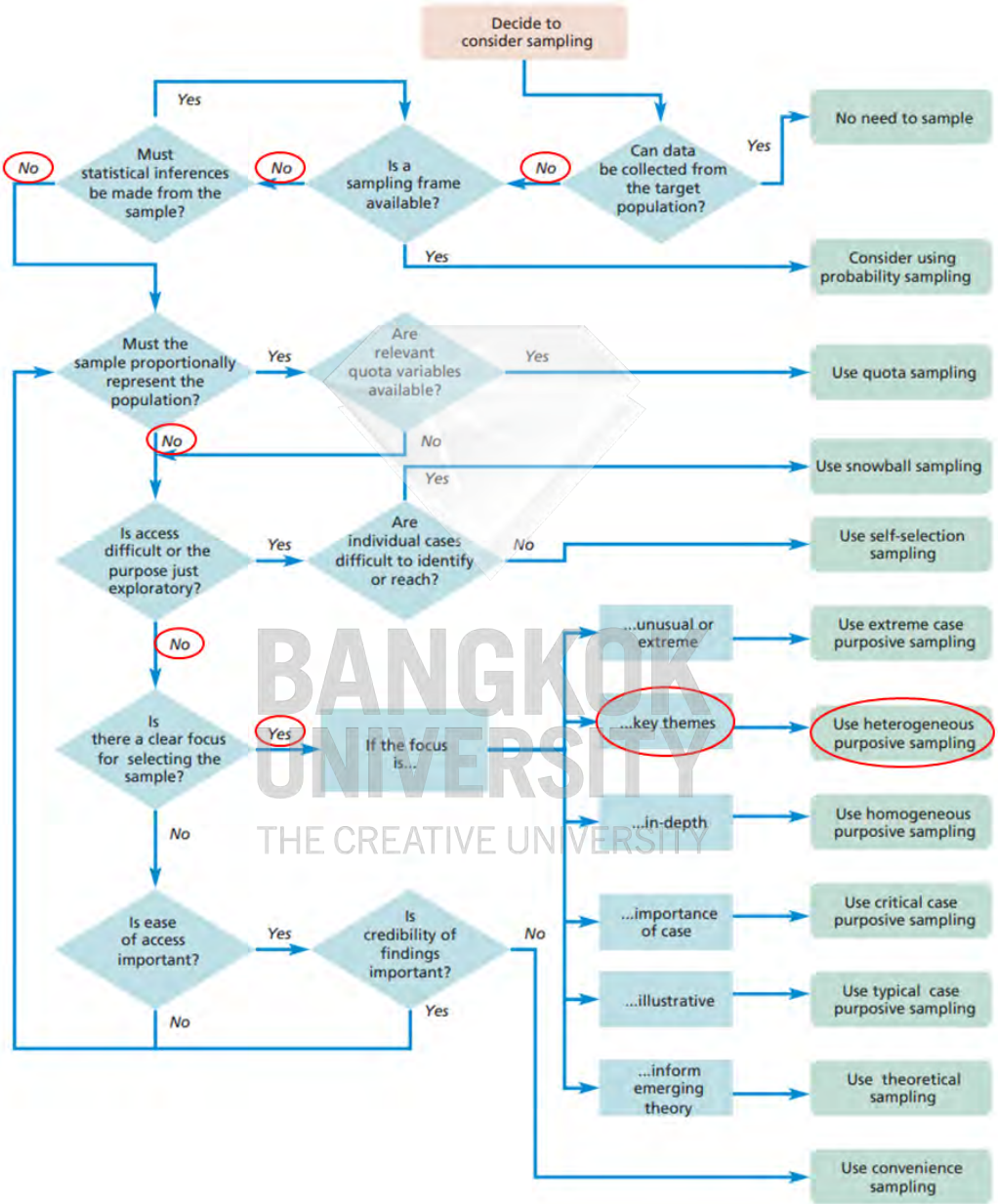
The difficulty of conducting an experimental study lies in, on the one hand, designing an applicable/feasible research protocol, and, on the other hand, sampling challenge (Bartel-Radic, 2019). In this study, purposive sampling, a type of non-probability sampling, was utilized as the sampling technique, which means that the researcher used her own judgment to select cases that best fit the study in terms of providing answers to the research questions and realizing the research objectives (Saunders et al., 2016). Purposive sampling is useful when very small samples are to be worked with, or particularly informative cases are targeted (Saunders et al., 2016)). More specifically, heterogeneous purposive sampling is to be adopted, as previous studies suggest that a heterogeneous sample helps capture maximum variance in the important constructs of a study and enhances the generalizability of findings (Abdullah et al., 2019; Mahmood et al., 2023). In other words, the researcher judged and chose participants with diverse characteristics to ensure the maximum variation

that guaranteed the observation of key themes and the capture of uniqueness (Saunders et al., 2016). Figure 3.8 demonstrates the decision-making process of the sampling technique selection.

To inquire into whether cultural differences will manifest in individuals' responses to knowledge requests, the researcher predicts the challenges to be faced are threefold. Firstly, to adequately address the limitation of recruiting students as research subjects, the author intends to invite working professionals to participate in the research. However, to reach as many potential participants as the study requires will be an effort-taking task. Secondly, the participants are supposed to be from the intended two countries that represent distinctive cultures so that a more accurate insight could be generated regarding cultural mechanisms in knowledge sharing and knowledge hiding behavior, which makes it more challenging to include "qualified" respondents in the research. Thirdly, due to the inherent socially undesirable nature of knowledge hiding, it is possible that the participants could "under-act" their behavior to avoid negative impressions or judgments, as disclosed in previous studies.

Figure 3.8

Choosing A Non-probability Sampling Technique (Saunders et al., 2016, p. 296)



While the last challenge –obtaining accurate data regarding individuals' knowledge hiding behavior is related to research design, the first two challenges are more concerned with sample size. In terms of the sample size for non-probability

sampling techniques, there are no rules; and the sample size is determined by the research question(s) and objectives (Saunders et al., 2016). However, some rules of thumb for determining sample size have been proposed by Roscoe (1975) as cited in (Sekaran & Bougie, 2016, p. 264):

1. Sample sizes larger than 30 and less than 500 are appropriate for most research.
2. Where samples are to be broken into subsamples (males/females, juniors/seniors, etc.), a minimum sample size of 30 for each category is necessary.
3. In multivariate research (including multiple regression analyses), the sample size should be several times (preferably ten times or more) as large as the number of variables in the study.
4. For simple experimental research with tight experimental controls (matched pairs, etc.), successful research is possible with samples as small as 10 to 20 in size.

Taking full consideration of these suggestions, as well as respondent availability, manageability of the study, and the research objectives it aims to achieve, the researcher, therefore, held that a feasible sample objective should be one that consists of no less than 120 participants, with at least 60 (30 females and 30 males) from each country.

3.4 Data Collection

Self-reported measures (questionnaires) remain the dominant approach to study knowledge hiding. The 12-item self-reported scale developed by Connelly et al.

(2012) is the most widely used across knowledge hiding studies. Concerns arise when considering the inherent socially undesirable quality of knowledge hiding, for a self-report survey is likely to result in participants' under-reporting of the actual situation, which happens when they hope to avoid negative impressions or judgments on their behavior. Likewise, social desirability may be particularly an issue in knowledge sharing studies when the majority of these research measured knowledge sharing either in the form of participants' willingness (or intention) to share knowledge or their self-reported knowledge sharing behavior (Wang & Noe, 2010), where respondents are likely to overestimate their participation in knowledge sharing (Asrar-ul-Haq & Anwar, 2016).

Table 3.8

Specifications of Focal Variables

Variables	Variable Type	Levels of Variable
Knowledge request response	categorical	• full sharing • partial sharing • evasive hiding • playing dumb
Reciprocity history	categorical	• positive reciprocity • negative reciprocity • positive & negative reciprocity • no reciprocity
Rank of knowledge seeker	categorical	• higher rank (a superior) • same rank (a peer co-worker)
Gender of knowledge seeker	categorical	• male • female
Communication channel richness	categorical	• email • video conferencing • instant messaging
Knowledge ownership	categorical	• minimum investment in knowledge acquisition • substantial investment in knowledge acquisition
Knowledge type	categorical	• experience • documents • relationships
Knowledge scarcity	categorical	• low-level scarcity of the requested knowledge • high-level scarcity of the requested knowledge

As a meaningful step to address the concerned issues of under-reporting and over-estimation and to explore the potential of new and innovative research measurement, the current study employed a serious game as the data collection method, in which dedicated scenarios created to incorporate variables of interest were presented to the participants, and the responses of the participants to each knowledge request were documented. The variables of interest (has also been presented earlier in Figure 2.12 the research framework), variable type, and levels of these variables are specified in Table 3.8.

3.4.1 Use of Game Scenarios

Vermillion et al. (2017) concluded that interactive stimuli enhanced processing fluency, served better to activate deeper meaning than text stimuli, and held more realism that assisted in generating genuine responses. Their study reveals that no significant difference existed in participant responses between written narrative and scenario-based game (Vermillion et al., 2017).

Generally, scenarios are embodied through written narratives that are given to participants during a survey. Using written narratives for constructing scenarios is a widely found approach in decision-making research (Vermillion et al., 2017). In a typical manner, the participants are asked to make scenario-based decisions after reading a written description of the scenario. More experimental control can be achieved through this method in comparison to other ones. Thus, it gives researchers more confidence in any causal inference drawn from thereby (Vermillion et al., 2017).

Despite the benefits it provides, a written summary could be too simplified to be stimulating enough and to be sufficiently inclusive of necessary clues that help

retain realism when complex scenarios are involved and intended. Vermillion et al. (2017) argue that the limitations of written narratives left the door open to the application of games as the research context – a fairly reasonable and enlightening point, considering that games allow the players to experience the scenarios and discover relevant information through a more interactive process and that games facilitate immersion into a scenario (Koster, 2013).

3.4.2 Use of Serious Game

Serious games manifest the application of games and simulation technology to domains that are not for entertainment purposes (Zyda, 2005). Games enable the involvement of costly, dangerous, difficult, or impractical activities in classrooms, capable of functioning as a feasible medium for learning (Greitzer et al., 2007). Owing to their capability of providing fun, challenge, and instant feedback, computer games create an immersive experience for players, and the rich visuals of computer games make them enticing and engaging to players (Greitzer et al., 2007). As economists have suggested, virtual environments in video games may serve as efficient and cost-effective substitutes for laboratory settings in conducting economics research (Vermillion et al., 2017).

Simulation is a type of modeling that is a simplification of some structure or system (Gilbert & Troitzsch, 2005). Akin to an experimental methodology, simulation can be used for the purposes of understanding, predicting, business forecasting, substituting, training, and entertaining (Gilbert & Troitzsch, 2005). The latter two purposes are well aligned with that of serious games.

Serious game is defined as “a mental contest, played with a computer in accordance with specific rules, that uses entertainment to further government or corporate training, education, health, public policy, and strategic communication objectives” (Zyda, 2005, p. 26). The involvement of pedagogy is a prominent feature that distinguishes serious games from the general ones (Greitzer et al., 2007; Zyda, 2005). In other words, it is the characteristic of imparting knowledge or skill that makes a game “serious” – the involvement of activities that educate or instruct players is indispensable in a serious game (Zyda, 2005).

Therefore, in addition to creating realistic simulations of the actuality to make the game immersive and entertaining, it is equally (or even more) important for a serious game to provide the players with learning experiences. A qualified serious game developer hence should have knowledge of storytelling, interface design, gaming engines and tools, and learning theory (Greitzer et al., 2007).

Even though rarely utilized in international management, serious games are now drawing ever-growing research attention as innovative and effective implementations in terms of learning and managing knowledge (Bartel-Radic, 2019). It is argued that the employment of serious games in intervention and research, beyond its overwhelming application to educational and training contexts, can also be meaningful because of its facilitating effect in data collection (Vermillion et al., 2017).

3.4.3 The GenaGame® Platform

The GenaGame® platform is a digital platform supported by the InterCCom project funded by Science Po Grenoble and University Grenoble Alps in France, led

by Anne Bartel-Radic, a full professor in International Management at Sciences Po Grenoble and University Grenoble Alps. GenaGame® platform has served the data collection process for a few academic researches since its initiation in January 2019 and has progressed consistently along the way with the learned experience from these researches. See Figure 3.9 for the GenaGame® platform logo.

Figure 3.9

The GenaGame® Platform Logo https://genagame.com/

Four serious games are currently available on the GenaGame® platform. LINK game focuses on intercultural competence, MYM Social Responsibility, CRIT emotional intelligence and intercultural conflict resolution style, and ELITE the influence of language variety on communication and coordination strategies. Serving as a quasi-experimentation tool, these games are designed for research purposes. Theory-based scenarios incorporating documents, images, and videos uploaded on the platform create a reality-like interface that helps immerse the players in an interactive journey.

The particularities of the GenaGame® sets the games on the platform apart from other existing projects and contributes to maintaining realism. Along with the game process, the players “interacted” with their “coworkers” in the game. The choices made by the players during the interaction were documented on the platform, up to later analysis by the researcher.

The GenaGame® platform is devoted to promoting the application of serious games to research and international management research and education, and it is capable of accommodating more games. The researcher’s sincere gratitude goes to Professor Anne for her consistent and substantial support in incorporating and developing the serious game created for this study on the platform.

3.5 Summary

In this chapter, the researcher reasoned the ontological, epistemological, and axiological assumptions of positivism that establish the employment of the quantitative method in the study. Relating to the status quo of the knowledge hiding study and the feasibility of the research design, the researcher voted for a quasi-experimental design to be used for the study, coupled with a comparative approach. China and Germany were selected as the sample source countries of the study based on their discrete national culture and respondent availability. The researcher then justified the applicability of purposive sampling to this study and her adventurous plan of using a serious game as a data collection instrument with the assistance of the GenaGame® Platform.

CHAPTER 4

DATA ANALYSIS

4.1 Measures

In this chapter, the author will detail how the measurement designed and used in this particular study developed from the original idea to the final concrete version, how the data were collected in the two countries, and if the statistical analyses generated any support for us to validate the hypotheses.

4.1.1 Design and Development of SOS the Serious Game

The serious game developed for the current study to collect data on knowledge workers' responses to knowledge requests was named SOS the serious game (see Figure 4.1 for the logo), where "SOS" stands for "Share or Skip" (i.e., to share knowledge upon the request or to hide knowledge skipping the request).

Figure 4.1

Logo of SOS the Serious Game

The purposes of the game are twofold, the same as the other serious games currently available on the GenaGame® platform: (a) for research purposes – to collect data on participants' knowledge sharing and knowledge hiding responses to identify the responsive behavioral features of knowledge workers in automotive industry from two different cultural backgrounds; (b) for education purposes – to help educate the involved organizations and their employees about the conditions that will most likely to induce knowledge sharing and knowledge hiding behaviors. More specifically, at the organizational level, on the one hand, in the submitted report to the organization about the overall knowledge exchange survey results, suggestions will be provided as to how to facilitate knowledge sharing and contain knowledge hiding behavior through devising feasible management practices. On the other hand, at the individual level, we aim to provide individual employees an opportunity to reflect on their own responsive behavior to colleagues' requests for knowledge and to increase their awareness of the need to communicate their requests via the most appropriate media that fit the situation as well as of the importance of responding appropriately to knowledge requests from their colleagues by providing an individualized report that addresses their behavioral features.

In addition to the above-mentioned ultimate objectives of SOS the serious game, in-game pedagogy is one of the important elements that creates its uniqueness. Examples will be provided in the following sections that present the game visuals.

SOS the serious game was designed as an interactive simulation game first launched on the GenaGame® platform for data collection in a German automotive company. In the game setting, a player is presented with a sequence of scenarios where they are requested for knowledge by coworkers under various defined contexts

through three different communication media, i.e., email, video conferencing, and instant messaging. Experiencing each scenario that is demonstrated in the form of a pre-recording video, the player has to make choices to keep the game moving forward.

Having email, video conferencing, and instant messaging as the focal media used to make knowledge requests in SOS the serious game, the researcher recorded videos concerning instant messaging by utilizing the "record" function of Microsoft PowerPoint with each "line" put into different slides, simulating a conversation in the form of a chat on a messaging app. For those concerning video conferencing, the researcher contacted native speakers for roleplay. The "actors" were provided with detailed instructions (see Appendix 1) with the script for their role to ensure quality video recording. Whenever the initial recording was found less satisfying, for example, when the "actor" read lines with unnatural pauses, the researcher got back to them for further recording work till natural and realistic video was resulted.

The players of SOS the serious game take the role of a project team member in an automotive company, which is identical to their actual working status. Previous literature has established that a mimesis effect exists – when players are explicitly given a role, there is a significant relationship between their role and their in-game actions (Domínguez et al., 2016). For the purpose of obtaining a high degree of immersion, the players of SOS the serious game play their own roles in terms of age, gender, and nationality throughout the game. Drawing on the practice and experience from the other games devised on the platform, the researcher adopted the critical incident technique (Flanagan, 1954) to identify and formulate the critical incidents concerning the knowledge exchange contexts in the game, where a knowledge request

is forwarded, and the response to the request (i.e., knowledge sharing or knowledge hiding) is required to make. A series of interviews with working professionals with a knowledge management or management background were conducted for scenario creation.

Four working professionals from four different countries (i.e., China, France, Germany, and the United States), which made the total number of interviewees sixteen, formed the expert panel that established a significant source of the game plot. One-on-one interviews were conducted online during the time period form November 2021 to January 2022. Each interview lasted for thirty minutes to one hour. The objectives of the interviews were twofold: 1) to identify typical knowledge hiding incidents in work settings, which was not available in academic publications, and 2) to examine if there were any particulars in the events across cultures. An interview protocol was developed before conducting these interviews. The interviewees were first informed of the research purpose, the knowledge hiding definition, and the three dimensions of the concept. Then they were invited to share a recent knowledge hiding incident at their work, which could be one that happened to them or something they observed in their work environment, the contexts they believe under which people are likely to engage in knowledge hiding, the motivations that drive people to hide their knowledge, and the use of communication channel(s) in their organizations. In addition, they were invited to make suggestions for the game development they were shown the initial slides of the game.

The interviews were conducted in English, and all of them were recorded under the interviewees' consent for the researcher's review and reflection. Since the purpose of conducting these interviews is to have a sense of what knowledge hiding

occurrences are like in real work settings and to get inspiration for scenario establishment, the researcher did not transcribe and code the scripts. However, she did summarize each interviewee's main points after the interview and synthesized the summaries for scenario crafting.

With the kind and generous sharing of the sixteen interviewees who are experienced in knowledge management or management, several scenarios came into being. For example, based on one interviewee's personal experience, we developed a scenario where the knowledge holder's colleague in the game requests for feedback on a production material they previously used.

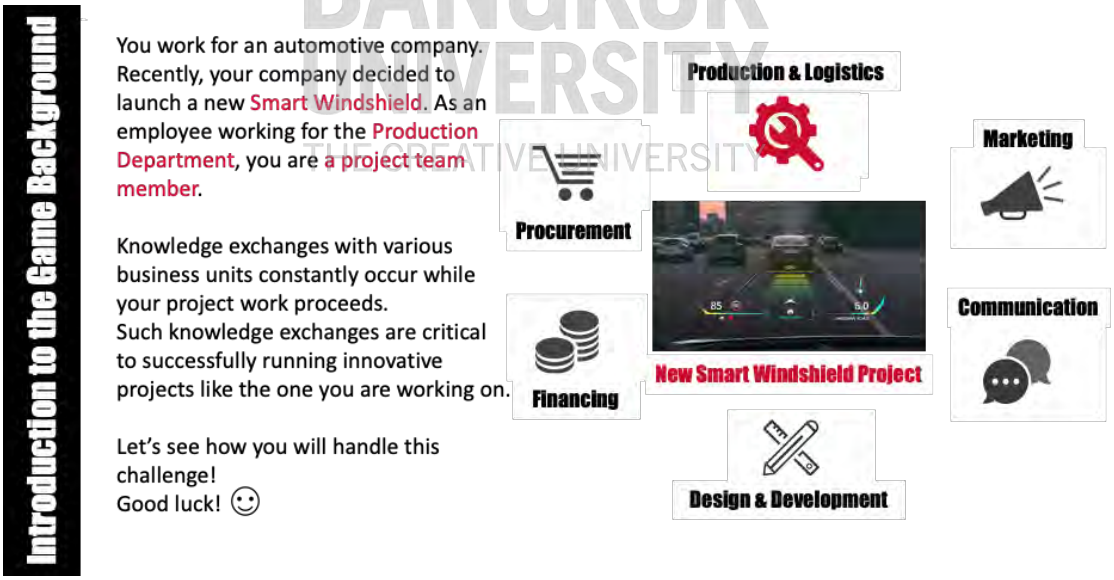
This round of interviews informed the researcher that knowledge hiding, in the forms of playing dumb, evasive hiding, and rationalized hiding, as had been demonstrated by multiple studies, is an animal running wild across countries. In other words, it is a universal practice observed by working professionals in various organizational settings around the globe. Moreover, these interviews did not reveal any clue of culture-specific features of knowledge hiding, which grounded the development of a game version that is to be administered in different national cultural contexts for players to join.

In addition to the valuable learnings from the interviewed management experts, communication with an automotive company in Germany established another repository that contributed enormously to the game development. After the one-year communication between the researcher and the company, back-and-forth providing/taking feedback and joint revision, SOS the serious game eventually settled down from the initial abstract concepts into the current applicable version.

The players joined SOS the serious game were first instructed on the basic functions of the platform and assured of the confidentiality of the information they would provide. Then, they were introduced to the project and the characters in the game. Figure 4.2 (the original English version is presented here for efficient explanation and understanding) informed them that they were to interact with colleagues from different functionalities as a member of a newly launched project. The colleagues they were going to encounter could be those at the same level as they are and, sometimes, someone of a higher rank in the company, as shown in the organizational chart (Figure 4.3).

Figure 4.2

SOS the Serious Game Background Introduction

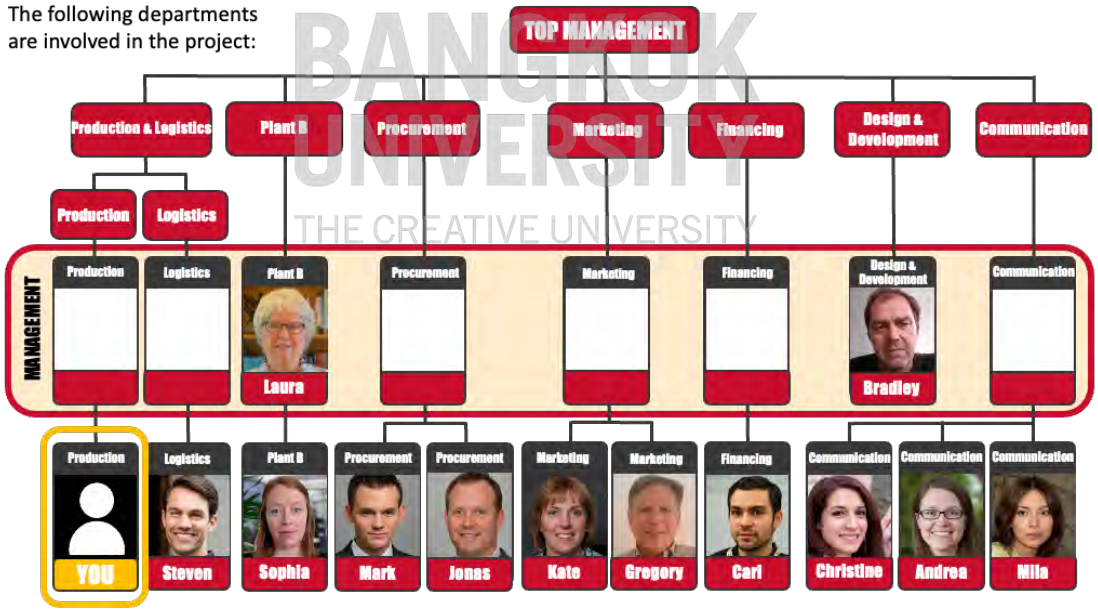


Then the first scenario came in where a colleague requested for knowledge the player had in possession. Throughout all the scenarios, it was always made clear to players that what another colleague approached to request was at their disposal or

accessible to them. By clarifying their ownership of the requested knowledge or the availability of it to them, we reduced the ambiguity of the context and focused the players on their responses. In total, the players of SOS the serious game experienced ten scenarios in which different levels of variables of interest were incorporated to construct specific contexts for them to make response. Each of the scenarios ended with a question requiring the players to pick one of the five choices that fit their situation the most as their response to the request forwarded by a colleague, as depicted in the scenario.

Figure 4.3

Organizational Chart of the Company in SOS the Serious Game



The ten scenarios represented a meticulous consideration of how to balance the distribution of the variables of interest throughout the scenarios while maintaining the time duration at a not unsatisfying level for the participants. Since the study involves

seven independent variables, the levels of each ranging from two to four, as shown in Table 3.8, manifesting all the possible combinations, that is, $2^{14} = 16384$, will make a huge project that goes far beyond the scope of this study and will be almost impossible to recruit participants willing to invest their time partaking the survey. Therefore, ten combinations came into being with careful calculation and planning.

Table 4.1 specifies the combinations of levels of variables in the ten scenarios. As can be seen, all knowledge requests were made at least from a coworker of the same rank. Comparisons between responses to the same and a higher rank were made in extreme situations, that is, situations where the knowledge holder shared negative reciprocity (scenario #10) with the knowledge seeker and where they were requested for knowledge of high-level scarcity (scenario #8).

Table 4.1

Variable Combinations in SOS the Serious Game Scenario

Independent Variables	Levels	Rank	Gender	Media	Knowledge type	Scene #
Reciprocity history	Positive	Same Level	Male	Email	**(experience)** lessons learned	2
	Negative	Same Level	Female	Video	**(documents)** contact list of experts	4
	Negative	Higher Level	Female	Video	**(relationships)** contact list of experts	10
	Positive + Negative	Same Level	Male	Chat	**(documents)** material feedback	1
	No reciprocity	Same Level	Female	Email	**(experience)** best practices	9
Knowledge ownership	Minimum	Same Level	Female	Email	**(documents)** project management discussions and decisions	7
	Substantial	Same Level	Male	Chat	**(experience)** suggestions for reducing production wastes	3
Knowledge scarcity	Low level scarcity	Same Level	Female	Email	**(documents)** materials for video making	5
	High level scarcity	Same Level	Male	Video	**(experience)** next practices	6
	High level scarcity	Higher Level	Male	Video	**(relationships)** a particular contact	8

Note. ↔ for comparison

To demonstrate how the game developed and how we crafted each scenario incorporating different levels of the focal variables, we use scenario #1 as an example. Figure 4.4 serves as the background of the first scenario, where the instructions in the frame highlight the reciprocity history, i.e., a mix of positive and negative past knowledge exchange between the knowledge holder and the knowledge seeker, and the organizational chart on the upper right notifies the players the rank of the knowledge seeker, same rank as the player in this case. Pressing on the "NEXT" button, the player will then be presented with a pre-recorded video simulating a chat between them and this knowledge seeker via instant messaging (Figure 4.5). In scenario #1, what this knowledge seeker requested – the insight into the material for producing the previous navigation windshield – was filed in documents. It was the player/the knowledge holder's call to make it available to the seeker or to withhold it to themselves confronted with the request.

Figure 4.4

Screenshot of Image #1 of Scenario #1 on GenaGame® Platform

Using the background image of Microsoft Team 365®, the communication app the German automotive company uses at their daily work, we intended to create familiarity and realism for the participants from the company. For the same purpose, a WeChat® background image was used for the participants from the Chinese automotive company in the scenarios involving instant messaging, as seen in Figure 4.6. When they were through with the recording, players were instructed that they were in possession of the requested knowledge (Figure 4.7) and that they were supposed to make a response by selecting a reply from the five options (Figure 4.8) representing the four levels of the variable "knowledge request response", as presented in Figure 4.9. Each of the first four options with a brief heading indicating the intended behavioral responses corresponds respectively to "full sharing", "partial sharing", "evasive hiding", and "playing dumb", the four levels of "knowledge request responses". The four options representing the four responses were purposefully shuffled across the ten scenarios to help screen any careless responding (Goldammer et al., 2020) and insufficient effort responding (McGonagle et al., 2016) from the participants. The fifth option was provided as another manifestation of playing dumb, considering its occurrence in real work situations. This was also the case for knowledge requests made by email. However, for scenarios involving video conferencing as the media employed to request knowledge, the fifth option was that the knowledge holder would have to leave for something else, for example, an urgent appointment (as shown in Figure 4.10). This type of response represented another form of evasive hiding, that is, stalling the knowledge seeker's request.

Figure 4.5

Screenshot of the Recording for Scenario #1

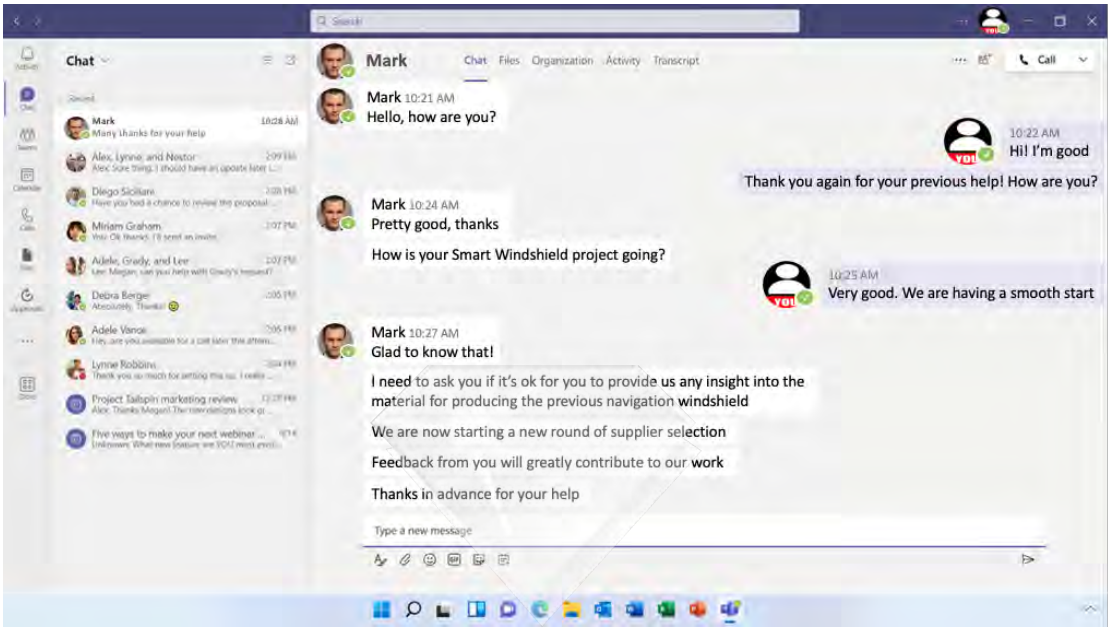


Figure 4.6

Screenshot of the Recording for Scenario #1 on Chinese version

Therefore, for scenario #1, as has been exhibited above, variables “reciprocity history”, “rank of knowledge seeker”, “gender of knowledge seeker”, “communication channel richness”, and “knowledge type” were incorporated to create a dedicated context for the knowledge exchange. Table 4.2 lists the levels of the focal independent variables incorporated in scenario #1.

Figure 4.7

Screenshot of Image #2 of Scenario #1 on GenaGame® Platform

Figure 4.8

Screenshot of Image #3 of Scenario #1 on GenaGame® Platform

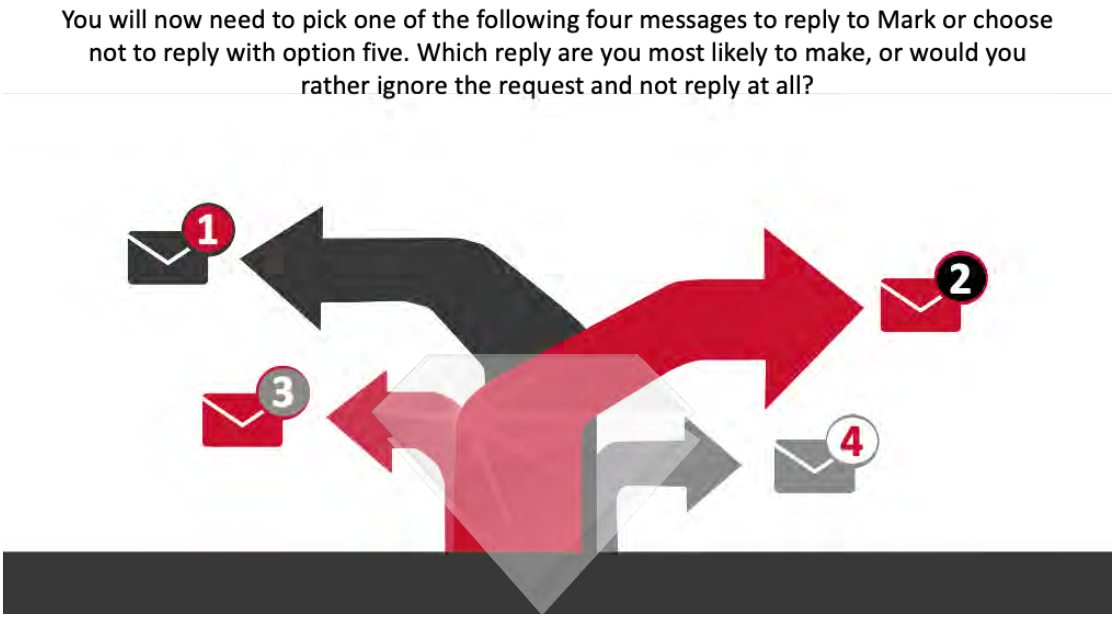


Figure 4.9

Screenshot of Image #4 of Scenario #1Presenting Five Response Options

Figure 4.10

Image Showing Option Five as Manifestation of Evasive Hiding

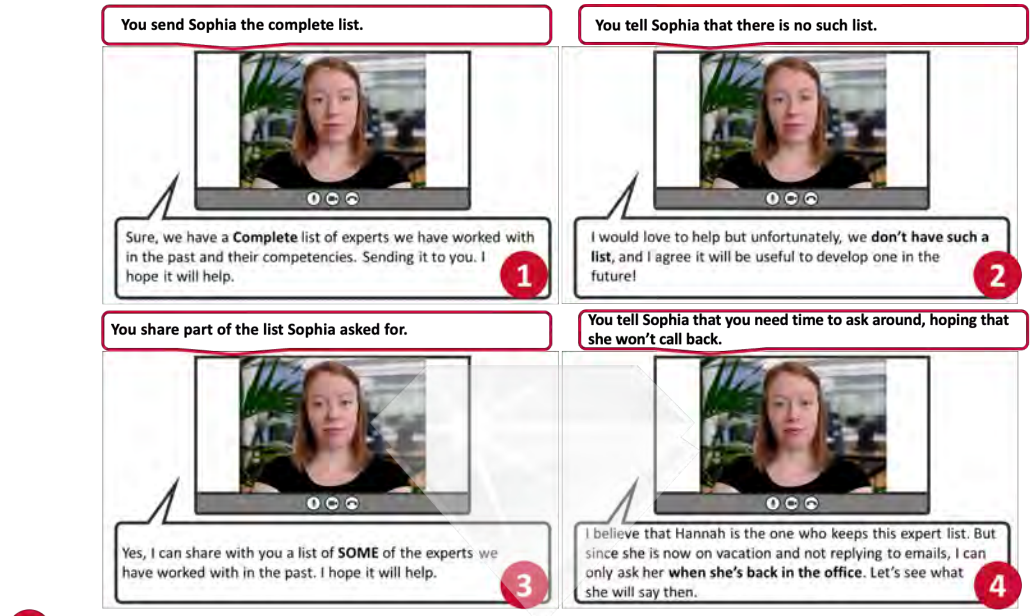


Table 4.2

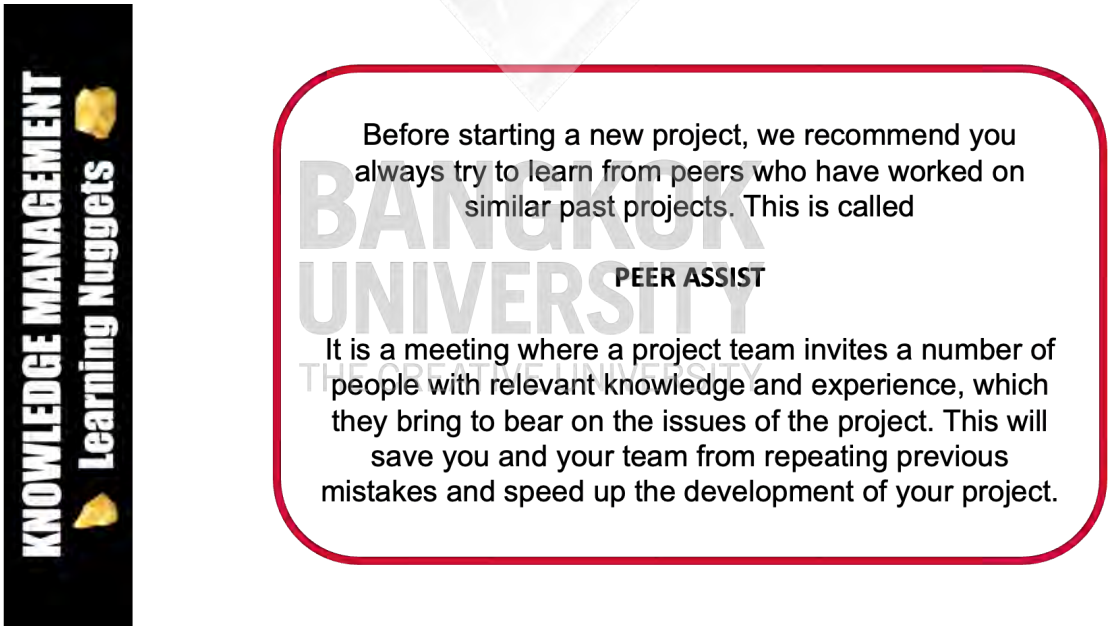
Levels of Variables Involved in Scenario #1

Variables (N = 5)	Levels of Focal Variable
Reciprocity history	● positive reciprocity ● negative reciprocity ● ***positive & negative reciprocity*** ● no reciprocity
Rank of knowledge seeker	● higher rank (a superior) ● ***same rank (a peer co-worker)***
Gender of knowledge seeker	● ***male*** ● female
Communication channel richness	● Email ● video conferencing ● ***instant messaging***
Knowledge type	● experience ● ***documents*** ● relationships

Knowledge nuggets as representative of learning material running through the game are a particular pedagogical element of SOS the serious game, sticking it to the core of serious games (Ravyse et al., 2017). Five pieces of knowledge nuggets were structured in the game, introducing the players to basic knowledge management tools and practices, i.e., peer assist, expertise locators, best practice, next practice, and mentoring. See Figure 4.11 for the piece of "peer assist" as an example.

Figure 4.11

Knowledge Nugget "Peer Assist" in SOS the Serious Game



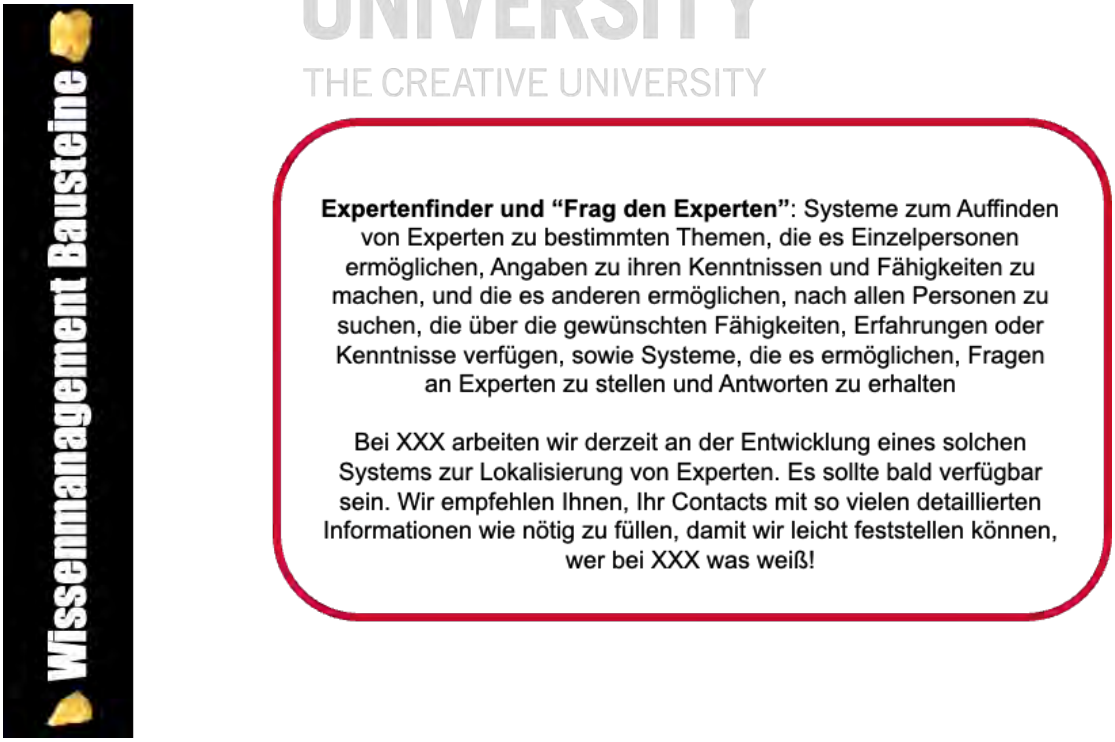
For the German company, the imparting of this knowledge was combined with internal marketing of the existing tools or practices the knowledge management unit developed or was developing for work efficiency. For example, in the knowledge nugget about expertise locators (see Figure 4.12 for the German version), the participants were informed that a system for locating experts would be available soon,

and they were recommended to fill in their detailed contacts to help the company better understand who at the company knows what.

As another essential part of the game, an individualized report that will be accessible only to the player is to be provided for each player once the data analysis is done (proceeding at the moment when writing this dissertation). In their customized report, SOS the serious game players were presented with feedback on their behavioral features of responding to knowledge requests from colleagues. In-group comparison results based on the features they have demonstrated throughout the game will be reported, and suggestions for future knowledge exchanges will be made for their reference.

Figure 4.12

Knowledge Nuggets "Expertise Locators" in SOS the Serious Game (German)



Prior studies of knowledge withholding addressed the issue that respondents might tend to make a socially desirable response, resulting in an inaccurate research conclusion, and highlighted the valuableness of online approach/web-based reporting in gathering sensitive information in that it assures anonymity (Webster et al., 2008). To adequately address this concern, SOS the serious game was administered through an online means, i.e., the GenaGame® platform. The platform requires email accounts to register for login. For information confidentiality purposes, dummy accounts were created and distributed by our contacts in the two automotive companies in China and Germany upon participation request from interested employees.

4.1.2 Validity and Reliability

Solid and well-established theories that were widely adopted in knowledge sharing and knowledge hiding studies and the most acknowledged definition of these two concepts (knowledge sharing and knowledge hiding) were drawn on as the theoretical foundation of SOS the serious game. Scenarios in the game were built centering around a series of circumstances, developed on the basis of critical incidents identified by working professionals, under which the players (acting as a project team member and the knowledge holder) were supposed to respond to knowledge requests from their colleagues by engaging in either knowledge sharing or knowledge hiding.

The interviews conducted to acquire insight into knowledge hiding incidents with the subject matter experts and the one-year in-depth communication with a German automotive company, the one we accessed to collect data, acted as strong and solid support for the validity and reliability establishment of the developed game. By obtaining feedback and suggestions on the realism and representativeness of the

scenarios from those subject matter experts who are “working in the field” and making refinement, the researcher was able to establish content validity, also referred to as face validity (Garson, 2013) of the instrument, i.e., SOS the serious game, particularly when the inclusion of subject matter experts has been identified as valuable in developing serious games (Ravyse et al., 2017). Amendments regarding the wording of the questions and instructions and the scenarios format were made accordingly throughout the process.

That no adapted versions of the scenarios were to be used for different cultures left the translation of the scenarios (from the original English version into two different target languages, i.e., Chinese and German) the only prime task to be accomplished when scenarios were finalized. To maintain the comparability of the data collected from the two different cultures, in other words, to prevent placing the participants from the two target cultures at unequal positions, both linguistic and functional equivalence need to be ensured during the translation process before circulating the instrument (Koršňáková & Ebbs, 2020). The quality of the translator plays a crucial role in producing high-quality results (Iliescu, 2017) as cited in (Koršňáková & Ebbs, 2020). Qualified translation enables participants to fully demonstrate their content domain-related knowledge without being restricted to limitations in language proficiency.

For the translation from the English version of the game into German, the researcher approached seven native German speakers who are proficient in English and experienced in international management for help by sending them a link to SOS the serious game on the GenaGame® platform once the first version was done with the help of our contact and members in his team, who not only knew adequately about the

game but also qualified as translators by being native German speakers proficient in English and using English as one of their working languages. Four of the six invited field experts agreed to help finalize the translation. These four bilinguals were encouraged to provide feedback with screenshots and notes taken through their gameplaying process to inform the researcher of any inappropriate use of language or awkward language they found during the process.

Parallelly, the link to the game was also shared with seven employees working for the German automotive company for a pilot study. The knowledge management unit in the company facilitated the pilot and helped collect feedback from the participants. The objective of undertaking a pilot study is to refine and validate the scenarios so that they will not confuse participants, further securing face validity (Saunders et al., 2016) and thus facilitating data recording.

When feedback from both sources was obtained, the researcher negotiated with the liaison, the facilitator from the company that would provide the researcher with access to their employees as SOS the serious game players, to finalize the scenarios and wordings in the game and finally reached the ultimate version with their confirmation.

To collect data from the Chinese automotive company, the original English version of SOS the serious game was translated into Chinese at a similar time. Two translators, who are native Chinese speakers and work as university faculty teaching English, worked independently on the translation and back translation of the game. One of them translated it from English into Chinese, and the other then translated the Chinese back to English. Once they were done with their work, they compared their works and negotiated for any existing discrepancies until they reached an agreement.

Using the background image of Microsoft Team 365®, the communication app the German automotive company uses at their daily work, we intended to create familiarity and realism for the participants from the company. For the same purpose, a WeChat® background image was used for the participants from the Chinese automotive company in the scenarios involving instant messaging, as seen in Figure 4.6. When they were through with the recording, players were instructed that they were in possession of the requested knowledge (Figure 4.7) and that they were supposed to make a response by selecting a reply from the five options (Figure 4.8) representing the four levels of the variable "knowledge request response", as presented in Figure 4.9. Each of the first four options with a brief heading indicating the intended behavioral responses corresponds respectively to "full sharing", "partial sharing", "evasive hiding", and "playing dumb", the four levels of "knowledge request responses". The four options representing the four responses were purposefully shuffled across the ten scenarios to help screen any careless responding (Goldammer et al., 2020) and insufficient effort responding (McGonagle et al., 2016) from the participants. The fifth option was provided as another manifestation of playing dumb, considering its occurrence in real work situations. This was also the case for knowledge requests made by email. However, for scenarios involving video conferencing as the media employed to request knowledge, the fifth option was that the knowledge holder would have to leave for something else, for example, an urgent appointment (as shown in Figure 4.10). This type of response represented another form of evasive hiding, that is, stalling the knowledge seeker's request.

Figure 4.5 and Figure 4.13 are screenshots of the message recordings used in the game for scenario #1 in English and Chinese, respectively. Table 4.3 presents the

original English, the translated Chinese, and the back translation from Chinese to English of the message in scenario #1.

Figure 4.5

Screenshot of the Recording for Scenario #1

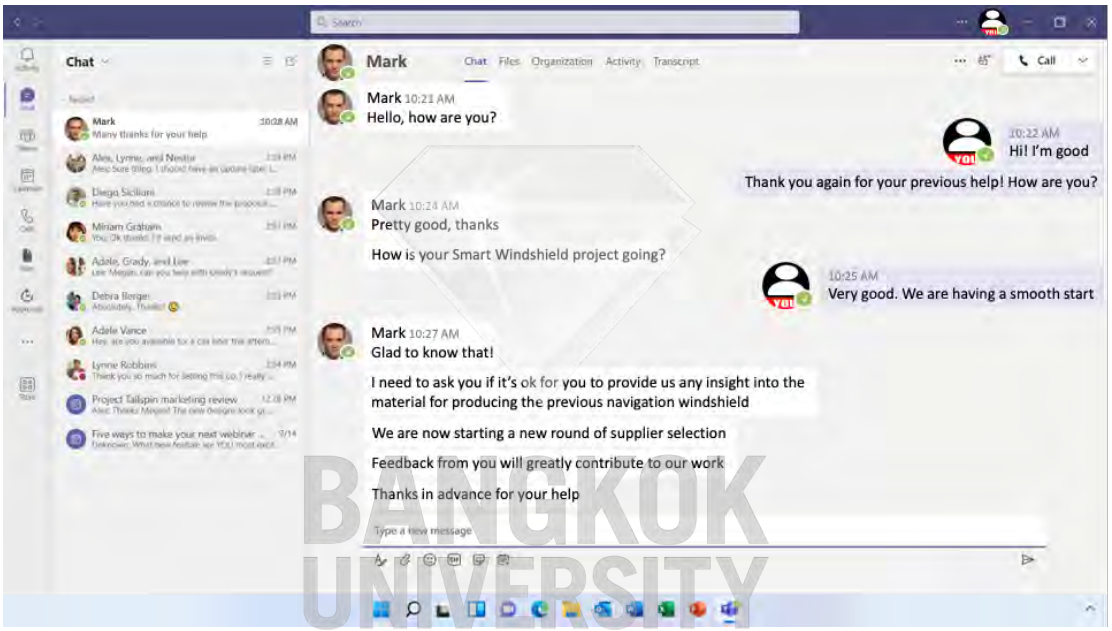


Figure 4.13

Screenshot of the Recording for Scenario #1 (Chinese version)

Table 4.3

Translation and Back Translation of Message in Scenario #1

Original English	Translation from English to Chinese	Back translation from Chinese to English
Hello, how are you?	早啊，忙不忙？	Good morning. Are you busy?
Hi! I'm good	还可以	Not bad.
Thank you again for your previous help! How are you?	谢谢你之前提供的帮助!你怎么样？	Thanks for the help you provided earlier! How are you doing?
Pretty good, thanks	挺好的，谢谢关心	Pretty good. Thanks for asking.
How is your Smart Windshield project going?	你的新项目怎么样？	How's your new program?
Very good. We are having a smooth start	很好，开始得很顺利	Good. It's started very well.
Glad to know that!	太好了	It's great.
I need to ask you if it's ok for you to provide us any insight into the material for producing the previous navigation windshield	想问问能不能向你了解一下你们生产之前那款导航挡风玻璃用的材料？	Could I ask about the material for the navigation windshield your company produced?
We are now starting a new round of supplier selection	我们现在准备开始新一轮的供应商甄选	We're about to start a new round of supplier selection.
Feedback from you will greatly contribute to our work	你的反馈对这个工作很重要	Your feedback is very important to it.
Thanks in advance for your help	先谢谢了	Thanks in advance.

The translation, from English to Chinese, of the serious game developed and utilized to collect data for the current research followed pragmatics principles. For example, "How are you?" in English was translated into "Are you busy lately?" literally in Chinese. In China, people tend to ask more specific questions to show sincere concern about their interlocutors. The two translators agreed that the essence of the messages had been conveyed well despite some minor deviations in terms of syntactical features and cultural differences (in terms of phatic communion) and, therefore, functional equivalence (Nida, 1964) was achieved in this case.

Table 4.4, Table 4.5, and Table 4.6 are examples of translation and back translation of background instructions, response options, and email correspondence.

Table 4.4

Translation and Back Translation of Background Instructions

Original English	Translation from English to Chinese	Back translation from Chinese to English
A video call jumps in. It's Sophia, who works at Plant B. Not long ago, you asked Sophia for the best practices from her previous head-up project to get well prepared for your current project. However, Sophia declined your request!	一个视频电话打进来，是 B 厂的苏菲。 不久前在为你现在的项目做准备工作的时候，你曾向苏菲询问有关她之前参与的抬头显示器项目的最佳实践，但是当时她拒绝了你的请求！	A video call comes in, it's Sophie from Factory B. Not long ago, while working on your current project, you once asked Sophie about the best practices of the heads-up display project she had previously worked on. But she declined your request at that time!

Table 4.5

Translation and Back Translation of Options for Scenario #5

Options	Original English	Translation from English to Chinese	Back translation from Chinese to English
Option #1	You partially share what Christine requested. Smart windshield pics for WeTube channel Hello Christine, Nice receiving your email! I attached SOME pics taken during our meetings. I hope it can be of some help. Best,	你发给陈婷部分她想要的相关材料。 智能挡风玻璃项目相关照片 你好！ 很高兴收到你的来信!我附上了一些我们开会时拍的照片，希望能对你有所帮助。 祝好	You sent Chen Ting some relevant materials she wanted. Photos about the smart windshield project Hello! It's great to hear from you! I've attached some photos taken during our meeting. Hope they are helpful for you. Best regards!
Option #2	You tell Christine that nothing is available. No records available for WeTube channel Hello Christine, Thank you for your email! It reminds us of the necessity of keeping things on file. But currently, we are not able to provide anything relevant. Sorry about that! Best,	你告诉她你没有存档任何相关材料。 无相关资料存档 你好！ 感谢你的来信！谢谢你提醒我们记录项目进程的重要性。但我们当下没有任何相关素材。抱歉! 祝好	You tell her that you don't save any relevant material. No relevant material on file Hello! Thanks for your email! Thank you for reminding us of the importance of tracking our project progress. But we don't have any relevant materials at present. Sorry! Best regards!

Table 4.5 (continued)

Translation and Back Translation of Options for Scenario #5

Options	Original English	Translation from English to Chinese	Back translation from Chinese to English
Option #3	You share all relevant material with Christine. All material at hand for WeTube channel Hello Christine, Attached is what I have concerning our project. ALL we have in our documentation include some pics, a few animated videos made by the D&D, and two progress reports. Good luck with your work! Best,	你把手上所有的相关材料都发给她。 智能挡风玻璃项目所有相关资料 你好！ 附件中是我手上项目相关的所有资料。包括照片、研发部制作的一些动画视频以及两份项目进展报告。祝你工作顺利！ 祝好	You send her all the relevant materials in your hands. All relevant materials about the smart windshield Hello! The attachment is all the materials about the project in my hands, including photos, some animated videos produced by the R&D department, and two project progress reports. All the best in your work! Best regards.
Option #4	You tell Christine that you need time to collect what she requested, hoping that she will not ask again. WeTube channel--PC broke down Hello Christine, I would like to share with you records of our work activities. However, my computer where those files are stored has been sent for repair. I'm not sure when it can be fixed and what can be retrieved from it. Sorry for not being helpful at the moment. Best,	你告诉她需要过一段时间才能确定有没有材料能提供给她，心里希望她不要再联系你。 电脑故障 你好！ 很想与你分享我们的工作活动记录，但是我的电脑送修了，相关材料都在里面。不知道什么时候能修好，也不知道还能恢复多少文件。抱歉，暂时无法提供帮助。 祝好	You inform her that it will take some time to determine if there are any materials that can be provided to her, and hope that she will not contact you again. Computer malfunction Hello! I would love to share our work activity records with you, but my computer has malfunctioned, and all the relevant materials are in it. I don't know when it can be fixed, and I don't know how many files can be recovered. I'm sorry, but I cannot provide assistance at the moment. Best regards.
Option #5	You ignore Christine's email and do not reply to her.	你决定不回复她的邮件。	You decide not to reply to her email.

Table 4.6

Translation and Back Translation of Request by Email for Scenario #9

Original English	Translation from English to Chinese	Back translation from Chinese to English
Best practices from smart windshield project Hello, I hope you are doing well! We Communication are planning to publicize project team best practices to help the company's internal project efficiency. Knowing that you are part of the smart windshield project, I wonder if you could help provide the best practices your team has identified so far along the project progress. We would appreciate it a lot if you could consider this request! Andrea Communication	智能挡风玻璃项目的最佳实践 你好！ 希望你一切顺利! 我们公关部正计划发布各项目团队的最佳实践， 以提升公司项目效率。得知你是智能挡风玻璃项目组的成员，想问你能否帮忙提供你们项目组迄今为止在项目进程中所总结的最佳实践。非常感谢你能考虑我们的请求! 安玉 公关部	Best practices for the smart windshield project. Hello! Hope everything is going well with you! Our PR department is planning to release the best practices of various project teams to improve project efficiency in the company. Knowing that you are a member of the smart windshield project team, I would like to ask if you can help provide the best practice that your project team has summarized so far in the project process. Thank you very much for considering our request! Anyu PR department,

The scenario crafting has been supervised by the German company along the way. Even though the interviews conducted by the researcher prior to game development did not reveal any culture-related specifics of knowledge hiding behavior, the researcher piloted the game in Chinese version before administering it in the data source company, with an aim to identify ambiguities or confusion, if there was any.

Six working professionals were approached for help. All of them agreed to assist. There are four females and two males with management, knowledge management, or automotive industry backgrounds. Among the six pilot participants, one has a bachelor's degree, two master's degree, and three doctoral degree. The pilot participants were invited to share how long it took them to go through the game, comment on any detail(s) they found confusing, and provide suggestions for game improvements. The six pilot participants provided very specific comments and

suggestions regarding the game setting, their game experiences, and even their personal observations and feelings about the game.

Table 4.7 details the feedback from the pilot and the researcher's reflections and updates based on the feedback. Noticeably, the game's prominent features were captured and understood by the participants. For example, participant #5 mentioned that the time spent playing the game was long. Participant #6, who works in the industry and helped the researcher to access his colleagues for data collection, shared his understanding of the interpersonal interaction scenarios and his feelings about the realism of the game in terms of what was requested in the game, assuring the researcher that these things did happen in his work environment. Moreover, he offered to help ensure accurate data by sending the link to his colleagues after work for their concentration. Participant #4, who has joined another serious game as a player, said that she was happy to see great improvements in this current one.

Table 4.7

Feedback from the Pilot of SOS the Serious Game in Chinese Version

Participants	Gender	Age	Education level	Position & field	Comments / suggestions	Indications /revision
#1	Male	40-49	PhD	Top management in international trade	It took 20 minutes or so to go through the game. Everything worked fine and smooth.	Taking into account all participants' feedback on time duration of the game, the researcher indicated on the front page that it would take 15-25 mins to finish the game.
#2	Female	30-39	Bachelor	An employee in automotive industry; a contact of automotive companies	It took 20 minutes to finish the game.	
#3	Female	30-39	PhD	A university faculty and researcher in English translation; a contact of an automotive company	It took 15 mins or so to go through the game	
					Using videos as a part of the survey is quite innovative. But I didn't always have enough patience to wait till the video ended. Better to have the scripts on the following page to make sure the participants would not miss anything.	To keep the consistency between Chinese version and German version, scripts were provided
					"同僚"(translated from "peer") indicated negative meaning	After consulting dictionaries and discussion with the pilot participant who made this comment, the researcher decided to stick to "同僚". The researcher and the participant reached an agreement that this word represented the intended meaning
#4	Female	30-39	PhD	A university faculty; a researcher in knowledge management	Huge improvements have been made since last game.	

Table 4.7 (continued)

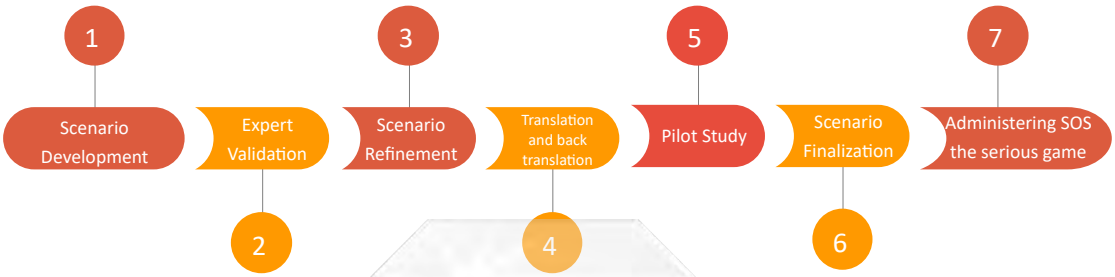
Feedback from the Pilot of SOS the Serious Game in Chinese Version

Participants	Gender	Age	Education level	Position & field	Comments / suggestions	Indications /revision
#5	Female	40-49	Master	Administrative personnel in a higher vocational school; a contact of automotive companies	It took about 20 mins to finish the game.	The researchers are fully aware of this as a potential drawback of the current data collection method. However, it also highlights the unique strength that it helps obtain insightful and valuable data.
					Long time duration might increase the probability of mission abortion or careless responding	Feedback on time duration will allow the researcher to be able to ensure validity by identifying and excluding data from those whose devoted time is less than 15 mins if necessary
#6	Male	30-39	Master	A R&D employee in an automotive company; one of the contacts of this company	It's good that the investigation does not involve specific technological knowledge for the company has strict rules as to what kind of knowledge can be shared with whom. All employees have taken training in regards of confidentiality.	
					Personnel from the same department or even the same company might have similar behavioral features in terms of sharing or not sharing due to same company policy.	
					Interpersonal relationships is one of the major factors influencing individuals' sharing and non-sharing decision. But previous request decline in the game might not be enough to establish "negative reciprocity" between individuals or at least not enough to make it obvious.	Indicating that the incorporation of "social exchange" into the scenarios is successful – salient enough to participants. The build-in of reciprocity might need more effort.
					Why different people ask for the same thing (a list of expert contacts)?	This conveys that difference in organizational level might not be as obvious as intended.
					"A list of expert contacts" is relevant in my work setting and interpersonal relationships do play a role in deciding whether or not to share their knowledge or to share or partially share what was requested.	This highlights the realism and culture-generalizability of our research design and the rationality of our research hypotheses
					I will share the link afterwork for my colleagues' better experience of the game. It would not be appropriate for them to play video during work, particularly all together in the workplace.	It would help ensure adequate and quality performance of the game and hence genuine and accurate data.

Figure 4.14 specifies the progressing procedures for ensuring validity.

Figure 4.14

Procedure for Ensuring Validity



For measuring the reliability of SOS the serious game, the data collection instrument in the study, existing approaches, such as the test-retest method, are not applicable considering the categorical nature of the main variables in the study and the fact that most of these approaches rely on statistical analyses. However, with full awareness of the challenge of developing a novel and innovative measurement, the researcher spared no effort in harnessing every possible resource to refine it as planned. The meticulous work invested is expected to serve to ensure its credibility. The researcher also counts on future usage of this instrument to bring in more empirical data to test its reliability.

4.1.3 Participants and Procedures

Once the two versions in English and Chinese were validated with the help of professionals working in the field, they were administered in the two automotive companies.

Being a subsidiary of an international automobile manufacturer, the German automotive company enjoys high prestige for its history and well-known brand. It is recognized as one of the leading car manufacturers in the premium and supercar segment with worldwide 87,000 employees. Headquartered in Germany, the company operates production facilities together with its subsidiaries globally.

Before being sent to employees for participation, the game was submitted for a full round of review and approval from committees in various German automotive company (the headquarters) departments, e.g., production, legal, and labor departments, etc. Despite the researcher's intention to collect participants' demographic data, the company released restrictions on revealing employees' demographics and only allowed gender information to be collected.

The Knowledge Management unit in the German company helped the data collection process by advertising SOS the serious game, and then distributing anonymous accounts created by the researcher to interested employees so they could log in to the GenaGame® platform. The invitation to play the game was sent to 7,900 employees, 214 of whom have requested an account to play during the game-on period that lasted approximately two months from early July till mid-September 2023. The response rate is 2.7%. All participants are knowledge workers within the production unit. Two reminders have been sent across the process. Eventually, 187 participants played through the game and generated usable data; 46 were female, 129 of them were male, and the rest 12 were unidentified. We provided no incentive in monetary terms for the participants in the German automotive company but offered to compile personal reports on their behavioral features and suggestions for their future knowledge exchange.

The Chinese automotive company is a listed joint venture. Having operated for more than half a century in the industry, the company now acts as one of the leading domestic automobile manufacturers specializing in passenger cars and new energy vehicles, with over 20,000 employees working in four manufacturing bases across the country and overseas subsidiaries, ranking among the top for its outstanding production capacity and sales volume.

Knowledge workers working for the Research and Development department in the Chinese automotive company (the basement) were invited to play SOS the serious game via our contact working in the same unit in late July. Beforehand, the researcher informed the contact of the research background, including the research objectives, intended respondents, and the scenarios the respondents will experience in the survey. To relieve the potential concern that the survey questions might involve specific technological or industrial knowledge and learnings, the researcher assured the contact of the integrity of the survey and highlighted that the questions and scenarios in the current survey only concerned general knowledge in work settings and that the value of specific knowledge depicted in the scenario were fictional and only held for the survey context. The contact piloted the game before he shared the link in his unit.

Among the invited 4,000 employees, 231 have joined the research with two-time reminders till the end of August, yielding a response rate of 5.8%. The following screening process, based on the duration time and data completeness, validated 76 of the documented data, 30 of which were from females.

4.2 Descriptive Statistics

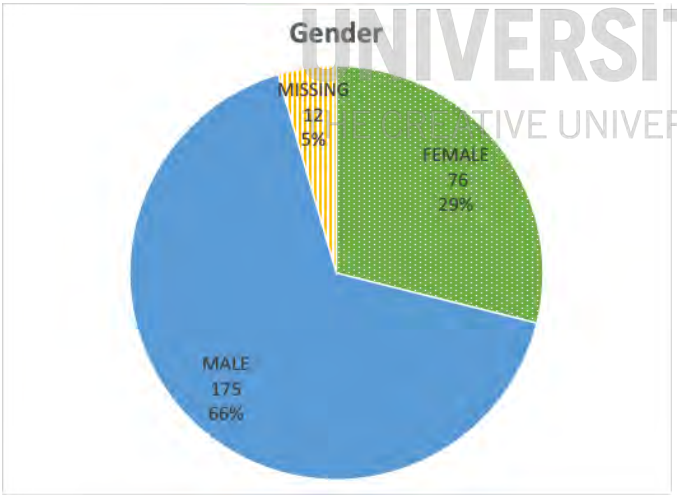
IBM SPSS Statistics (version 26) was used for statistical analysis of the collected data. Descriptive statistics was first run for the researchers' premier understanding of the big picture.

4.2.1 Descriptive Statistics of the Full Sample

Respondents from the two automotive companies constitute the final sample size of 263 for the research. Among them, 76 were female, 175 were male, and 12 unidentified, as shown in Figure 4.15.

Figure 4.15

Gender Information of All Participants (N = 263)

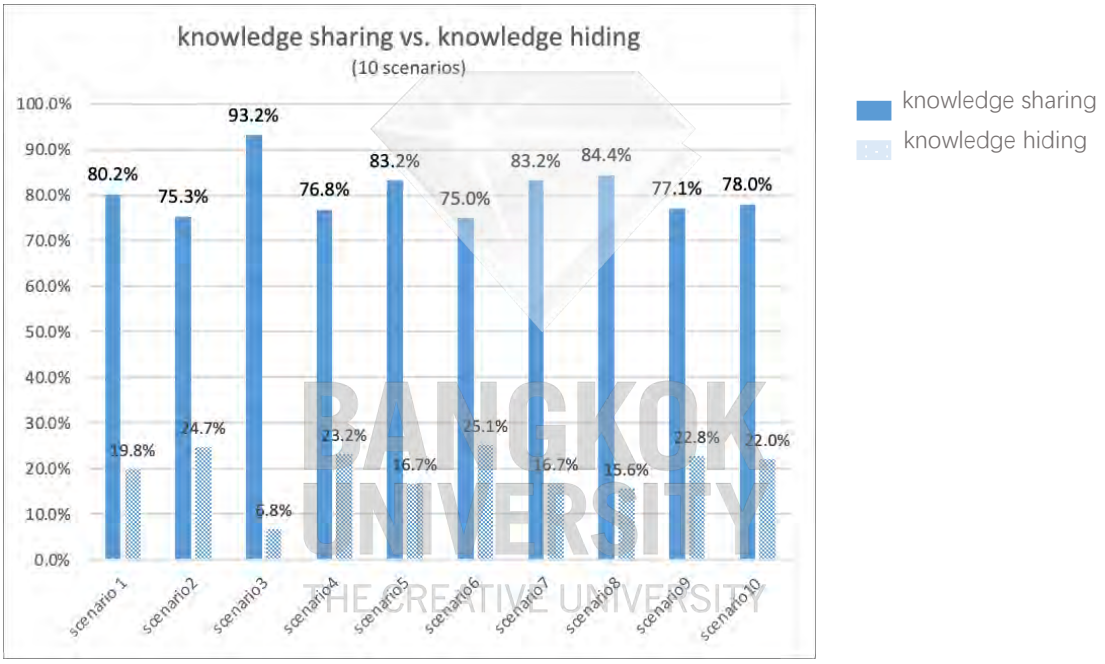


Based on the full sample (consisting of German and Chinese participants), it is salient from the descriptive analysis for our 10 scenarios that knowledge holders shared (average = 80.7%) far more often than they hid (average = 19.3%) upon

colleagues' requests, and that in scenario #3, the frequency of knowledge sharing was particularly high, as shown in Figure 4.16.

Figure 4.16

Knowledge Request Response Distribution by Knowledge Sharing and Knowledge Hiding (N = 263)

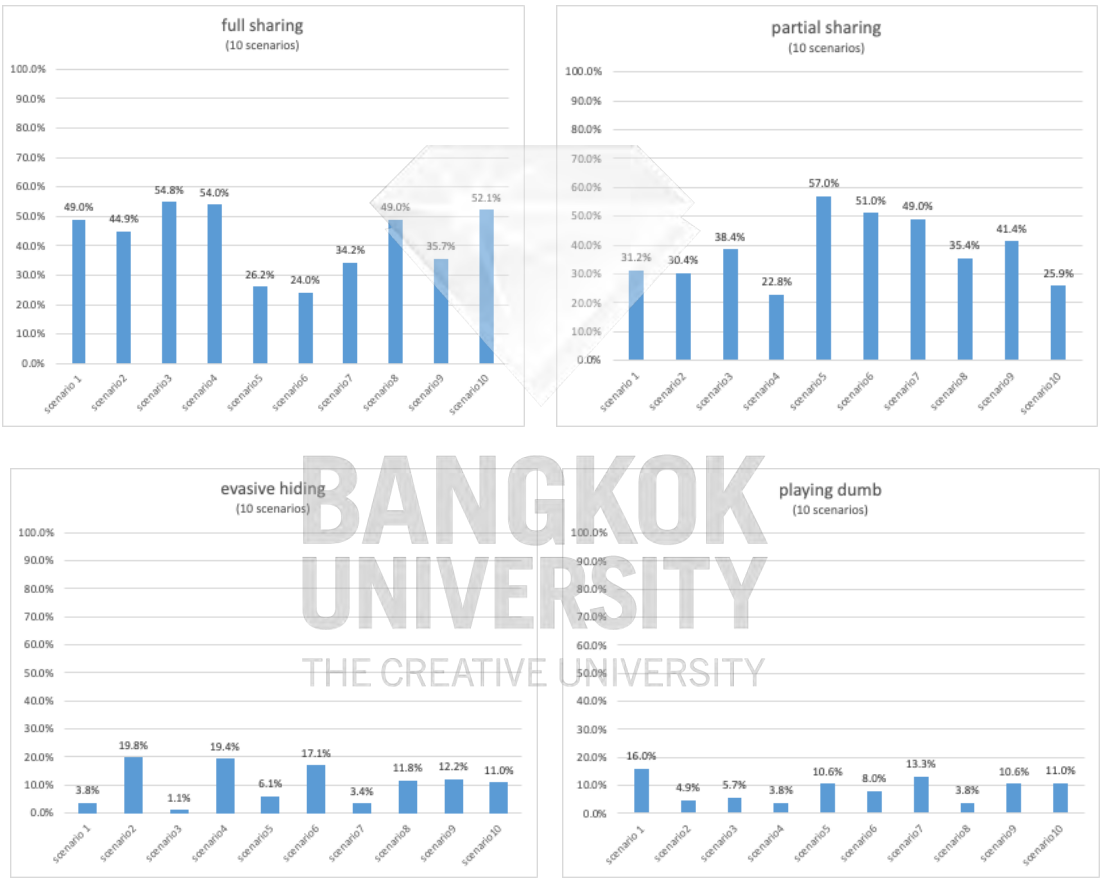


If we look more closely into the types of sharing and hiding, as shown in Figure 4.17, we can observe that participants "fully shared" (average = 42.3%) more often than they "partially shared" (average = 38.3%) what they knew with others, while they used "playing dumb" strategy (average = 8.8 %) less often than evasive hiding (average = 10.6 %) to hide what they knew, and that they used one strategy far more often than the other when sharing/hiding what they knew in some scenarios. For example, in scenarios #4 and #5 huge gap between "full sharing" and "partial sharing"

emerged, while in scenarios #2 and #4 “evasive hiding” took place far more frequently than “playing dumb”.

Figure 4.17

Knowledge Request Response Distribution by Four Behavior (N = 263)

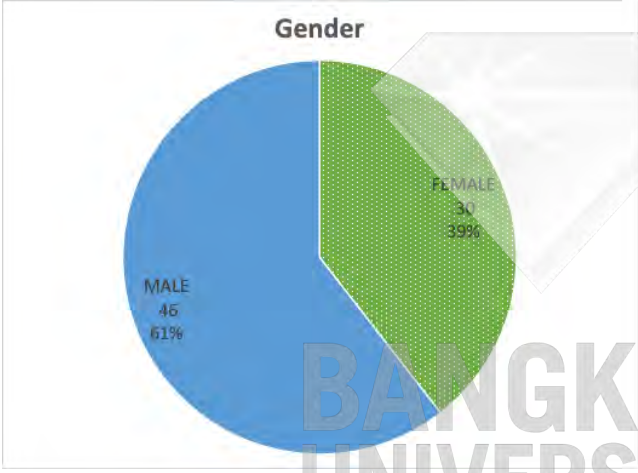


4.2.2 Descriptive Statistics of Chinese Sample

Participants from the automotive company in China are 76 R&D employees, including 30 females (39%) and 46 males (61%), as presented in Figure 4.18.

Figure 4.18

Gender Information of Chinese Participants (N = 76)



The descriptive results demonstrate that Chinese knowledge holders shared what they knew with colleagues (average = 73.7%) a lot more often than they hid from them (average = 26.3%) (see Figure 4.19) and that they preferred “partial sharing” (average = 47.5%) to “full sharing” (average =26.2%) when sharing with colleagues while using “evasive hiding” (average = 13.0%) roughly equally to “playing dumb” strategy (average = 13.3%) when withholding knowledge from them (see Figure 4.20).

Figure 4.19

Chinese Knowledge Request Response Distribution by Knowledge Sharing and Knowledge Hiding (N = 76)

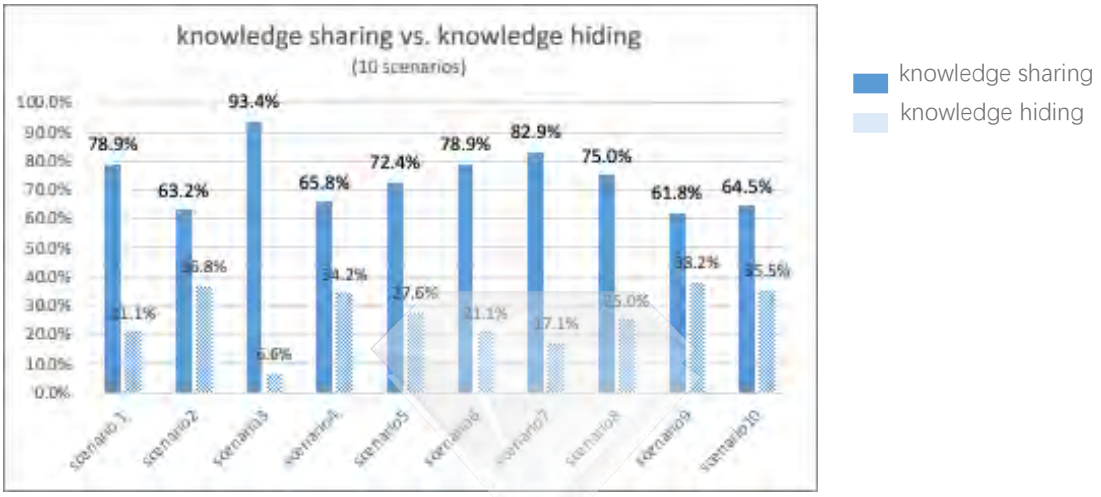
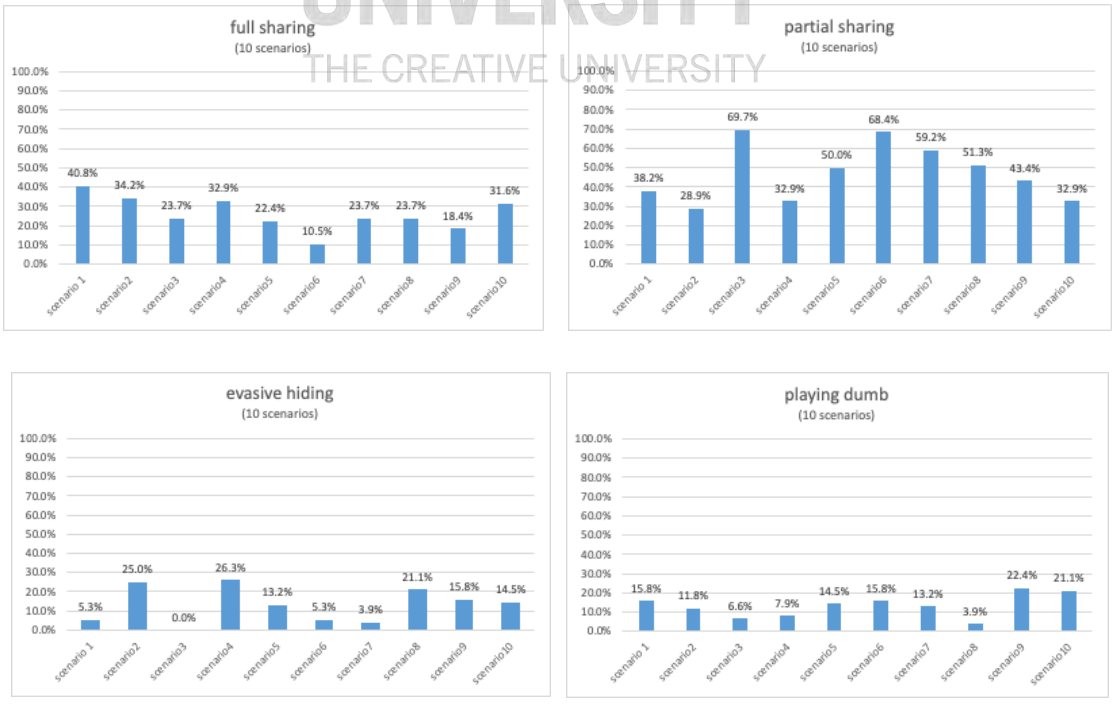


Figure 4.20

Chinese Knowledge Request Response Distribution by Four Behavior (N = 76)



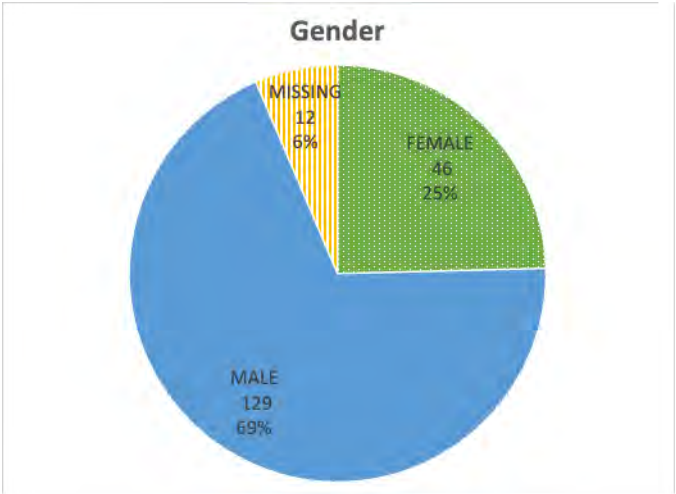
While scenario #3 appeared, again, as the one where participants demonstrated the most sharing behavior, scrutinizing the four responsive behaviors also allowed us to observe some other distinguished features across scenarios. For example, in scenario #3 and scenario #6, Chinese knowledge holders showed the greatest difference in their sharing behaviors between "full sharing" and "partial sharing", while the greatest difference in using hiding strategies between "evasive hiding" and "playing dumb" arose in scenario #4 and scenario #8.

4.2.3 Descriptive Statistics of German Sample

German participants who joined this study were 187 Production knowledge workers from a German automotive company. Among them, 46 are females (25%), 129 are males (69%), and 12 (6%) not identified, as presented in Figure 4.21.

Figure 4.21

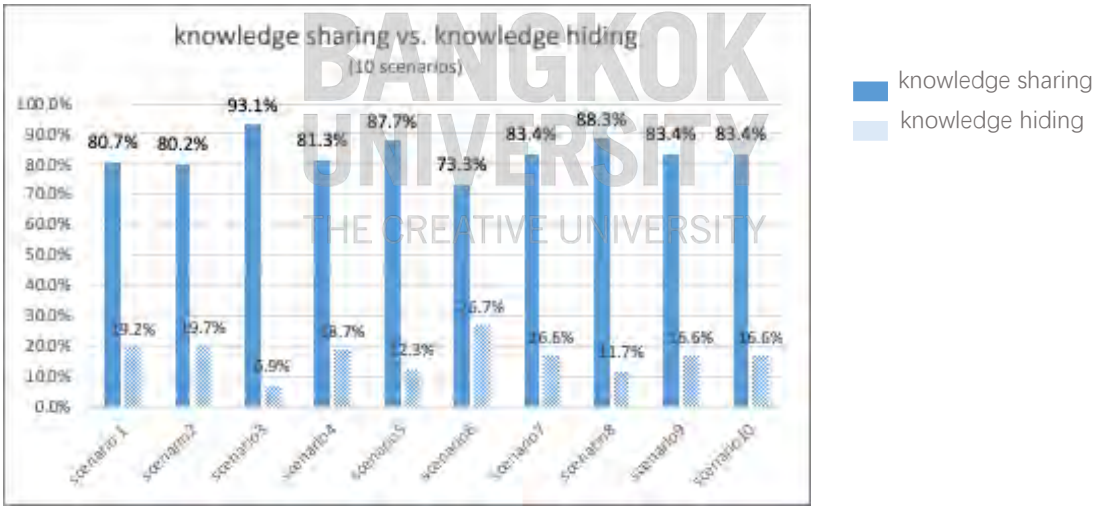
Gender Information of German Participants (N = 187)



The descriptive results demonstrate that German knowledge holders shared (average = 83.5%) far more often than they hid (average = 16.5%) from their colleagues. Most of them chose to share what they knew with colleagues instead of withholding their knowledge across the ten scenarios (see Figure 4.22). Same as the previous two samples, the prominent differences in German participants' sharing and hiding responses was found in scenario #3, arousing the researcher's curiosity about what exactly in this scenario that brought about the distinction.

Figure 4.22

German Knowledge Request Response Distribution by Knowledge Sharing and Knowledge Hiding (N=187)

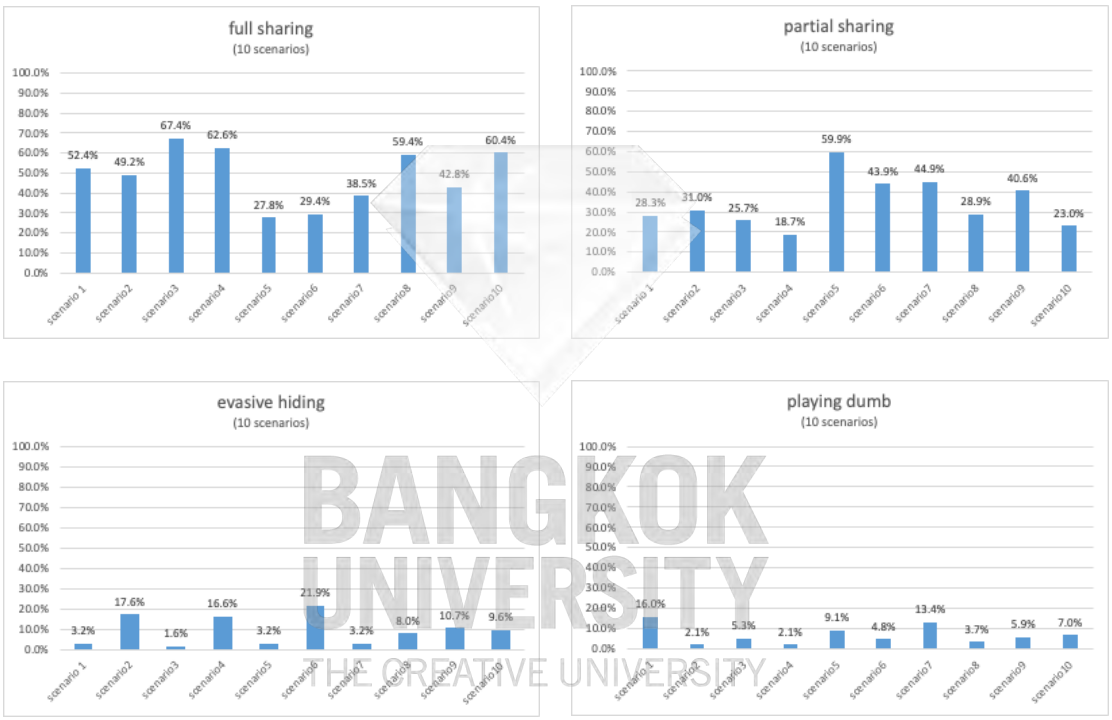


In terms of the four sub-level behaviors, German participants "fully shared" (average = 49.0%) more often than they "partially shared" (average = 34.5%) with their colleagues when making their knowledge available to them while "evasively hid" (average = 9.6%) more often than "played dumb" (average = 6.9%) to their colleagues to withhold their knowledge (as shown in Figure 4.23). The biggest

difference in “full sharing” and “partial sharing” was found in scenarios #3 and #4 while that in “evasive hiding” and “playing dumb” was found in scenario #6.

Figure 4.23

German Knowledge Request Response Distribution by Four Behaviors (N=187)



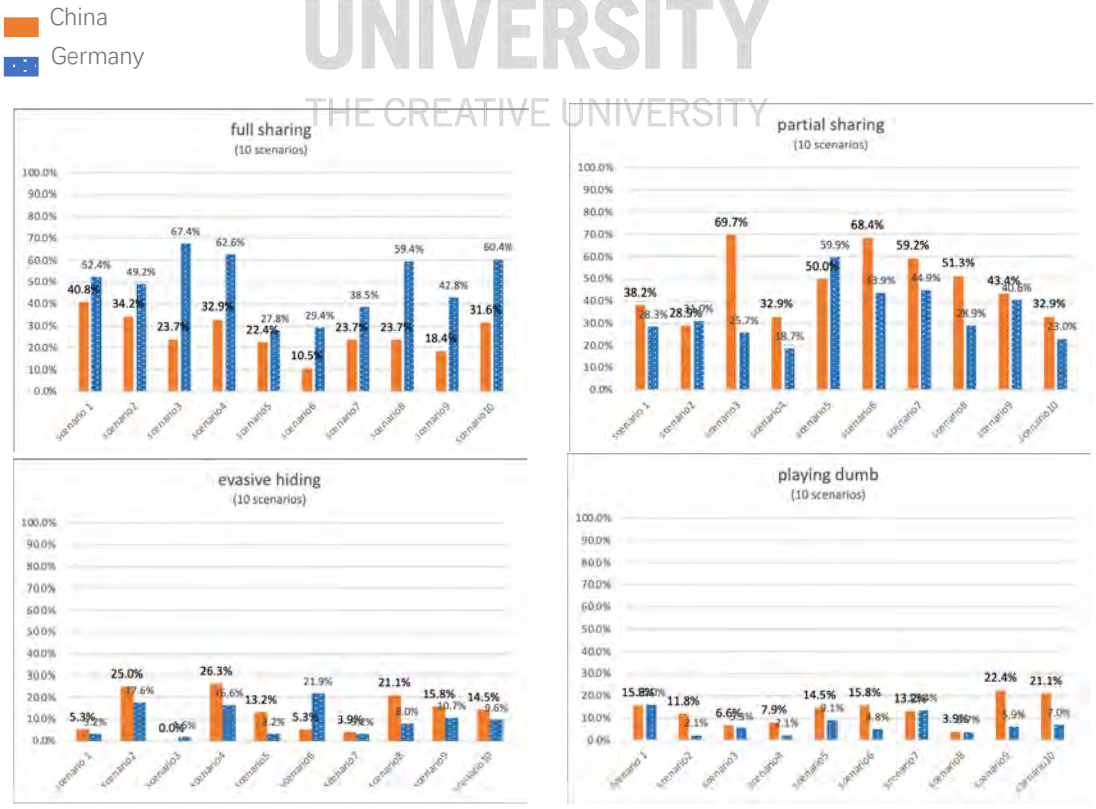
4.2.4 Descriptive Statistics Between Chinese and German Samples

The previous initial findings have surfaced a few differences within each sample respectively. To further unveil the potential differences across countries, one of the major objectives this study aims to achieve, we then brought the samples from two different countries into a comparative perspective. Figure 4.24 shows knowledge holders’ responses across the two countries.

As can be seen, even though knowledge workers from both countries coincidentally demonstrated a lot of sharing behavior, they exhibited several differences when it came to the extent to which they shared. For example, in scenarios #3, #4, #8, and #10, German knowledge workers fully shared what they knew much more often than their Chinese counterparts, while in scenario #3, they partially shared less often than them. On the other hand, the strategies they used to withhold what they knew were also different in some particular scenarios. For example, a huge difference in "evasive hiding" emerged in scenario #6, where German knowledge workers evasively hid more often, while in scenarios #9 and #10, Chinese knowledge workers used a lot more "playing dumb" strategy.

Figure 4.24

Knowledge Holders' Responses Across Cultures



Since each scenario involved one level of several independent variables, each of them shared the potential contributing to knowledge holders' responses to requests. To better identify which variable(s) could be possible predictors leading to the variations in knowledge workers' responses across cultures, we decided to dig into our focal dependent variable from "communication media richness", and "knowledge type", the two independent variables incorporated in all scenarios.

When looking into knowledge workers' responsive behaviors by the two mentioned variables, i.e., "communication media richness" and "knowledge type", we were able to identify some patterns across cultures. When we look at media use, first, we can see that knowledge sharing behavior was more pronounced to German knowledge workers in general, while knowledge hiding was more pronounced to Chinese knowledge workers (as Figure 4.25 shows).

In terms of the extent to which they shared, it was found that Chinese knowledge holders were inclined to partially share what they knew no matter which media was used to request their knowledge, while German knowledge holders preferred to fully share. When it comes to the strategies used to withhold their knowledge, Chinese knowledge holders showed more "playing dumb" and "evasive hiding" when requested by "email" and "video conferencing"; however, their use of the two strategies was roughly equal to Germany knowledge holders when requested by instant messaging.

Figure 4.25

Knowledge Holders' Responses by Media Use Across Cultures

Looking into knowledge type, as shown in Figure 4.26, we can observe the same phenomenon that Chinese knowledge holders shared less frequently and Germen hid less frequently in general. At the four behavior level, Chinese knowledge workers "fully shared" evidently less often than German knowledge workers regardless of what type of knowledge they were requested, while the frequencies of their "partial sharing" and "playing dumb" responses were higher than German knowledge workers'. In terms of "evasive hiding", Chinese knowledge workers engaged in this behavior more often than German knowledge workers when they were requested for "documents" and "relationships" but not when they were requested for "experience".

Figure 4.26

Knowledge Holders' Responses by Knowledge Type Across Cultures

If we focus our attention on the impact made by a particular media or a particular type of knowledge on knowledge holders' responses, more interesting findings unfold.

Figure 4.27 showed that German knowledge holders "shared" and even "fully shared" what they knew more often than their Chinese counterparts when they were requested by email, and they used "hiding" strategies less often than Chinese knowledge holders, with a single exception found in scenario #7 where their "playing dumb" behavior nosed out Chinese knowledge holders'.

When they were requested for knowledge by video conferencing, see Figure 4.28, identically, differences manifested in that German knowledge holders demonstrated more “sharing” behavior in general and more “full sharing” in specific, while more Chinese knowledge holders chose to “partially share” what they knew. While they “hid” more often than German knowledge holders in general, except for in scenario #6, where more German knowledge holders “evasively hid” what they knew, Chinese knowledge holders used hiding strategies, i.e., “evasive hiding” and “play dumb” more often to avoid making what they knew available to others when requested by video conferencing.

Figure 4.27

Knowledge Holders’ Responses by Email Across Cultures

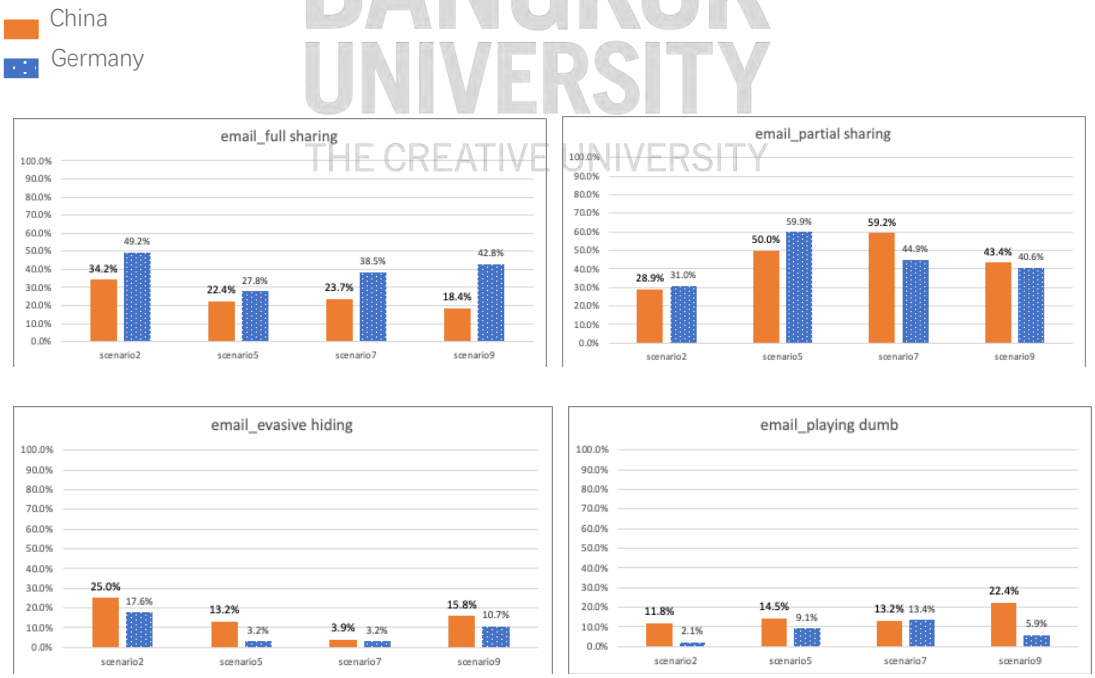


Figure 4.28

Knowledge Holders' Responses by Video Conferencing Across Culture

Responses of the knowledge holders who are from two different cultural backgrounds to knowledge requests made by instant messaging, however, were found not discretely distinct from one another. As Figure 4.29 presents, major differences were found in the extent to which knowledge holders shared with the knowledge seeker. To be more specific, more German knowledge holders engaged in "full sharing", while their Chinese counterparts were more likely to "partially share" what they knew with knowledge seekers who forwarded the request by instant messaging.

Figure 4.29

Knowledge Holders' Responses by Instant Messaging Conferencing Across Cultures

Taking a close look at knowledge type, as presented in Figure 4.30, Figure 4.31, and Figure 4.32, we notice that in addition to the prevalent findings across the previous comparisons that German knowledge holders generally "shared" and also "fully shared" more often than Chinese knowledge holders and that "partial sharing" and "playing dumb" were more articulated to Chinese knowledge holders, the use of the "evasive hiding" strategy when knowledge holders were requested for experience appeared to be "abnormal" as compared to previous cases. Here in two scenarios, we capture that more German knowledge holders than Chinese engaged in "evasive hiding" (see Figure 4.30).

The descriptive statistics detailed in this section not only exposed us to some behavioral patterns (of knowledge holders' responses) across different samples but

also allowed us to observe differences between knowledge workers from two different cultural backgrounds. A close comparison between the Chinese and German samples will be made in the following section.

Figure 4.30

Knowledge Holders' Responses for Experience Knowledge Across Cultures

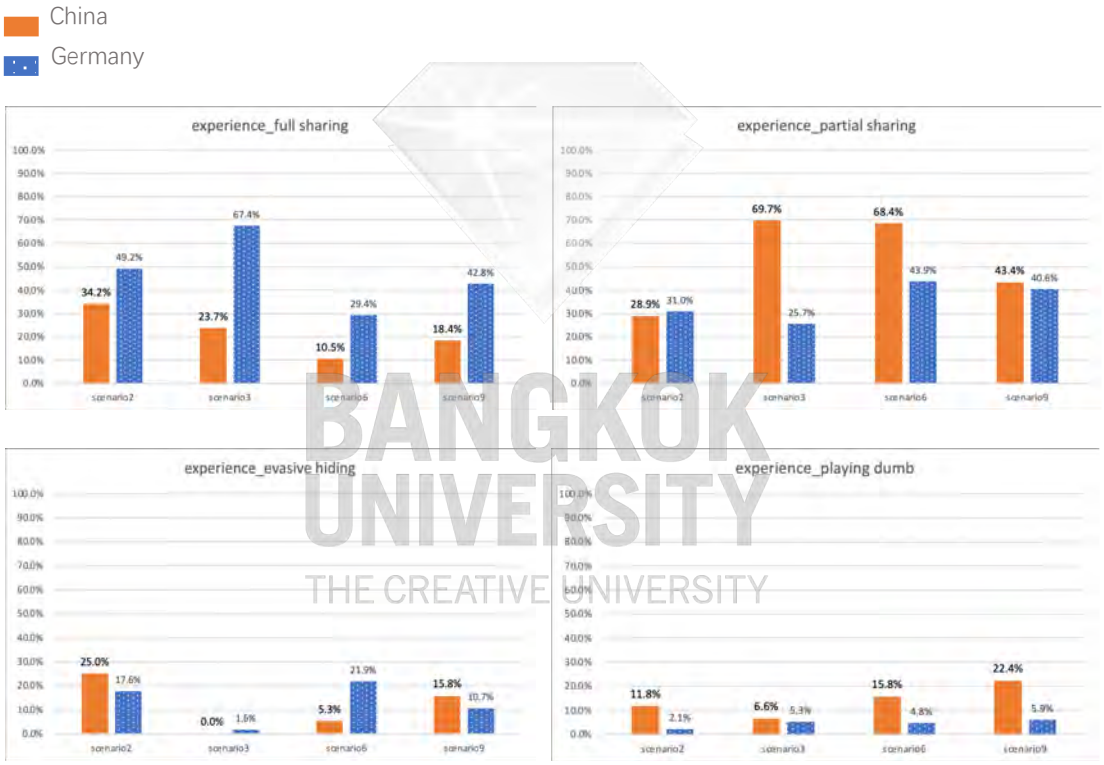
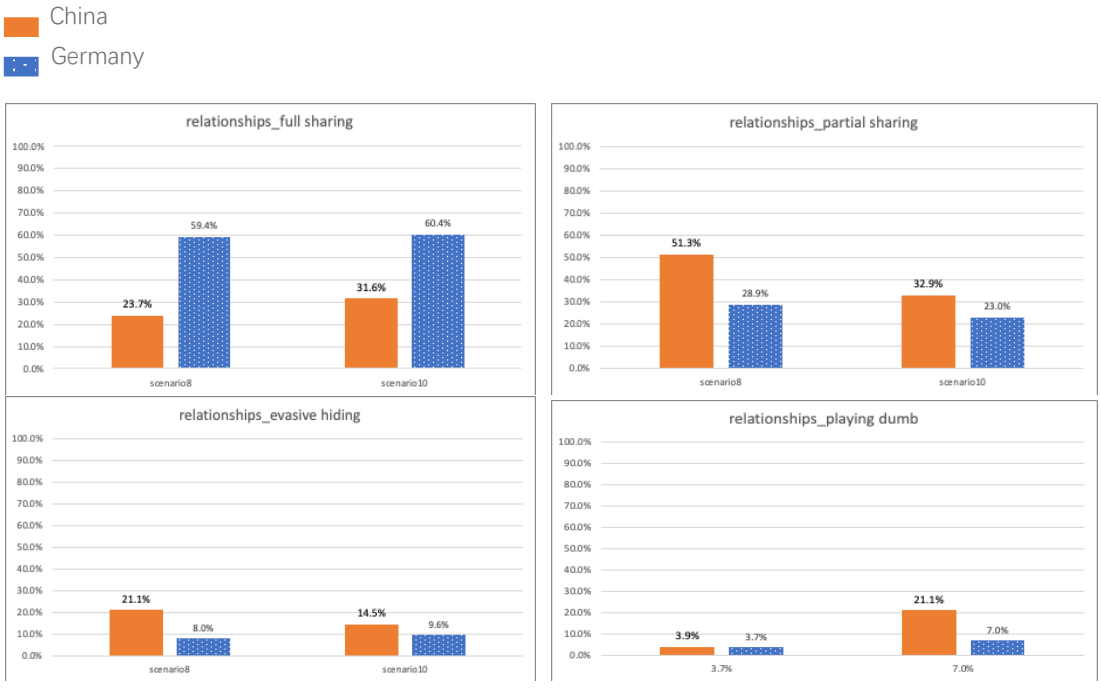


Figure 4.31

Knowledge Holders' Responses for Document Knowledge Across Cultures

Figure 4.32

Knowledge Holders' Responses by Relationships Knowledge Across Cultures



4.3 Inferential Statistics

Since most of the data collected is of a categorical nature, the chi-square test and repeated-measures ANOVA, in particular, were utilized to fulfill the data analyses. More specifically, a series of chi-square tests were run for two-by-two comparisons, as suggested by (McHugh, 2013), for sub-hypotheses testing for H1, H2, H3, and for H5 and H7, where all variables of focus were categorical. For H4 and H6, repeated-measures ANOVA was employed to compare participants' responses to the requests forwarded via three different communication media and their responses to the requests for three different types of knowledge, using the percentage calculated based on the frequencies of participants' responses they selected for the scenarios. Table 4.8 specifies the application of the two statistic techniques in hypothesis tests.

Table 4.8

Statistic Techniques Used to Test Hypotheses

Hypotheses	Sub-hypotheses	Statistic Techniques
H1$_a$: Knowledge holders are likely to respond differently to knowledge requests made by different colleagues with whom they shared different past knowledge exchange experience **H1$_0$**: Knowledge holders are likely to respond similarly to knowledge requests made by different colleagues with whom they shared different past knowledge exchange experience	**H1$_{1a}$**: Knowledge holders are likely to share (to different extents) knowledge with the one they had *at least one past positive knowledge exchange* while likely to hide knowledge from the one they had *at least one past negative knowledge exchange* **H1$_{10}$**: Knowledge holders are likely to respond similarly to the one they had at least one past positive knowledge exchange and the one they had at least one negative knowledge exchange	Chi-square test
	H1$_{2a}$: Knowledge holders are likely to share (to different extents) knowledge with the one they had *at least one past positive knowledge exchange* while likely to hide knowledge from the one they had *past positive and negative knowledge exchanges* **H1$_{20}$**: Knowledge holders are likely to respond similarly to the one they had at least one past positive knowledge exchange and the one they had past positive and negative knowledge exchanges	
	H1$_{3a}$: Knowledge holders are likely to hide knowledge from the one they had *at least one past negative knowledge exchange* while likely to share (to different extents) knowledge with the one they had *past positive and negative exchanges* **H1$_{30}$**: Knowledge holders are likely to respond similarly to the one they had at least one past negative knowledge exchange and the one they had past positive and negative knowledge exchanges	

Table 4.8 (continued)

Statistic Techniques Used to Test Hypotheses

Hypotheses	Sub-hypotheses	Statistic Techniques
H1$_{a}$: Knowledge holders are likely to respond differently to knowledge requests made by different colleagues with whom they shared different past knowledge exchange experience **H1$_{0}$**: Knowledge holders are likely to respond similarly to knowledge requests made by different colleagues with whom they shared different past knowledge exchange experience	**H1$_{4a}$**: Knowledge holders are likely to share (to different extents) knowledge with the one they had *at least one past positive knowledge exchange* while likely to hide knowledge from the one they had *no past exchange* **H1$_{40}$**: Knowledge holders are likely to respond similarly to the one they had at least one past positive knowledge exchange and the one they had no past exchange	Chi-square test
	H1$_{5a}$: Knowledge holders are likely to hide knowledge from the one they had *at least one past negative knowledge exchange* while likely to share (to different extents) knowledge with the one they had *no past exchange* **H1$_{50}$**: Knowledge holders are likely to respond similarly to the one they had at least one negative knowledge exchange and the one they had no past exchange	
	H1$_{6a}$: Knowledge holders are likely to share (to different extents) knowledge with the one they had *past positive and negative exchanges* while likely to hide knowledge from the one they had *no past exchange* **H1$_{60}$**: Knowledge holders are likely to respond similarly to the one they had past positive and negative knowledge exchanges and the one they had no past exchange	

Table 4.8 (continued)

Statistic Techniques Used to Test Hypotheses

Hypotheses	Sub-hypotheses	Statistic Techniques
H2$_a$: Knowledge holders are likely to share (to different extents) knowledge with knowledge seekers of a higher rank while likely to hide knowledge from knowledge seekers of the same rank **H2$_0$**: The knowledge seeker's rank does not predict the knowledge holder's responses	**H2$_{1a}$**: In the extreme situation where a past negative knowledge exchange happened between the knowledge seeker and the knowledge holder, the knowledge holder is more likely to share (to different extents) knowledge with the knowledge seeker of a higher rank while likely to hide knowledge from the knowledge seeker of the same rank **H2$_{10}$:** In the extreme situation where a past negative knowledge exchange happened between the knowledge seeker and the knowledge holder, the knowledge seeker's rank does not predict the knowledge holder's responses	Chi-square test
	H2$_{2a}$: In the extreme situation where the knowledge seeker requests for high-level scarcity knowledge the knowledge holder has, the knowledge holder is more likely to share (to different extents) knowledge with the knowledge seeker of a higher rank while likely to hide knowledge from the knowledge seeker of the same rank **H2$_{20}$**: In the extreme situation where the knowledge seeker requests for high-level scarcity knowledge the knowledge holder has, the knowledge seeker's rank does not predict the knowledge holder's responses	
H3$_a$: Knowledge holders are likely to share (to different extents) knowledge with female knowledge seekers while likely to hide knowledge from male knowledge seekers **H3$_0$**: The knowledge seeker's gender does not predict knowledge holders' responses	**H3$_{1a}$**: *Female* knowledge holders are likely to share (to different extents) knowledge with female knowledge seekers while likely to hide knowledge from male knowledge seekers **H3$_{10}$**: The knowledge seeker's gender does not predict female knowledge holders' responses	Chi-square test
	H3$_{2a}$: *Male* knowledge holders are likely to share (to different extents) knowledge with female knowledge seekers while likely to hide knowledge from male knowledge seekers **H3$_{20}$**: The knowledge seeker's gender does not predict male knowledge holders' responses	

Table 4.8 (continued)

Statistic Techniques Used to Test Hypotheses

Hypotheses	Sub-hypotheses	Statistic Techniques
H4$_a$: Knowledge holders are likely to share (to different extents) their knowledge when a request is made through a rich communication channel while likely to hide their knowledge when a request is made via a lean communication channel **H4$_0$**: The richness level of the communication channel used to make a knowledge request does not predict knowledge holders' responses to the request for knowledge	**H4$_{1a}$**: Knowledge holders are likely to share (to different extents) their knowledge when a request is made through *video conferencing* while likely to hide their knowledge when a request is made through *email* **H4$_{10}$**: Knowledge holders do not vary their responses to knowledge requests made through video conferencing or through email	Repeated-measures ANOVA
	H4$_{2a}$: Knowledge holders are likely to share (to different extents) their knowledge when a request is made through *video conferencing* while likely to hide their knowledge when a request is made through *instant messaging* **H4$_{20}$:** Knowledge holders do not vary their responses to knowledge requests made through video conferencing or through instant messaging	
	H4$_{3a}$: Knowledge holders are likely to share (to different extents) their knowledge when a request is made through *instant messaging* while likely to hide their knowledge when a request is made through *email* **H4$_{30}$**: Knowledge holders do not vary their responses to knowledge requests made through instant messaging or through email	
H5$_a$: Knowledge holders are likely to share (to different extents) the knowledge acquired with minimum investment while likely to hide the knowledge acquired with substantial investment **H5$_0$**: The investment knowledge holders made in acquiring the requested knowledge does not predict their responses		Chi-square test

Table 4.8 (continued)

Statistic Techniques Used to Test Hypotheses

Hypotheses	Sub-hypotheses	Statistic Techniques
H6$_a$: Knowledge holders are likely to share (to different extents) explicit knowledge (i.e., documents) while likely to hide the knowledge that was acquired over time and difficult to codify (i.e., experience) and the one developed over time or more personal (i.e., relationships) **H6$_0$**: The type of the requested knowledge does not predict knowledge holders' responses	**H6$_{1a}$**: Knowledge holders are likely to share (to different extents) their knowledge when they are requested for explicit knowledge (i.e., *documents*) while likely to hide knowledge when they are requested for the knowledge that was acquired over time and difficult to codify (i.e., *experience*). **H6$_{10}$**: Knowledge holders are likely to respond similarly to requests for explicit knowledge (i.e., documents) and to those for the knowledge that was acquired over time and difficult to codify (i.e., experience)	Repeated-measures ANOVA
	H6$_{2a}$: Knowledge holders are likely to share (to different extents) their knowledge when they are requested for explicit knowledge (i.e., *documents*) while likely to hide knowledge when they are requested for the knowledge developed over time or more personal (i.e., *relationships*) **H6$_{20}$**: Knowledge holders are likely to respond similarly to requests for explicit knowledge (i.e., documents) and to those for the knowledge developed over time or more personal (i.e., relationships)	
	H6$_{3a}$: Knowledge holders are likely to share (to different extents) their knowledge when they are requested for the knowledge that was acquired over time and difficult to codify (i.e., *experience*) while likely to hide knowledge when they are requested for the knowledge developed over time or more personal (i.e., *relationships*) **H6$_{30}$**: Knowledge holders are likely to respond similarly to requests for the knowledge that was acquired over time and difficult to codify (i.e., experience) and to those for the knowledge developed over time or more personal (i.e., relationships)	
H7$_a$: Knowledge holders are likely to share (to different extents) low-level scarcity knowledge while likely to hide high-level scarcity knowledge **H7$_0$**: The scarcity level of knowledge does not predict knowledge holders' responses		Chi-square test

4.3.1 Knowledge Holders' Responses to Knowledge Requests

In this section, we reported how we tested our hypotheses, with statistical techniques, that concern the relationships between the independent variables, i.e., reciprocity history (H1), the rank of knowledge seeker (H2), gender of knowledge seeker (H3), communication channel richness (H4), knowledge ownership (H5), knowledge type (H6), knowledge scarcity (H7), and the dependent variable, i.e., knowledge holders' responses to requests from colleagues.

4.3.1.1 Knowledge Holders' Sharing and Hiding Responses. To acquire an initial understanding of knowledge holders' responses to knowledge requests, we began the comparisons by testing our hypotheses first at the generic "sharing" and "hiding" levels, combining ("partial sharing" behavior with "full sharing" behavior) and ("evasive hiding" with "playing dumb").

In order to test our Hypothesis 1_{1a}, a Chi-square test of independence was performed to evaluate the relationship between knowledge holders' sharing and hiding responses to the request from the one they had at least one past positive knowledge exchange (scenario #2) and their sharing and hiding responses to the request from the one they had at least one past negative knowledge exchange history (scenario #4). The relationship between the two sets of responses was significant, χ^2 (1, N = 263) = 2.781, p = .095. Since our hypothesis is oriented, we can divide the p-value by 2 (Frost, 2021), so p = 0.0475. Table 4.9 presents the result for this comparison.

Consequently, we can conclude that knowledge holders responded similarly to the request from the one they had at least one positive knowledge exchange and the

one they had at least one negative knowledge exchange. The test results provide no evidence for us to validate $H1_{1a}$ since we failed to reject the null hypothesis.

Table 4.9

Chi-square Test Results for Hypothesis 1_{1a}

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
positive reciprocity * negative reciprocity	263	100.0%	0	0.0%	263	100.0%

positive reciprocity * negative reciprocity Crosstabulation

			negative reciprocity		
			hiding	sharing	Total
positive reciprocity	hiding	Count	20	45	65
		Expected Count	15.1	49.9	65.0
	sharing	Count	41	157	198
		Expected Count	45.9	152.1	198.0
Total		Count	61	202	263
		Expected Count	61.0	202.0	263.0

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2.781[a]	1	.095		
Continuity Correction[b]	2.245	1	.134		
Likelihood Ratio	2.665	1	.103		
Fisher's Exact Test				.127	.069
Linear-by-Linear Association	2.771	1	.096		
N of Valid Cases	263				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 15.08.
b. Computed only for a 2x2 table

Identically, a series of Chi-square tests had been planned for testing the rest sub-hypotheses of H1 (i.e., $H1_{2a}$, $H1_{3a}$, $H1_{4a}$, $H1_{5a}$, and $H1_{6a}$,), those of H2 and H3

(i.e., $H2_{1a}$, $H2_{2a}$,), $H5_a$, and $H7_a$. However, Fisher's exact test results of $H3_{1a}$, $H3_{2a}$, and $H5_a$ had to be alternatively referred to when the Chi-square test assumption was violated (Kim, 2017). As suggested by (Bower, 2003), especially when more than 20% of cells have expected frequencies less than 5, Fisher's exact test need to be used because applying approximation method is inadequate. Fisher's exact test bears resemblance with the Chi-square test in that it also assesses the null hypothesis of independence, whereas, by applying hypergeometric distribution of the numbers in the cells of the table (Kim, 2017).

The results of Fisher's exact test ($p < .001$) indicate a significant association between female knowledge holders' sharing and hiding responses to the requests from female knowledge seekers and those to the requests from male knowledge seekers. Table 4.10 presents the results of Fisher's exact test for $H3_{1a}$ as an example.

This round of Chi-square tests/Fisher's exact test revealed similarity in almost all pairwise comparisons of knowledge holders' responses to knowledge requests from colleagues with whom the knowledge holders shared different reciprocity histories. The only exception was found in the comparison between knowledge holders' responses to the one they had at least one past negative knowledge exchange and the one they had both positive and negative knowledge exchanges. Therefore, we failed to validate $H1_a$.

Table 4.10

Fisher's Exact Test Results for Hypothesis 3_{1a}

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
femalescenario_sharing_count * malescenario_sharing_count	76	100.0%	0	0.0%	76	100.0%

femalescenario_sharing_count * malescenario_sharing_count Crosstabulation

			malescenario_sharing_count						
			0	1	2	3	4	5	Total
femalescenario_sharing_count	0	Count	1	1	0	0	0	0	2
		Expected Count	.0	.1	.1	.2	.7	.9	2.0
	1	Count	0	2	2	0	1	1	6
		Expected Count	.1	.2	.4	.6	2.1	2.6	6.0
	2	Count	0	0	1	2	1	1	5
		Expected Count	.1	.2	.3	.5	1.7	2.2	5.0
	3	Count	0	0	0	1	6	1	8
		Expected Count	.1	.3	.5	.8	2.7	3.5	8.0
	4	Count	0	0	1	2	8	11	22
		Expected Count	.3	.9	1.4	2.3	7.5	9.6	22.0
	5	Count	0	0	1	3	10	19	33
		Expected Count	.4	1.3	2.2	3.5	11.3	14.3	33.0
Total		Count	1	3	5	8	26	33	76
		Expected Count	1.0	3.0	5.0	8.0	26.0	33.0	76.0

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	89.566[a]	25	.000	.[b]		
Likelihood Ratio	44.858	25	.009	.001		
Fisher's Exact Test	44.563			.000		
Linear-by-Linear Association	28.127[c]	1	.000	.000	.000	.000
N of Valid Cases	76					

a. 32 cells (88.9%) have expected count less than 5. The minimum expected count is .03.
b. Cannot be computed because there is insufficient memory.
c. The standardized statistic is 5.304.

For $H2_a$, $H3_a$, $H5_a$, and $H7_a$ concerning respectively the influence of knowledge seekers' rank, knowledge seekers' gender, knowledge ownership, and knowledge scarcity, out of our expectations, the Chi-square tests and Fisher's exact tests also revealed prevalent similarity in knowledge holders' sharing and hiding responses to knowledge requests from colleagues. See Table 4.11 for test results, indications, and

conclusions. The corresponding test result tables from SPSS are documented in Appendix 2. To conclude, we failed to validate $H2_a$, $H3_a$, $H5_a$, and $H7_a$ at the sharing and hiding level.

Table 4.11

Hypotheses Test Result at Sharing and Hiding Level

Hypotheses	Sub-hypotheses	Test results	Indications	Conclusions
$H1_a$	$H1_{1a}$	χ^2 (1, N = 263) = 2.781, p = .095	Knowledge holders shared/hid similarly to the request from the one they had at least one past positive knowledge exchange and the one they had at least one past negative knowledge exchange	$H1_{1a}$ fail to validate
	$H1_{2a}$	χ^2 (1, N = 263) = 37.883, p < .001	Knowledge holders shared/hid similarly to the request from the one they had at least one past positive knowledge exchange and the one they had past positive and negative knowledge exchanges	$H1_{2a}$ fail to validate
	$H1_{3a}$	χ^2 (1, N = 263) = .119, p = .730	There was no significant association between knowledge holders' sharing/hiding response to the one they had at least one past negative knowledge exchange and their responses to the one they had past positive and negative knowledge exchanges	Cannot conclude
	$H1_{4a}$	χ^2 (1, N = 263) = 17.191, p < .001	Knowledge holders shared/hid similarly to the request from the one they had at least one past positive knowledge exchange and the one they had no past exchange	$H1_{4a}$ fail to validate
	$H1_{5a}$	χ^2 (1, N = 263) = 12.325, p < .001	Knowledge holders shared/hid similarly to the request from the one they had at least one past negative knowledge exchange and the one they had no past exchange	$H1_{5a}$ fail to validate
	$H1_{6a}$	χ^2 (1, N = 263) = 11.364, p = .001	Knowledge holders shared/hid similarly to the request from the one they had past positive and negative knowledge exchanges and the one they had no past exchange	$H1_{6a}$ fail to validate
				$H1_a$ fail to validate

Table 4.11 (continued)

Hypotheses Test Result at Sharing and Hiding Level

Hypotheses	Sub-hypotheses	Test results	Indications	Conclusions
$H2_a$	$H2_{1a}$	χ^2 (1, N = 263) = 33.999, p < .001	Knowledge holders shared/hid similarly to the request from a peer coworker and the one from a superior when they shared a negative knowledge exchange history with them	$H2_{1a}$ fail to validate
	$H2_{2a}$	χ^2 (1, N = 263) = 9.140, p = .003	Knowledge holders shared/hid similarly to the request for high level scarcity knowledge from a peer coworker and the one from a superior	$H2_{2a}$ fail to validate
				$H2_a$ fail to validate
$H3_a$	$H3_{1a}$	p < .001	Female knowledge holders shared/hid similarly to requests from female and male knowledge seekers	$H3_{1a}$ fail to validate
	$H3_{2a}$	p < .001	Male knowledge holders shared/hid similarly to requests from female and male knowledge seekers	$H3_{2a}$ fail to validate
				$H3_a$ fail to validate
$H4_a$	$H4_{1a}$, $H4_{2a}$, $H4_{3a}$	email (mean = .798) video conferencing (mean = .785) instant messaging (mean = .867) χ^2 (2) = 34.397, p < .001 ε = .896 F (1.792, 469.380) = 13.202, p < .001 email vs video conferencing (p = 1.000) video conferencing vs instant messaging (p < .001) email vs instant messaging (p < .001)	There was a significant effect of communication channels on knowledge holders' sharing/hiding responses. There was no significant difference between knowledge holders' sharing/hiding responses when requested for knowledge by email and by video conferencing. Knowledge holders' sharing/hiding responses to requests made by instant messaging is significantly different from those to requests made by email and by video conferencing. Knowledge holders' sharing/hiding responses to requests made by instant messaging happened significantly more frequently than that to requests made by email and by video conferencing.	$H4_{2a}$ and $H4_{3a}$ validated
				$H4_a$ partially validated

Table 4.11 (continued)

Hypotheses Test Result at Sharing and Hiding Level

Hypotheses	Sub-hypotheses	Test results	Indications	Conclusions
$H5_a$	/	p = .001	knowledge holders shared/hid similarly to the request for knowledge acquired with minimum investment and the one for knowledge acquired with substantial investment	**$H5_a$ fail to validate**
$H6_a$	$H6_{1a}$, $H6_{2a}$, $H6_{3a}$	χ^2 (2) = 23.102, p < .001 ε = .922 F (1.856, 486.346) = .217, p = .789	The effect of knowledge type on knowledge holders' sharing/hiding behavior was not significant	**$H6_a$ fail to validate**
$H7_a$	/	χ^2 (1, N = 263) = 28.289, p < .001	Knowledge holders shared/hid similarly to the request for low-level scarcity knowledge and the one for high-level scarcity knowledge	**$H7_a$ fail to validate**

Correspondingly, repeated-measures ANOVA was employed to compare participants' responses to the requests forwarded via three different communication media ($H4_a$) and their responses to the requests for three different types of knowledge ($H6_a$), also first at the knowledge sharing and knowledge hiding level.

To begin with, a repeated measures ANOVA was performed to compare the effect of communication channels on knowledge holders' sharing behavior ($H4_a$).

Mauchly's test indicated that the assumption of sphericity had been violated, χ^2 (2) = 34.397, $p < .001$, and therefore degrees of freedom were corrected using Huynh-Feldt estimates of sphericity ($\varepsilon = .896$). The results show that there was a significant effect of communication channels on knowledge holders' sharing behavior, F (1.792, 469.380) = 13.202, $p < .001$.

Post-hoc pairwise comparisons with a Bonferroni adjustment indicated that there was no significant difference between knowledge holders' sharing behavior when requested for knowledge by email and by video conferencing ($p = 1.000$). However, knowledge holders' sharing behavior to requests made by instant messaging is significantly different from that to requests made by email ($p < .001$) and by video conferencing ($p < .001$). Knowledge holders' sharing behavior to requests made by instant messaging (mean = .867) happened significantly frequently than that to requests made by email (mean = .798) and by video conferencing (mean = .785). Table 4.12 presents the test results.

Test for knowledge hiding response revealed the same results (see Appendix 2 for full result report) since we were using the same set of data, i.e., percentage of frequencies of counts in the ten scenarios, from two opposite sides, i.e., knowledge

sharing and knowledge hiding. Therefore, $H4_a$ was partially validated at the sharing and hiding level.

Similarly, a repeated measures ANOVA was performed to compare the effect of knowledge type on knowledge holders' sharing/hiding responses.

Mauchly's test indicated that the assumption of sphericity had been violated, χ^2 (2) = 23.102, $p < .001$, and therefore degrees of freedom were corrected using Huynh-Feldt estimates of sphericity ($\varepsilon = .922$). The results show that the effect of knowledge type on knowledge holders' sharing/hiding behavior was not significant, F (1.856, 486.346) = .217, p = .789. We failed to validate H6. See Appendix 2 for detailed test result tables from SPSS.

Table 4.12

Repeated Measures ANOVA Test Results for Hypothesis 4_a

Within-Subjects Factors

Measure: MEASURE_1

media	Dependent Variable
1	percent_email_sharing_count
2	percent_video_sharing_count
3	percent_chat_sharing_count

Descriptive Statistics

	Mean	Std. Deviation	N
percent_email_sharing_count	.7975	.26595	263
percent_video_sharing_count	.7852	.27272	263
percent_chat_sharing_count	.8669	.24590	263

Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df	Sig.
media	Pillai's Trace	.073	10.344[b]	2.000	261.000	.000
	Wilks' Lambda	.927	10.344[b]	2.000	261.000	.000
	Hotelling's Trace	.079	10.344[b]	2.000	261.000	.000
	Roy's Largest Root	.079	10.344[b]	2.000	261.000	.000

a. Design: Intercept
Within Subjects Design: media

b. Exact statistic

Mauchly's Test of Sphericity[a]

Measure: MEASURE_1

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon[b] Greenhouse-Geisser	Epsilon[b] Huynh-Feldt	Epsilon[b] Lower-bound
media	.877	34.397	2	.000	.890	.896	.500

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. Design: Intercept
Within Subjects Design: media

b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

Table 4.12 (continued)

Repeated Measures ANOVA Test Results for Hypothesis 4_a

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square	F	Sig.
media	Sphericity Assumed	1.021	2	.511	13.202	.000
	Greenhouse-Geisser	1.021	1.780	.574	13.202	.000
	Huynh-Feldt	1.021	1.792	.570	13.202	.000
	Lower-bound	1.021	1.000	1.021	13.202	.000
Error(media)	Sphericity Assumed	20.270	524	.039		
	Greenhouse-Geisser	20.270	466.410	.043		
	Huynh-Feldt	20.270	469.380	.043		
	Lower-bound	20.270	262.000	.077		

Pairwise Comparisons

Measure: MEASURE_1

(I) media	(J) media	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b] Lower Bound	Upper Bound
1	2	.012	.015	1.000	-.023	.048
	3	-.069*	.016	.000	-.109	-.030
2	1	-.012	.015	1.000	-.048	.023
	3	-.082*	.020	.000	-.130	-.034
3	1	.069*	.016	.000	.030	.109
	2	.082*	.020	.000	.034	.130

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

b. Adjustment for multiple comparisons: Bonferroni.

4.3.1.2 Knowledge Holders' Four Responsive Behaviors. To further unveil the knowledge holders' responsive behavior, the same statistical tests were applied to compare the sub-level four different responses (i.e., full sharing, partial sharing, evasive hiding, and playing dumb) the knowledge holders made to knowledge requests under a series of conditions. Interestingly while unsurprisingly, several hypotheses that we failed to validate previously at the general sharing and hiding level were supported at the sub-level of four behaviors.

Likewise, Fisher's exact test results need to be reported when more than 20% of cells have expected frequencies less than 5 (Kim, 2017). In the first instance ($H1_{1a}$), as shown in Table 4.13, the results of Fisher's exact test ($p = .134$) indicate a significant association between knowledge holders' responses to the request from the one they had at least one past positive knowledge exchange (scenario #2) and their responses to the request from the one they had at least one past negative knowledge exchange (scenario #4).

Table 4.13

Fisher's Exact Test Results for Hypothesis 1_{1a}

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
scenario2 * scenario4	263	100.0%	0	0.0%	263	100.0%

scenario2 * scenario4 Crosstabulation

			scenario4				
			playing dumb	evasive hiding	partial sharing	full sharing	Total
scenario2	playing dumb	Count	1	4	2	6	13
		Expected Count	.5	2.5	3.0	7.0	13.0
	evasive hiding	Count	3	12	14	23	52
		Expected Count	2.0	10.1	11.9	28.1	52.0
	partial sharing	Count	3	16	24	37	80
		Expected Count	3.0	15.5	18.3	43.2	80.0
	full sharing	Count	3	19	20	76	118
		Expected Count	4.5	22.9	26.9	63.7	118.0
Total		Count	10	51	60	142	263
		Expected Count	10.0	51.0	60.0	142.0	263.0

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	12.059[a]	9	.210	.206	
Likelihood Ratio	11.825	9	.223	.267	
Fisher's Exact Test	12.936			.134	
Linear-by-Linear Association	7.032	1	.008	.[b]	.[b]
N of Valid Cases	263				

a. 6 cells (37.5%) have expected count less than 5. The minimum expected count is .49.

b. Cannot be computed because there is insufficient memory.

In the case of the followed-up comparison between knowledge holders' responses to the request from the one they had at least one past positive knowledge exchange (scenario #2) and their responses to the request from the one they had past positive and negative knowledge exchanges (scenario #1) ($H12_a$), the first round of Fisher's exact test ran into computation insufficiency (see Table 4.14). Therefore, we had to remove the cell(s) with a low number to ensure proper computation (Raymond

& Rousset, 1995). In this case, cases that engaged in evasive hiding in scenario #1 (count = 10), where the knowledge holder experienced past positive and negative knowledge exchanges with the knowledge seeker, were removed, resulting in 253 valid cases (see Table 4.15). This technique was applied for following tests whenever the same issue arose and repeated until the p-value for Fisher's exact test finally yielded. Appendix 2 documents the full process of every incidence that applied this kind of treatment. Table 4.16 presents all the test results, the indication, and the conclusions of this round of tests.

The second round of tests at the sub-four behavior level, although did not provide enough evidence to validate all our hypotheses, revealed some interesting findings.

Table 4.14

Fisher's Exact Test Results for Hypothesis 1_{2a} (1)

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
scenario2 * scenario1	263	100.0%	0	0.0%	263	100.0%

scenario2 * scenario1 Crosstabulation

			scenario1				
			playing dumb	evasive hiding	partial sharing	full sharing	Total
scenario2	playing dumb	Count	3	1	5	4	13
		Expected Count	2.1	.5	4.1	6.4	13.0
	evasive hiding	Count	24	2	14	12	52
		Expected Count	8.3	2.0	16.2	25.5	52.0
	partial sharing	Count	7	6	38	29	80
		Expected Count	12.8	3.0	24.9	39.2	80.0
	full sharing	Count	8	1	25	84	118
		Expected Count	18.8	4.5	36.8	57.9	118.0
Total		Count	42	10	82	129	263
		Expected Count	42.0	10.0	82.0	129.0	263.0

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	78.669[a]	9	.000	.[b]		
Likelihood Ratio	71.502	9	.000	.[b]		
Fisher's Exact Test	.[b]			.[b]		
Linear-by-Linear Association	44.820[c]	1	.000	.000	.000	.000
N of Valid Cases	263					

a. 6 cells (37.5%) have expected count less than 5. The minimum expected count is .49.

b. Cannot be computed because there is insufficient memory.

c. The standardized statistic is 6.695.

Table 4.15

Fisher's Exact Test Results for Hypothesis 1_{2a} (2)

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
scenario2 * scenario1	253	100.0%	0	0.0%	253	100.0%

scenario2 * scenario1 Crosstabulation

			scenario1			
			playing dumb	partial sharing	full sharing	Total
scenario2	playing dumb	Count	3	5	4	12
		Expected Count	2.0	3.9	6.1	12.0
	evasive hiding	Count	24	14	12	50
		Expected Count	8.3	16.2	25.5	50.0
	partial sharing	Count	7	38	29	74
		Expected Count	12.3	24.0	37.7	74.0
	full sharing	Count	8	25	84	117
		Expected Count	19.4	37.9	59.7	117.0
Total		Count	42	82	129	253
		Expected Count	42.0	82.0	129.0	253.0

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	72.237[a]	6	.000	.000		
Likelihood Ratio	64.656	6	.000	.000		
Fisher's Exact Test	63.925			.000		
Linear-by-Linear Association	42.280[b]	1	.000	.000	.000	.000
N of Valid Cases	253					

a. 2 cells (16.7%) have expected count less than 5. The minimum expected count is 1.99.

b. The standardized statistic is 6.502.

Table 4.16

Hypotheses Test Result at Four Behavior Level

Hypotheses	Sub-hypotheses	Test results	Indications	Conclusions
$H1_a$	$H1_{1a}$	$p = .134$	There was no significant association between knowledge holders' responses to the request from the one they had at least one past positive knowledge exchange and their responses to the request from the one they had at least one past negative knowledge exchange.	Cannot conclude
	$H1_{2a}$	$p < .001$[a]	Knowledge holders responded similarly to the one they had at least one past positive knowledge exchange and the one they had past positive and negative knowledge exchanges.	$H1_{2a}$ fail to validate
	$H1_{3a}$	$p = .021$[b]	Knowledge holders responded similarly to the one they had at least one past negative knowledge exchange and the one they had past positive and negative knowledge exchanges.	$H1_{3a}$ fail to validate
	$H1_{4a}$	χ^2 (9, N = 263) = 44.862, $p < .001$	Knowledge holders responded similarly to the one they had at least one past positive knowledge exchange and the one they had no past exchange.	$H1_{4a}$ fail to validate
	$H1_{5a}$	$p < .001$[b]	Knowledge holders responded similarly to the one they had at least one past negative knowledge exchange and the one they had no past exchange.	$H1_{5a}$ fail to validate
	$H1_{6a}$	$p < .001$[a]	Knowledge holders responded similarly to the one they had past positive and negative knowledge exchanges and the one they had no past exchange.	$H1_{6a}$ fail to validate
				$H1_a$ fail to validate

Note. a. Evasive hiding cases for scenario #1 were removed for proper computation (N = 253)

b. Playing dumb cases for scenario #4 were removed for proper computation (N = 253)

Table 4.16 (continued)

Hypotheses Test Result at Four Behavior Level

Hypotheses	Sub-hypotheses	Test results	Indications	Conclusions
$H2_a$	$H2_{1a}$	χ^2 (9, N = 263) = 122.834, p < .001	Knowledge holders responded similarly to the request from a peer coworker and the one from a superior when they shared a negative knowledge exchange history with them.	$H2_{1a}$ fail to validate
	$H2_{2a}$	χ^2 (6, N = 253 [c]) = 30.141, p < .001	Knowledge holders responded similarly to the request for high level scarcity knowledge from a peer coworker and the one from a superior.	$H2_{2a}$ fail to validate
				$H2_a$ fail to validate
$H3_a$	$H3_{1a}$	p = .036 [d]	There was a significant association between female knowledge holders' *full sharing* behavior to requests from female knowledge seekers and those from male knowledge seekers.	$H3_{1a}$ fail to validate
		p = .438 [d]	There was no significant association between female knowledge holders' *partial sharing* behavior to requests from female knowledge seekers and those from male knowledge seekers.	Cannot conclude
		p = .325	There was no significant association between female knowledge holders' *evasive hiding* behavior to requests from female knowledge seekers and those from male knowledge seekers.	Cannot conclude
		p = .001	There was a significant association between female knowledge holders' *playing dumb* behavior to requests from female knowledge seekers and those from male knowledge seekers.	$H3_{1a}$ fail to validate

Note. c. Playing dumb cases for scenario #9 were removed for proper computation (N = 253)
d. 5 count cases were removed for proper computation (N = 71)

Table 4.16 (continued)

Hypotheses Test Result at Four Behavior Level

Hypotheses	Sub-hypotheses	Test results	Indications	Conclusions
$H3_a$	$H3_{2a}$	χ^2 (9, N = 118 [e]) = 20.450, p = .015	There was a significant association between male knowledge holders' *full sharing* behavior to requests from female knowledge seekers and those from male knowledge seekers.	$H3_{2a}$ fail to validate
		$\chi 2$ (9, N = 138 [e]) = 27.488, p = .001	There was a significant association between male knowledge holders' *partial sharing* behavior to requests from female knowledge seekers and those from male knowledge seekers.	$H3_{2a}$ fail to validate
		p < .001	There was a significant association between male knowledge holders' *evasive hiding* behavior to requests from female knowledge seekers and those from male knowledge seekers.	$H3_{2a}$ fail to validate
		p < .001	There was a significant association between male knowledge holders' *playing dumb* behavior to requests from female knowledge seekers and those from male knowledge seekers.	$H3_{2a}$ fail to validate
				$H3_a$ fail to validate

Note. e. 4 and 5 count cases were removed for proper computation

Table 4.16 (continued)

Hypotheses Test Result at Four Behavior Level

Hypotheses	Sub-hypotheses	Test results	Indications	Conclusions
$H4_a$	$H4_{1a}$, $H4_{2a}$, $H4_{3a}$	email (mean = .353) video conferencing (mean = .448) instant messaging (mean = .519) χ^2 (2) = 19.082, p < .001 ε = .934 F (1.881, 492.873) = 29.722, p < .001 email vs video conferencing (p < .001) video conferencing vs instant messaging (p = .010) email vs instant messaging (p < .001)	There was a significant effect of communication channels on knowledge holders' *full sharing* behavior. There was a significant difference between knowledge holders' full sharing behavior to knowledge requests made by email and by video conferencing, by email and by instant messaging, and also by video conferencing and by instant messaging. Knowledge holders most often fully shared what they knew when requested knowledge by instant messaging while least did so when requested knowledge by email.	$H4_{1a}$, $H4_{2a}$, and $H4_{3a}$ validated
		email (mean = .445) video conferencing (mean = .338) instant messaging (mean = .348) χ^2 (2) = 17.576, p < .001 ε = .939 F (1.891, 495.390) = 13.875, p < .001 email vs video conferencing (p < .001) video conferencing vs instant messaging (p = 1.000) email vs instant messaging (p < .001)	There was a significant effect of communication channels on knowledge holders' *partial sharing* behavior. There was a significant difference between knowledge holders' partial sharing behavior to knowledge requests made by email and by video conferencing and to those made by email and by instant messaging, but not to those made by video conferencing and by instant messaging. Knowledge holders partially shared what they know more often when requested knowledge by email than when requested knowledge by video conferencing and instant messaging.	$H4_{1a}$ and $H4_{3a}$ validated

Table 4.16 (continued)

Hypotheses Test Result at Four Behavior Level

Hypotheses	Sub-hypotheses	Test results	Indications	Conclusions
$H4_a$	$H4_{1a}$, $H4_{2a}$, $H4_{3a}$	email (mean = .104) video conferencing (mean = .148) instant messaging (mean = .025) χ^2 (2) = 14.948, p = .001 ε = .947 F (1.908, 499.880) = 45.827, p < .001 email vs video conferencing (p = .003) video conferencing vs instant messaging (p < .001) email vs instant messaging (p < .001)	There was a significant effect of communication channels on knowledge holders' *evasive hiding* behavior. There was a significant difference between knowledge holders' evasive hiding behavior to knowledge requests made by email and by video conferencing, by email and by instant messaging, and also by video conferencing and by instant messaging. Knowledge holders evasively hid most often when requested knowledge by video conferencing while least did so when requested knowledge by instant messaging.	$H4_{1a}$, $H4_{2a}$, and $H4_{3a}$ validated
		email (mean = .099) video conferencing (mean = .067) instant messaging (mean = .108) χ^2 (2) = 24.304, p < .001 ε = .918 F (1.849, 484.446) = 5.197, p = .007 email vs video conferencing (p = .015) video conferencing vs instant messaging (p = .015) email vs instant messaging (p = 1.000)	There was a significant effect of communication channels on knowledge holders' *playing dumb* behavior. There was a significant difference between knowledge holders' evasive hiding behavior to knowledge requests made by email and by video conferencing and to those made by video conferencing and by instant messaging, but not to requests made by email and by instant messaging. Knowledge holders used the playing dumb strategy more often when requested knowledge by instant messaging and email as compared to video conferencing.	$H4_{1a}$ and $H4_{2a}$ validated
				$H4_a$ partially validated

Table 4.16 (continued)

Hypotheses Test Result at Four Behavior Level

Hypotheses	Sub-hypotheses	Test results	Indications	Conclusions
$H5_a$	/	$p < .001$	Knowledge holders responded similarly to the request for knowledge acquired with minimum investment and the one for knowledge acquired with substantial investment.	**$H5_a$ fail to validate**
$H6_a$	$H6_{1a}$, $H6_{2a}$, $H6_{3a}$	experience (mean = .398) documents (mean = .409) relationships (mean = .506) χ^2 (2) = 28.415, p < .001 ε = .906 F (1.825, 478.123) = 16.871, p < .001 experience vs documents (p = 1.000) documents vs relationships (p < .001) experience vs relationships (p < .001)	The effect of knowledge type on knowledge holders' *full sharing* behavior was significant. There was a significant difference between knowledge holders' full sharing behavior to requests for experience and for relationships, and to requests for documents and for relationships, but not to requests for experience and for documents. They fully shared more relationships than experience and documents.	$H6_{2a}$ and $H6_{3a}$ validated
		experience (mean = .403) documents (mean = .400) relationships (mean = .306) χ^2 (2) = 16.381, p < .001 ε = .943 F (1.899, 497.416) = 13.934, p < .001 experience vs documents (p = 1.000) documents vs relationships (p < .001) experience vs relationships (p < .001)	The effect of knowledge type on knowledge holders' *partial sharing* behavior was significant. There was a significant difference between knowledge holders' partial sharing behavior to requests for experience and for relationships, and to requests for documents and for relationships, but not to requests for experience and for documents. They partially shared more experience and documents than relationships.	$H6_{2a}$ and $H6_{3a}$ validated

Table 4.16 (continued)

Hypotheses Test Result at Four Behavior Level

Hypotheses	Sub-hypotheses	Test results	Indications	Conclusions
$H6_a$	$H6_{1a}$, $H6_{2a}$, $H6_{3a}$	experience (mean = .126) documents (mean = .082) relationships (mean = 114) χ^2 (2) = 24.848, p < .001 ε = .917 F (1.846, 483.595) = 4.519, p = .013 experience vs documents (p = .004) documents vs relationships (p = .082) experience vs relationships (p = 1.000)	The effect of knowledge type on knowledge holders' *evasive hiding* behavior was significant. There was a significant difference between knowledge holders' evasive hiding behavior to requests for experience and for documents, and to requests for documents and for relationships, but not to requests for experience and for relationships. They evasively hid more experience and relationships than documents.	$H6_{1a}$ and $H6_{2a}$ validated
		experience (mean = .073) documents (mean = .109) relationships (mean = .074) χ^2 (2) = 15.864, p < .001 ε = .944 F (1.902, 498.300) = 4.839, p = .009 experience vs documents (p = .006) documents vs relationships (p = .035) experience vs relationships (p = 1.000)	The effect of knowledge type on knowledge holders' *playing dumb* behavior was significant. There was a significant difference between knowledge holders' playing dumb behavior to requests for experience and for documents and to requests for documents and for relationships, but not to requests for experience and for relationships. They used the playing dumb strategy more often when requested for documents than for experience and relationships.	$H6_{1a}$ and $H6_{2a}$ validated
				$H6_a$ partially validated
Hypotheses	**Sub-hypotheses**	**Test results**	**Indications**	**Conclusions**
$H7_a$	/	p < .001[f]	There was a significant association between knowledge holders' responses to the request for low-level scarcity knowledge and to the one for high-level scarcity knowledge.	**$H7_a$ fail to validate**

Note. f. Cases that engaged in evasive hiding for scenario #5 were removed for proper computation (N = 247)

4.3.2 Knowledge Holders' Responses Across Cultures

Comparing knowledge holders' responsive behaviors to knowledge requests across cultures is another objective of the current research. Therefore, we followed up the analysis of the complete sample with two separate analyses of samples from the two countries, i.e., China and Germany.

4.3.2.1 Chinese Knowledge Holders' Responses to Knowledge Request.

4.3.2.1.1 Chinese Knowledge Holders' Sharing and Hiding Responses. For further understanding beyond descriptive results, we applied the same set of the previous statistical tests to the Chinese sample to test the same hypotheses, first at the general sharing and hiding level.

$H1_a$*: Chinese Knowledge holders are likely to respond differently to knowledge requests made by different colleagues with whom they shared different past knowledge exchange experience*

$H1_0$*: Chinese Knowledge holders are likely to respond similarly to knowledge requests made by different colleagues with whom they shared different past knowledge exchange experience*

With the test results, we can conclude that Chinese knowledge holders shared/hid similarly to the request from the one they had at least one past positive knowledge exchange and the one they had at least one past negative knowledge exchange to the request from the one they had at least one past negative knowledge exchange and the one they had past positive and negative knowledge exchanges, and to the request from the one they had past positive and negative knowledge exchanges

and the one they had no past exchange (as presented in Table 4.17). Therefore, we failed to validate $H1_a$ that hypothesized differences in knowledge holders' responses to knowledge seekers with whom they shared different reciprocity histories.

***$H2_a$**: Chinese knowledge holders are likely to share (to different extents) knowledge with knowledge seekers of a higher rank while likely to hide knowledge from knowledge seekers of the same rank*

***$H2_0$**: The knowledge seeker's rank does not predict Chinese knowledge holder's responses*

As it was validated that Chinese knowledge holders shared/hid similarly to the request from a peer coworker and the one from a superior under the situation where they shared a negative knowledge exchange history with them, we failed to validate $H2_a$.

***$H3_a$**: Chinese knowledge holders are likely to share (to different extents) knowledge with female knowledge seekers while likely to hide knowledge from male knowledge seekers*

***$H3_0$**: The knowledge seeker's gender does not predict Chinese knowledge holders' responses*

Both Chinese female and male knowledge holders shared/hid similarly to requests from colleagues of different genders, leading to our failure to validate $H3_a$.

***$H4_a$**: Chinese knowledge holders are likely to share (to different extents) their knowledge when a request is made through a rich communication channel while likely to hide their knowledge when a request is made through a lean communication channel*

***$H4_0$**: The richness level of the communication channel used to make a knowledge request does not predict Chinese knowledge holders' responses*

We rejected $H4_{20}$ and $H4_{30}$ with the evidence that significant differences existed in Chinese knowledge holders' sharing and hiding responses to requests made by instant messaging and their responses to requests made by email and video conferencing. However, we failed to reject $H4_{10}$. Therefore, $H4_a$ was partially validated. Table 4.17 presents the test results, indications, and conclusions for $H2_a$, $H3_a$, and $H4_a$.

***$H5_a$:** Chinese knowledge holders are likely to share (to different extents) the knowledge acquired with minimum investment while likely to hide the knowledge acquired with substantial investment*

***$H5_0$:** The investment knowledge holders made in acquiring the requested knowledge does not predict Chinese knowledge holders' responses to the request for the knowledge*

It was validated that Chinese knowledge holders shared/hid similarly to the request for knowledge acquired with minimum investment and the one for knowledge acquired with substantial investment. Therefore, we failed to reject $H5_0$ and failed to validate $H5_a$.

***$H6_a$**: Chinese knowledge holders are likely to share (to different extents) explicit knowledge (i.e., documents) while likely to hide the knowledge that was acquired over time and difficult to codify (i.e., experience) and the one developed over time or more personal (i.e., relationships)*

***$H6_0$**: The type of the requested knowledge does not predict Chinese knowledge holders' responses*

$H7_a$: *Chinese knowledge holders are likely to share (to different extents) low-level scarcity knowledge while likely to hide high-level scarcity knowledge*

$H7_0$: *The scarcity level of knowledge does not predict Chinese knowledge holders' responses*

In the same vein, they shared/hid similarly to the request for different types of knowledge and with different scarcity levels, resulting in the failure of validating $H6_a$ and $H7_a$. Table 4.17 presents the test results, indications, and conclusions for $H5_a$, $H6_a$, and $H7_a$.

In conclusion, except for partially validating $H4_a$, we could not validate the other hypotheses at the sharing and hiding level. With curiosity about the results at the sub-level of the four responsive behaviors, the researcher conducted a second round of tests with the four behaviors data for Chinese sample.

Table 4.17

Hypotheses Test Result at Sharing and Hiding Level (Chinese)

Hypotheses	Sub-hypotheses	Test results	Indication	Conclusion
$H1_a$	$H1_{1a}$	χ^2 (1, N = 76) = 2.940, p = .086	Chinese knowledge holders shared/hid similarly to the request from the one they had at least one past positive knowledge exchange and the one they had at least one past negative knowledge exchange.	$H1_{1a}$ fail to validate
	$H1_{2a}$	χ^2 (1, N = 76) = 1.508, p = .219	There was no significant association between Chinese knowledge holders' sharing/hiding response to the request from the one they had at least one past positive knowledge exchange and the one they had past positive and negative knowledge exchanges.	Cannot conclude
	$H1_{3a}$	χ^2 (1, N = 76) = 4.374, p = .036	Chinese knowledge holders shared/hid similarly to the request from the one they had at least one past negative knowledge exchange and the one they had past positive and negative knowledge exchanges.	$H1_{3a}$ fail to validate
	$H1_{4a}$	χ^2 (1, N = 76) = .415, p = .520	There was no significant association between Chinese knowledge holders' sharing/hiding response to the request from the one they had at least one past positive knowledge exchange and the one they had no past exchange.	Cannot conclude
	$H1_{5a}$	χ^2 (1, N = 76) = 2.349, p = .125	There was no significant association between Chinese knowledge holders' sharing/hiding response to the request from the one they had at least one past negative knowledge exchange and the one they had no past exchange.	Cannot conclude
	$H1_{6a}$	χ^2 (1, N = 76) = 5.089, p = .024	Chinese knowledge holders shared/hid similarly to the request from the one they had past positive and negative knowledge exchanges and the one they had no past exchange.	$H1_{6a}$ fail to validate
				$H1_a$ fail to validate

Table 4.17 (continued)

Hypotheses Test Result at Sharing and Hiding Level (Chinese)

Hypotheses	Sub-hypotheses	Test results	Indication	Conclusion
$H2_a$	$H2_{1a}$	χ^2 (1, N = 76) = 8.477, p = .004	Chinese knowledge holders shared/hid similarly to the request from a peer coworker and the one from a superior when they shared a negative knowledge exchange history with them.	$H2_{1a}$ fail to validate
	$H2_{2a}$	p = .208	There was no significant difference between Chinese knowledge holders' sharing/hiding response to the request for high level scarcity knowledge from a peer coworker and the one from a superior.	Cannot conclude
				$H2_a$ fail to validate
$H3_a$	$H3_{1a}$	p = .010	Chinese female knowledge holders shared/hid similarly to requests from female and male knowledge seekers.	$H3_{1a}$ fail to validate
	$H3_{2a}$	p = .003	Chinese male knowledge holders shared/hid similarly to requests from female and male knowledge seekers.	$H3_{2a}$ fail to validate
				$H3_a$ fail to validate
$H4_a$	$H4_{1a}$, $H4_{2a}$, $H4_{3a}$	email (mean = .701) video conferencing (mean = .711) instant messaging (mean = .862) χ^2 (2) = 5.722, p = .056 F (2, 150) = 16.274, p < .001 email vs video conferencing (p = 1.000) video conferencing vs instant messaging (p < .001) email vs instant messaging (p < .001)	There was a significant effect of communication channels on Chinese knowledge holders' sharing/hiding responses. There was no significant difference between Chinese knowledge holders' sharing/hiding responses when requested for knowledge by email and video conferencing. Chinese knowledge holders' sharing/hiding responses to requests made by instant messaging are significantly different from those to requests made by email and by video conferencing. Chinese knowledge holders' sharing/hiding responses to requests made by instant messaging happened significantly more frequently than to requests made by email and video conferencing.	$H4_{2a}$ and $H4_{3a}$ validated
				$H4_a$ partially validated

Table 4.17 (continued)

Hypotheses Test Result at Sharing and Hiding Level (Chinese)

Hypotheses	Sub-hypotheses	Test results	Indication	Conclusion
$H5_a$	/	$p = .003$	Chinese knowledge holders shared/hid similarly to the request for knowledge acquired with minimum investment and the one for knowledge acquired with substantial investment	**$H5_a$ fail to validate**
$H6_a$	$H6_{1a}$, $H6_{2a}$, $H6_{3a}$	χ^2 (2) = 8.098, p = .017 ε = .906 F (1.854, 139.084) = 1.339, p = .265	The effect of knowledge type on Chinese knowledge holders' sharing/hiding behavior was not significant	**$H6_a$ fail to validate**
$H7_a$	/	$p < .001$	Chinese knowledge holders shared/hid similarly to the request for low-level scarcity knowledge and the one for high-level scarcity knowledge	**$H7_a$ fail to validate**

4.3.2.1.2 Chinese Knowledge Holders' Four Responsive Behaviors. As what has been done previously, comparisons at the four behavior level were firstly made between knowledge holders' responses to requests from knowledge seekers with whom they shared different reciprocity histories. When looking closer at their four behaviors, the association between Chinese knowledge holders' responses to different colleagues amplifies, as it was found in more pairwise comparisons, providing further evidence that goes against $H1_a$. Since no support has been identified for us to reject any of the sub-hypotheses (see Table 4.18), we failed to validate $H1_a$.

On the comparison between knowledge holders' four responsive behaviors to knowledge seekers of different ranks, the second round of test yielded similar results as the first one. That is, a significant association existed between Chinese knowledge holders' responses to a peer coworker and a superior when they share a negative knowledge exchange history with them (see Table 4.18). We failed to validate $H2_a$ at the four behavior level.

Similar to the case of H1, this round of test generated further evidence against the alternative hypotheses of H3. For example, significant association was found between Chinese male knowledge holders' full sharing and playing dumb behaviors to requests from female and male knowledge seekers (as presented in Table 4.18) and between Chinese male knowledge holders' playing dumb behavior to requests from female and male knowledge seekers (as presented in Table 4.18). Therefore, we failed to validate $H3_{1a}$, $H3_{2a}$, and, eventually, failed to validate $H3_a$.

With the significant effect of communication channels on knowledge holders' full sharing and evasive hiding behaviors confirmed (see Table 4.18), we, again,

rejected $H4_{20}$ and $H4_{30}$ and partially validated $H4_{a}$. Also, the significant association between Chinese knowledge holders' four responsive behaviors to the request for knowledge acquired with minimum investment and with substantial investment (see Table 4.18) did not allow us to validate $H5_{a}$.

We successfully rejected $H6_{10}$, $H6_{20}$, and $H6_{30}$, but not with requests for all knowledge types in all four behavior cases (see Table 4.18). It was found that Chinese knowledge holders fully shared documents more frequently than the other two, while they partially shared experiences more often. Requests for relationships, on the other hand, were probably more frequently responded to by their evasive hiding behavior. Therefore, we could partially validate $H6_{a}$ at this four behavior level.

We also failed to validate $H7_{a}$ at the sub-level of the four behaviors, for a significant association existed between Chinese knowledge holders' responses to the request for low-level scarcity knowledge and high-level scarcity. The test results are presented in Table 4.18.

Table 4.18

Hypotheses Test Result at Four Behavior Level (Chinese)

Hypotheses	Sub-hypotheses	Test results	Indication	Conclusion
$H1_a$	$H1_{1a}$	p = .875	There was no significant association between Chinese knowledge holders' responses to the request from the one they had at least one past positive knowledge exchange and their responses to the request from the one they had at least one past negative knowledge exchange.	Cannot conclude
	$H1_{2a}$	p = .071	Chinese knowledge holders responded similarly to the one they had at least one past positive knowledge exchange and the one they had past positive and negative knowledge exchanges.	$H1_{2a}$ fail to validate
	$H1_{3a}$	p = .012	Chinese knowledge holders responded similarly to the one they had at least one past negative knowledge exchange and the one they had past positive and negative knowledge exchanges.	$H1_{3a}$ fail to validate
	$H1_{4a}$	p = .078	Chinese knowledge holders responded similarly to the one they had at least one past positive knowledge exchange and the one they had no past exchange.	$H1_{4a}$ fail to validate
	$H1_{5a}$	p = .071	Chinese knowledge holders responded similarly to the one they had at least one past negative knowledge exchange and the one they had no past exchange.	$H1_{5a}$ fail to validate
	$H1_{6a}$	p < .001	Chinese knowledge holders responded similarly to the one they had past positive and negative knowledge exchanges and the one they had no past exchange.	$H1_{6a}$ fail to validate
				$H1_a$ fail to validate

Table 4.18 (continued)

Hypotheses Test Result at Four Behavior Level (Chinese)

Hypotheses	Sub-hypotheses	Test results	Indication	Conclusion
$H2_a$	$H2_{1a}$	p = .005	Chinese knowledge holders responded similarly to the request from a peer coworker and the one from a superior when they shared a negative knowledge exchange history with them.	$H2_{1a}$ fail to validate
	$H2_{2a}$	p = .330	There was no significant association between Chinese knowledge holders' responses to the request for high level scarcity knowledge from a peer coworker and the one from a superior.	Cannot conclude
				$H2_a$ fail to validate
$H3_a$	$H3_{1a}$	p = .048	There was a significant association between Chinese female knowledge holders' *full sharing* behavior to requests from female knowledge seekers and to those from male knowledge seekers.	$H3_{1a}$ fail to validate
		p = .479	There was no significant association between Chinese female knowledge holders' *partial sharing* behavior to requests from female knowledge seekers and to those from male knowledge seekers.	Cannot conclude
		p = .184	There was no significant association between Chinese female knowledge holders' *evasive hiding* behavior to requests from female knowledge seekers and to those from male knowledge seekers.	Cannot conclude
		p = .001	There was a significant association between Chinese female knowledge holders' *playing dumb* behavior to requests from female knowledge seekers and to those from male knowledge seekers.	$H3_{1a}$ fail to validate

Table 4.18 (continued)

Hypotheses Test Result at Four Behavior Level (Chinese)

Hypotheses	Sub-hypotheses	Test results	Indication	Conclusion
$H3_a$	$H3_{2a}$	p = .132	There was no significant association between Chinese male knowledge holders' *full sharing* behavior to requests from female knowledge seekers and those from male knowledge seekers.	Cannot conclude
		p = .805	There was no significant association between Chinese male knowledge holders' *partial sharing* behavior to requests from female knowledge seekers and those from male knowledge seekers.	Cannot conclude
		p = .461	There was no significant association between Chinese male knowledge holders' *evasive hiding* behavior to requests from female knowledge seekers and those from male knowledge seekers.	Cannot conclude
		p = .018	There was a significant association between Chinese male knowledge holders' *playing dumb* behavior to requests from female knowledge seekers and those from male knowledge seekers.	$H3_{2a}$ fail to validate
				$H3_a$ fail to validate

Table 4.18 (continued)

Hypotheses Test Result at Four Behavior Level (Chinese)

Hypotheses	Sub-hypotheses	Test results	Indication	Conclusion
$H4_a$	$H4_{1a}$, $H4_{2a}$, $H4_{3a}$	email (mean = .247) video conferencing (mean = .247) instant messaging (mean = .322) χ^2 (2) = 6.887, p = .032 ε = .918 F (1.881, 141.049) = 2.806, p = .067 email vs video conferencing (p = 1.000) video conferencing vs instant messaging (p = .368) email vs instant messaging (p = .255)	There was a significant effect of communication channels on Chinese knowledge holders' *full sharing* behavior. However, post-hoc pairwise comparisons with a Bonferroni adjustment provided no evidence for differences in Chinese knowledge holders' full sharing behavior upon knowledge requests made by media channels of different richness. The mean scores suggest that Chinese knowledge holders might fully share what they knew more often when requested by instant messaging than by email and video conferencing.	Cannot conclude
		email (mean = .445) video conferencing (mean = .338) instant messaging (mean = .348) χ^2 (2) = 16.145, p < .001 ε = .836 F (1.706, 127.942) = 2.252, p = .117	There was no significant effect of communication channels on Chinese knowledge holders' *partial sharing* behavior.	Cannot conclude

Table 4.18 (continued)

Hypotheses Test Result at Four Behavior Level (Chinese)

Hypotheses	Sub-hypotheses	Test results	Indication	Conclusion
$H4_a$	$H4_{1a}$, $H4_{2a}$, $H4_{3a}$	email (mean = .145) video conferencing (mean = .168) instant messaging (mean = .026) χ^2 (2) = 2.038, p = .361 F (2, 150) = 21.593, p < .001 email vs video conferencing (p = .899) video conferencing vs instant messaging (p < .001) email vs instant messaging (p < .001)	There was a significant effect of communication channels on Chinese knowledge holders' *evasive hiding* behavior. There was no significant difference between Chinese knowledge holders' evasive hiding behavior when requested knowledge by email or by video conferencing. However, Chinese knowledge holders' evasive hiding behavior to requests made by instant messaging was significantly different from that made by email and video conferencing. Chinese knowledge holders evasively hid less often when requested knowledge by instant messaging than when requested knowledge by email and video conferencing.	$H4_{2a}$ and $H4_{3a}$ validated
		email (mean = .155) video conferencing (mean = .122) instant messaging (mean = .112) χ^2 (2) = = 3.228, p = .199 F (2, 150) = 1.457, p = .236	There was no significant effect of communication channels on Chinese knowledge holders' *playing dumb* behavior.	Cannot conclude
				$H4_a$ partially validated

Table 4.18 (continued)

Hypotheses Test Result at Four Behavior Level (Chinese)

Hypotheses	Sub-hypotheses	Test results	Indication	Conclusion
$H5_a$	/	p = .003	Chinese Knowledge holders responded similarly to the request for knowledge acquired with minimum investment and the one for knowledge acquired with substantial investment.	**$H5_a$ fail to validate**
$H6_a$	$H6_{1a}$, $H6_{2a}$, $H6_{3a}$	experience (mean = .217) documents (mean = .299) relationships (mean = .276) χ^2 (2) = 8.222, p = .016 ε = .905 F (1.852, 138.888) = 2.374, p = .101 experience vs documents (p = .041) documents vs relationships (p = 1.000) experience vs relationships (p < .537)	The effect of knowledge type on Chinese knowledge holders' *full sharing* behavior was not significant. However, post-hoc pairwise comparisons with a Bonferroni adjustment indicated that there was a significant difference between Chinese knowledge holders' full sharing behavior to requests for experience and those for documents. Chinese knowledge holders fully shared what they knew more frequently when requested for documents than for experience.	$H6_{1a}$ validated
		experience (mean = .526) documents (mean = .451) relationships (mean = .421) χ^2 (2) = 11.392, p = .003 ε = .875 F (1.789, 134.151) = 3.427, p = .040 experience vs documents (p = .071) documents vs relationships (p = 1.000) experience vs relationships (p = .074)	The effect of knowledge type on Chinese knowledge holders' *partial sharing* behavior was significant. There was a significant difference between Chinese knowledge holders' partial sharing behavior to requests for experience and for documents, between those to requests for experience and for relationships, but not between that to requests for documents and for relationships. Chinese knowledge holders partially shared what they knew more frequently when requested for experience than for documents and relationships.	$H6_{1a}$, $H6_{3a}$ validated

Table 4.18 (continued)

Hypotheses Test Result at Four Behavior Level (Chinese)

Hypotheses	Sub-hypotheses	Test results	Indication	Conclusion
$H6_a$	$H6_{1a}$, $H6_{2a}$, $H6_{3a}$	experience (mean = .115) documents (mean = .122) relationships (mean = .178) χ^2 (2) = 10.536, p = .005 ε = .883 F (1.805, 135.379) = 2.450, p = .096 experience vs documents (p = 1.000) documents vs relationships (p = .292) experience vs relationships (p = .213)	The effect of knowledge type on Chinese knowledge holders' *evasive hiding* behavior was significant. However, post-hoc pairwise comparisons with a Bonferroni adjustment provided no evidence for differences in Chinese knowledge holders' evasive hiding behavior to requests for different types of knowledge. The mean scores suggest that Chinese knowledge holders might evasively hide relationships more often than experience and documents.	Cannot conclude
		experience (mean = .141) documents (mean = .128) relationships (mean = .125) χ^2 (2) = 5.197, p = .074 F (2, 150) = .176, p = .839	The effect of knowledge type on Chinese knowledge holders' *playing dumb* behavior was not significant.	Cannot conclude
				$H6_a$ partially validated
$H7_a$	/	p < .001	There was a significant association between Chinese knowledge holders' responses to the request for low-level scarcity knowledge and to the one for high-level scarcity knowledge.	**$H7_a$ fail to validate**

4.3.2.2 German Knowledge Holders' Responses to Knowledge Requests.

4.3.2.2.1 German Knowledge Holders' Sharing and Hiding Responses. For further understanding beyond descriptive results, statistical methods were applied to the German sample.

At the first sharing and hiding level, we failed to validate $H1_a$, given that no evidence supported us to reject $H1_{2a}$, $H1_{4a}$, $H1_{5a}$, and $H1_{6a}$, while no conclusion could be drawn for $H1_{1a}$ and $H1_{3a}$ (see Table 4.19 for test results).

German knowledge holders shared/hid similarly to the requests from a peer coworker and a superior under two extreme situations we had devised in the scenarios, leading to our failure to validate $H2_a$. Although we could not conclude that German female knowledge holders' sharing/hiding responses to requests from female and male colleagues were associated, their male counterparts' responses were. Therefore, we failed to validate $H3_a$. Table 4.19 presents the test results for $H2_a$ and $H3_a$.

We were able to partially validate $H4_a$ by rejecting $H4_{20}$ with the evidence showing that German knowledge holders' sharing/hiding responses to requests made by video conferencing were significantly different from those to requests made by instant messaging. However, we also failed to validate $H5_a$, $H6_a$, and $H7_a$ for lack of statistical support. Table 4.19 presents the test results for $H4_a$, $H5_a$, $H6_a$, and $H7_a$.

The second round of tests at the four behavior level was then followed up for our comprehensive and profound understanding.

Table 4.19

Hypotheses Test Result at Sharing and Hiding Level (German)

Hypotheses	Sub-hypotheses	Test results	Indications	Conclusions
$H1_a$	$H1_{1a}$	χ^2 (1, N = 187) = .001, p = .972	There was no significant association between German knowledge holders' sharing/hiding response to the request from the one they had at least one past positive knowledge exchange and the one they had at least one past negative knowledge exchange.	Cannot conclude
	$H1_{2a}$	χ^2 (1, N = 187) = 47.972, p < .001	German knowledge holders shared/hid similarly to the request from the one they had at least one past positive knowledge exchange and the one they had past positive and negative knowledge exchanges.	$H1_{2a}$ fail to validate
	$H1_{3a}$	χ^2 (1, N = 187) = 1.695, p = .193	There was no significant association between German knowledge holders' sharing/hiding response to the one they had at least one past negative knowledge exchange and their responses to the one they had past positive and negative knowledge exchanges.	Cannot conclude
	$H1_{4a}$	χ^2 (1, N = 187) = 19.153, p < .001	German knowledge holders shared/hid similarly to the request from the one they had at least one past positive knowledge exchange and the one they had no past exchange.	$H1_{4a}$ fail to validate
	$H1_{5a}$	χ^2 (1, N = 187) = 6.867, p = .009	German knowledge holders shared/hid similarly to the request from the one they had at least one past negative knowledge exchange and the one they had no past exchange.	$H1_{5a}$ fail to validate
	$H1_{6a}$	χ^2 (1, N = 187) = 6.299, p = .012	German knowledge holders shared/hid similarly to the request from the one they had past positive and negative knowledge exchanges and the one they had no past exchange.	$H1_{6a}$ fail to validate
				$H1_a$ fail to validate

Table 4.19 (continued)

Hypotheses Test Result at Sharing and Hiding Level (German)

Hypotheses	Sub-hypotheses	Test results	Indications	Conclusions
$H2_a$	$H2_{1a}$	χ^2 (1, N = 187) = 21.503, p < .001	German knowledge holders shared/hid similarly to the request from a peer coworker and the one from a superior when they shared a negative knowledge exchange history with them.	$H2_{1a}$ fail to validate
	$H2_{2a}$	χ^2 (1, N = 187) = 9.842, p = .002	German knowledge holders shared/hid similarly to the request for high level scarcity knowledge from a peer coworker and the one from a superior.	$H2_{2a}$ fail to validate
				$H2_a$ fail to validate
$H3_a$	$H3_{1a}$	p = .104	There was no significant association between German female knowledge holders' sharing/hiding responses to requests from female and male knowledge seekers.	Cannot conclude
	$H3_{2a}$	p < .001[a]	German male knowledge holders shared/hid similarly to requests from female and male knowledge seekers.	$H3_{2a}$ fail to validate
				$H3_a$ fail to validate

Note. a. 0 count cases were removed when computing for male sharing responses and 5 count cases were removed when computing for their hiding responses (N = 127)

Table 4.19 (continued)

Hypotheses Test Result at Sharing and Hiding Level (German)

Hypotheses	Sub-hypotheses	Test results	Indications	Conclusions
$H4_a$	$H4_{1a}$, $H4_{2a}$, $H4_{3a}$	email (mean = .837) video conferencing (mean = .816) instant messaging (mean = .869) χ^2 (2) = 31.436, p < .001 ε = .865 F (1.744, 324.471) = 3.584, p = .035 email vs video conferencing (p = .678) video conferencing vs instant messaging (p = .076) email vs instant messaging (p = .250)	There was a significant effect of communication channels on German knowledge holders' sharing/hiding responses. There was no significant difference between German knowledge holders' sharing/hiding responses when requested for knowledge by email and by video conferencing and between email and instant messaging. However, German knowledge holders' sharing/hiding responses to requests made by video conferencing is significantly different from that to requests made by instant messaging. German knowledge holders' sharing/hiding responses to requests made by instant messaging happened significantly more frequently than that to requests made by video conferencing.	$H4_{2a}$ validated
				$H4_a$ partially validated
$H5_a$	/	p = .044	German knowledge holders shared/hid similarly to the request for knowledge acquired with minimum investment and the one for knowledge acquired with substantial investment	**$H5_a$ fail to validate**
$H6_a$	$H6_{1a}$, $H6_{2a}$, $H6_{3a}$	χ^2 (2) = 16.431, p < .001 ε = .922 F (1.861, 346.135) = 1.867, p = .159	The effect of knowledge type on German knowledge holders' sharing/hiding behavior was not significant	**$H6_a$ fail to validate**
$H7_a$	/	χ2 (1, N = 187) = 15.597, p < .001	German knowledge holders shared/hid similarly to the request for low-level scarcity knowledge and the one for high-level scarcity knowledge	**$H7_a$ fail to validate**

4.3.2.2.2 German Knowledge Holders' Four Responsive Behaviors. Statistical tests at the second four behavior level provided more evidence for similarity in German knowledge holders' responses to knowledge requests from colleagues with whom they shared different reciprocity histories. Except for no association between their responses to the request from the one they had at least one past positive knowledge exchange and the one they had at least one past negative knowledge exchange, association was confirmed for all the other pairwise comparisons (see Table 4.20 for test results). We, therefore, failed to validate $H1_a$.

The similarity in knowledge holders' sharing and hiding responses to knowledge seekers of different ranks also held for their sub-level four behaviors, and the probability of the association between the hiding behaviors ($p = .002$) to knowledge seekers of different ranks became even higher when we look closer into evasive hiding and playing dumb ($p < .001$) (as presented in Table 4.20), suggesting they demonstrated similar hiding strategies to colleagues regardless of their ranks. Same as the first round on the sharing and hiding responses, we failed to reject $H2_{1a}$ and $H2_{2a}$, so we could not validate $H2_a$.

For the influence of knowledge seeker's gender on German knowledge holders' responses, further support for association was found in females' full sharing and playing dumb behaviors while in males' all four behaviors towards different genders (see Table 4.20 for test results). Thus, we could not validate $H3_{1a}$ and $H3_{2a}$ since we could not reject $H3_{10}$ and $H3_{20}$, leading to our failure to validate $H3_a$.

Media's influence on knowledge holders' four responsive behaviors manifested in various ways. Instant messaging has been identified as the most useful media to

request for knowledge in that it was more likely to be responded to by German knowledge holders' full sharing, however, also playing dumb behavior. Email use was more likely to induce German knowledge holders' partial sharing behavior. While using video conferencing to make knowledge request was responded more often by their evasive hiding behavior. Therefore, $H4_{1a}$, $H4_{2a}$, and $H4_{3a}$ were supported but only under some circumstances. We partially validated $H4_a$. Table 4.20 presents the test results for H4.

The significant association between German knowledge holders' four responsive behaviors to the request for knowledge acquired with minimum investment and the request for knowledge acquired substantial investment led to our failure to validate $H5_a$ (as shown in Table 4.20).

However, we were able to partially validate $H6_{1a}$, $H6_{2a}$, and $H6_{3a}$ with the evidence that the requests for experience, documents, and relationships were responded to by German knowledge holders' four different behaviors, i.e., full sharing, partial sharing, evasive hiding, and playing dumb (see Table 4.20 for test results). Requests for relationship knowledge were more often responded to by German knowledge holders' full sharing behavior, while requests for experience and documents more frequently got partially satisfied. On the other hand, Requests for experience could induce German knowledge holders' evasive hiding more often than requests for the other two types. Rejecting $H6_{10}$, $H6_{20}$, and $H6_{30}$ under some circumstances enabled us to partially validate $H6_a$.

We still failed to validate $H7_a$ at the sub-level of four behaviors, since significant association between German knowledge holders' responses to the request

for low-level scarcity knowledge and high-level scarcity knowledge was confirmed (as presented in Table 4.20).

Table 4.20

Hypotheses Test Result at Four Behavior Level (German)

Hypotheses	Sub-hypotheses	Test results	Indications	Conclusions
$H1_a$	$H1_{1a}$	p = .130	There was no significant association between German knowledge holders' responses to the request from the one they had at least one past positive knowledge exchange and their responses to the request from the one they had at least one past negative knowledge exchange.	Cannot conclude
	$H1_{2a}$	p < .001	German knowledge holders responded similarly to the one they had at least one past positive knowledge exchange and the one they had past positive and negative knowledge exchanges.	$H1_{2a}$ fail to validate
	$H1_{3a}$	p = .081	German knowledge holders responded similarly to the one they had at least one past negative knowledge exchange and the one they had past positive and negative knowledge exchanges.	$H1_{3a}$ fail to validate
	$H1_{4a}$	p < .001	German knowledge holders responded similarly to the one they had at least one past positive knowledge exchange and the one they had no past exchange.	$H1_{4a}$ fail to validate
	$H1_{5a}$	p < .001	German knowledge holders responded similarly to the one they had at least one past negative knowledge exchange and the one they had no past exchange.	$H1_{5a}$ fail to validate
	$H1_{6a}$	p = .006	German knowledge holders responded similarly to the one they had past positive and negative knowledge exchanges and the one they had no past exchange.	$H1_{6a}$ fail to validate
				$H1_a$ fail to validate

Table 4.20 (continued)

Hypotheses Test Result at Four Behavior Level (German)

Hypotheses	Sub-hypotheses	Test results	Indications	Conclusions
$H2_a$	$H2_{1a}$	$p < .001$	German knowledge holders responded similarly to the request from a peer coworker and the one from a superior when they shared a negative knowledge exchange history with them.	$H2_{1a}$ fail to validate
	$H2_{2a}$	$p < .001$	There was no significant association between German knowledge holders' responses to the request for high level scarcity knowledge from a peer coworker and the one from a superior.	$H2_{2a}$ fail to validate
				$H2_a$ fail to validate
$H3_a$	$H3_{1a}$	$p = .081$	There was a significant association between German female knowledge holders' *full sharing* behavior to requests from female knowledge seekers and to those from male knowledge seekers.	$H3_{1a}$ fail to validate
		$p = .251$	There was no significant association between German female knowledge holders' *partial sharing* behavior to requests from female knowledge seekers and to those from male knowledge seekers.	cannot conclude
		$p = .254$	There was no significant association between German female knowledge holders' *evasive hiding* behavior to requests from female knowledge seekers and to those from male knowledge seekers.	cannot conclude
		$p = .026$	There was a significant association between German female knowledge holders' *playing dumb* behavior to requests from female knowledge seekers and to those from male knowledge seekers.	$H3_{1a}$ fail to validate

Table 4.20 (continued)

Hypotheses Test Result at Four Behavior Level (German)

Hypotheses	Sub-hypotheses	Test results	Indications	Conclusions
$H3_a$	$H3_{2a}$	p = .002[b]	There was a significant association between German male knowledge holders' *full sharing* behavior to requests from female knowledge seekers and those from male knowledge seekers.	$H3_{2a}$ fail to validate
		p = .004[c]	There was a significant association between German male knowledge holders' *partial sharing* behavior to requests from female knowledge seekers and those from male knowledge seekers.	$H3_{2a}$ fail to validate
		p < .001	There was a significant association between German male knowledge holders' *evasive hiding* behavior to requests from female knowledge seekers and those from male knowledge seekers.	$H3_{2a}$ fail to validate
		p < .001	There was a significant association between German male knowledge holders' *playing dumb* behavior to requests from female knowledge seekers and those from male knowledge seekers.	$H3_{2a}$ fail to validate
				$H3_a$ fail to validate

Note. b. Cases that fully shared for 0 or 1 times in the male scenario and for 0 or 4 times in the female scenario were removed when comparing their full sharing responses (N = 76)
c. Cases that partially shared for 4 or 5 times in male and female scenarios were removed when comparing their partial sharing responses (N = 109)

Table 4.20 (continued)

Hypotheses Test Result at Four Behavior Level (German)

Hypotheses	Sub-hypotheses	Test results	Indications	Conclusions
$H4_a$	$H4_{1a}$, $H4_{2a}$, $H4_{3a}$	email (mean = .396) video conferencing (mean = .529) instant messaging (mean = .599) χ^2 (2) = 15.704, p < .001 ε = .925 F (1.867, 347.306) = 31.011, p < .001 email vs video conferencing (p < .001) video conferencing vs instant messaging (p = .057) email vs instant messaging (p < .001)	There was a significant effect of communication channels on German knowledge holders' *full sharing* behavior. There was a significant difference between German knowledge holders' full sharing behavior when requested knowledge by email and by video conferencing, by email and by instant messaging, and by video conferencing and by instant messaging. German knowledge holders most often fully shared what they knew when requested knowledge by instant messaging while least did so when requested knowledge by email.	$H4_{1a}$, $H4_{2a}$, and $H4_{3a}$ validated
		email (mean = .441) video conferencing (mean = .286) instant messaging (mean = .270) χ^2 (2) = 4.287, p = .117 F (2, 372) = 28.039, p < .001 email vs video conferencing (p < .001) video conferencing vs instant messaging (p = 1.000) email vs instant messaging (p < .001)	There was a significant effect of communication channels on German knowledge holders' *partial sharing* behavior. There was a significant difference between German knowledge holders' partial sharing behavior when requested knowledge by email and by video conferencing, by email and by instant messaging, but not between their partial sharing behavior when requested knowledge by video conferencing and by instant messaging. German knowledge holders partially shared what they knew more often when requested knowledge by email than when requested knowledge by video conferencing and instant messaging.	$H4_{1a}$ and $H4_{3a}$ validated

Table 4.20 (continued)

Hypotheses Test Result at Four Behavior Level (German)

Hypotheses	Sub-hypotheses	Test results	Indications	Conclusions
$H4_a$	$H4_{1a}$, $H4_{2a}$, $H4_{3a}$	email (mean = .087) video conferencing (mean = .140) instant messaging (mean = .024) χ^2 (2) = 17.202, p < .001 ε = .918 F (1.854, 344.906) = 27.260, p < .001 email vs video conferencing (p = .005) video conferencing vs instant messaging (p < .001) email vs instant messaging (p < .001)	There was a significant effect of communication channels on German knowledge holders' *evasive hiding* behavior. There was a significant difference between German knowledge holders' evasive hiding behavior when requested knowledge by email and by video conferencing, by email and by instant messaging, and also by video conferencing and by instant messaging. German knowledge holders evasively hid most often when requested knowledge by video conferencing while least did so when requested knowledge by instant messaging.	$H4_{1a}$, $H4_{2a}$, and $H4_{3a}$ validated
		email (mean = .076) video conferencing (mean = .044) instant messaging (mean = .107) χ^2 (2) = 22.959, p < .001 ε = .895 F (1.807, 336.149) = 7.957, p = .001 email vs video conferencing (p = .039) video conferencing vs instant messaging (p = .001) email vs instant messaging (p = .220)	There was a significant effect of communication channels on German knowledge holders' *playing dumb* behavior. There was a significant difference between German knowledge holders' evasive hiding behavior when requested knowledge by email and by video conferencing, by video conferencing and by instant messaging, but not when requested knowledge by email and by instant messaging. German knowledge holders used the playing dumb strategy more often when requested knowledge by instant messaging and by email as compared to when requested knowledge by video conferencing	$H4_{1a}$ and $H4_{2a}$ validated
				$H4_a$ partially validated

Table 4.20 (continued)

Hypotheses Test Result at Four Behavior Level (German)

Hypotheses	Sub-hypotheses	Test results	Indications	Conclusions
$H5_a$	/	$p < .001$	German knowledge holders responded similarly to the request for knowledge acquired with minimum investment and the one for knowledge acquired with substantial investment.	**$H5_a$ fail to validate**
$H6_a$	$H6_{1a}$, $H6_{2a}$, $H6_{3a}$	experience (mean = .472) documents (mean = .453) relationships (mean = .599) χ^2 (2) = 21.451, p < .001 ε = .901 F (1.819, 338.374) = 22.736, p < .001 experience vs documents (p = .999) documents vs relationships (p < .001) experience vs relationships (p < .001)	The effect of knowledge type on German knowledge holders' *full sharing* behavior was significant. There was a significant difference between German knowledge holders' full sharing behavior to requests for experience and for relationships, to requests for documents and relationships, but not to requests for experience and for documents. German knowledge holders fully shared more often to requests for relationships than to those for experience and for documents.	$H6_{2a}$ and $H6_{3a}$ validated
		experience (mean = .353) documents (mean = .380) relationships (mean = .259) χ^2 (2) = 7.480, p = .024 ε = .962 F (1.943, 361.484) = 13.908, p < .001 experience vs documents (p = .642) documents vs relationships (p < .001) experience vs relationships (p = .001)	The effect of knowledge type on German knowledge holders' *partial sharing* behavior was significant. There was a significant difference between German knowledge holders' partial sharing behavior to requests for experience and for relationships, to requests for documents and relationships, but not to requests for experience and for documents. German knowledge holders partially shared more often to requests for experience and for documents than to those for relationships.	$H6_{2a}$ and $H6_{3a}$ validated

Table 4.20 (continued)

Hypotheses Test Result at Four Behavior Level (German)

Hypotheses	Sub-hypotheses	Test results	Indications	Conclusions
$H6_a$	$H6_{1a}$, $H6_{2a}$, $H6_{3a}$	experience (mean = .130) documents (mean = .066) relationships (mean = .088) χ^2 (2) = 19.100, p < .001 ε = .911 F (1.838, 341.938) = 7.442, p = .001 experience vs documents (p < .001) documents vs relationships (p = .423) experience vs relationships (p = .100)	The effect of knowledge type on German knowledge holders' *evasive hiding* behavior was significant. There was a significant difference between German knowledge holders' evasive hiding behavior to requests for experience and for documents, to requests for experience and for relationships, but not to requests for documents and for relationships. German knowledge holders evasively hid more experience than documents and relationships.	$H6_{1a}$ and $H6_{3a}$ validated
		experience (mean = .046) documents (mean = .102) relationships (mean = .054) χ^2 (2) = 16.809, p < .001 ε = .920 F (1.858, 345.531) = 9.126, p < .001 experience vs documents (p < .001) documents vs relationships (p = .003) experience vs relationships (p = 1.000)	The effect of knowledge type on German knowledge holders' *playing dumb* behavior was significant. There was a significant difference between German knowledge holders' playing dumb behavior to requests for experience and for documents, to requests for documents and for relationships, but not to requests for experience and for relationships. German knowledge holders used the playing dumb strategy more often when requested for documents than for experience and relationships.	$H6_{1a}$ and $H6_{2a}$ validated
				$H6_a$ partially validated
$H7_a$	/	p < .001	There was a significant association between German knowledge holders' responses to the request for low-level scarcity knowledge and to the one for high-level scarcity knowledge.	**$H7_a$ fail to validate**

4.3.3 Comparing Chinese and German Knowledge Holders' Responses

However inspiring the previously identified universal patterns and specific features are, we are so far still in the dark as to whether there exist any significant differences in Chinese and German knowledge holders' responses to colleagues' knowledge requests. As indicated by the descriptive results in section 4.2.3, where we compared Chinese and German knowledge holders' responses to requests for different types of knowledge made by different media, we expect statistically significant differences. Therefore, we ran statistical tests based on the two variables, i.e., "knowledge type" and "communication channel richness," with a view to identifying statistical differences, if there were any. Out of the consideration that "gender" is also a variable incorporated in all scenarios and evenly distributed, meaning that we have an equal number of female and male knowledge seekers across the ten scenarios, we compared knowledge holders' responses to knowledge requests made by the same and different genders as well.

4.3.3.1 Chinese and German Knowledge Holders' Responses to Knowledge Requests from Different Genders. An Independent-samples t-test was conducted to compare Chinese and German female knowledge holders' "full sharing" response to female knowledge seekers. There was not a significant difference in the full sharing response of Chinese female knowledge holders (M = 1.30, SD = 1.264) and German female knowledge holders (M = 1.91, SD = 1.518); t (74) = 1.835, p = .071, as presented in Table 4.21.

Table 4.21

Independent-samples t-test Results of Chinese and German Female Knowledge Holders' Full Sharing Response to Female Knowledge Seekers

Group Statistics

	Nationality	N	Mean	Std. Deviation	Std. Error Mean
femalescenario_fullsharing_count	German	46	1.91	1.518	.224
	Chinese	30	1.30	1.264	.231

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
femalescenario_fullsharing_count	Equal variances assumed	.384	.537	1.835	74	.071	.613	.334	-.053	1.279
	Equal variances not assumed			1.907	69.560	.061	.613	.321	-.028	1.254

Then a series of Independent-Samples T-Test were conducted accordingly to test if there was any significant difference in the other three responses, i.e., "partial sharing", "evasive hiding", and "playing dumb", between Chinese and German female knowledge holders and also in the four responses between Chinese and German male knowledge holders. The test results presented in Table 4.22 inform that German female knowledge holders evasively hid less often than Chinese female knowledge holders when requested by female knowledge seekers, while they fully shared more often and partially shared less often than Chinese female knowledge holders when requested by male knowledge seekers. German male knowledge holders fully shared more often while played dumb less often than Chinese male knowledge holders when requested by female knowledge seekers, while they fully shared more often while partially shared less often than Chinese male knowledge holders when requested by male knowledge seekers.

Table 4.22

Independent-samples t-test Results of Chinese and German Knowledge Holders' Responses to Knowledge Seekers of Different Genders

Knowledge Holders	Knowledge Seekers	Four Responses	Independent-samples t-test Results
Female knowledge holder	female knowledge seeker	full sharing	t (74) = 1.835, p = .071
		partial sharing	t (74) = .263, p = .793
		evasive hiding	t (74) = -2.035, ***p = .045***
		playing dumb	t (74) = -1.423, p = .159
	male knowledge seeker	***full sharing***	t (74) = 2.951, ***p = .004***
		partial sharing	t (74) = -2.638, ***p = .010***
		evasive hiding	t (74) = 1.004, p = .319
		playing dumb	t (36.618) = -1.586, p = .121
Male knowledge holder	female knowledge seeker	***full sharing***	t (113.181) = 4.885, ***p < .001***
		partial sharing	t (173) = -1.881, p = .062
		evasive hiding	t (173) = -1.563, p = .120
		playing dumb	t (56.546) = -2.813, ***p = .007***
	male knowledge seeker	***full sharing***	t (100.242) = 6.401, ***p < .001***
		partial sharing	t (173) = -4.919, ***p < .001***
		evasive hiding	t (173) = -1.455, p = .148
		playing dumb	t (173) = -1.555, p = .122

It can be concluded that German knowledge holders, either female or male, demonstrated more full sharing behavior when confronted with knowledge requests from male knowledge seekers. In other words, both German female and male knowledge holders fully shared, instead of partially sharing, what they knew, more frequently than their Chinese counterparts. However, when requested by female knowledge seekers, the difference in German and Chinese female knowledge holders' responses was found in their evasive hiding behavior and in male knowledge holders' full sharing and playing dumb responses. To be more specific, German female knowledge holders evasively hid less than Chinese female knowledge holders, while

German male knowledge holders fully shared more and played dumb less than Chinese male knowledge holders.

4.3.3.2 Chinese and German Knowledge Holders' Responses to Knowledge Requests Made by Different Media. Comparing Chinese and German knowledge workers' knowledge hiding behavior when they were requested by different media, we can readily notice some differences. As Figure 4.33 displays, the differences in their knowledge hiding response were mainly found when they were requested by email and video conferencing. This difference held true for their two hiding strategies, i.e., playing dumb and evasive hiding. However, they responded seemingly similarly when requested by instant messaging, as shown in Figure 4.34.

Figure 4.33

Chinese and German Knowledge Holders' Knowledge Hiding Response upon Requests Made by Different Midea

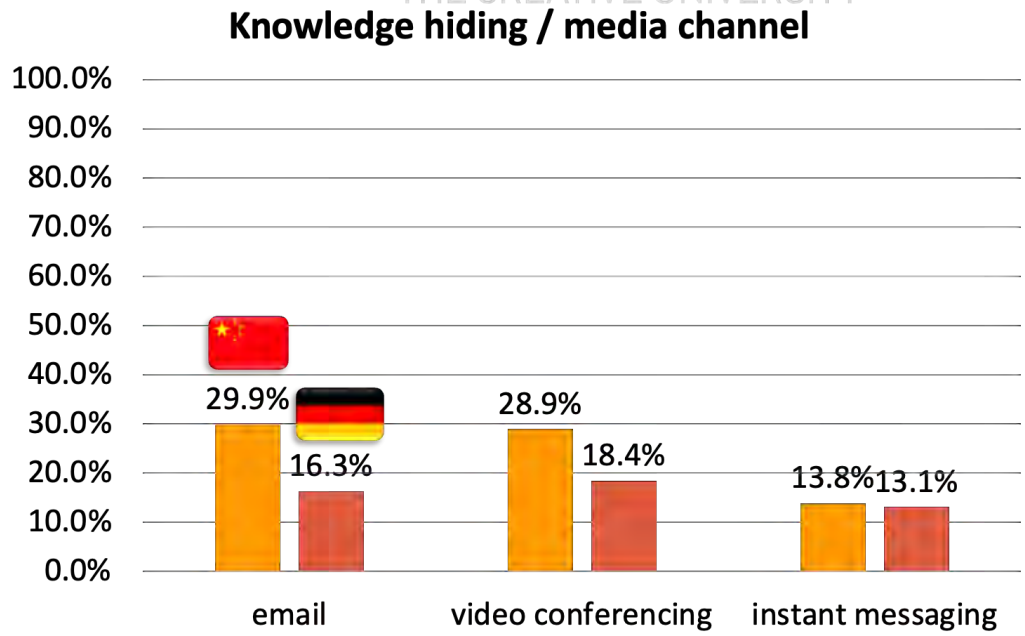
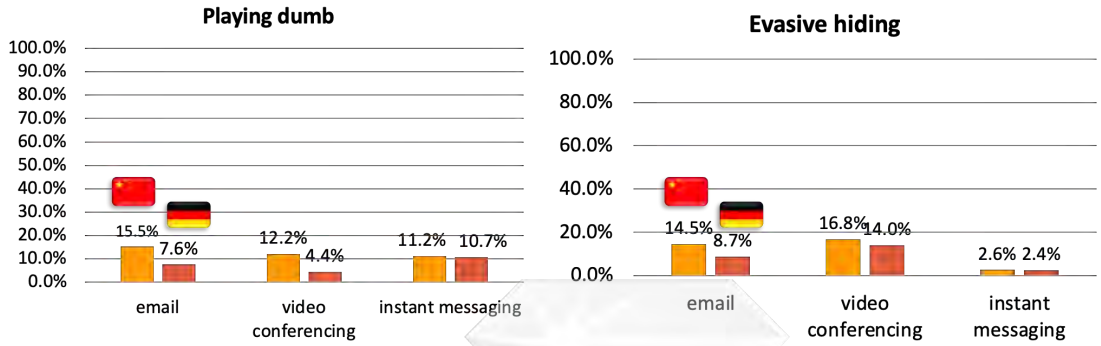


Figure 4.34

Chinese and German Knowledge Holders' Playing Dumb and Evasive Hiding Responses upon Requests Made by Different Midea



Independent-samples t-test conducted to compare knowledge holders' responses to requests made by the three different media, i.e., email, video conferencing, and instant messaging, also revealed great differences between Chinese and German knowledge holders' four responsive behaviors, as shown in Table 4.23.

As the results suggest, German knowledge holders fully shared significantly more often while evasively hid and played dumb significantly less often than Chinese knowledge holders when requested by email. When they were requested by video conferencing, German knowledge holders fully shared significantly more often while partially sharing and playing dumb significantly less often than Chinese knowledge holders. Moreover, they fully shared significantly more often while partially shared significantly less often than Chinese knowledge holders when requested by instant messaging.

Table 4.23

Independent-samples t-test Results of Chinese and German Knowledge Holders' Responses to Knowledge Requests Made by Different Midea

Communication Midea	Four Responses	Independent-samples t-test Results
Email	***full sharing***	t (199.981) = 4.092, ***p* < .001**
	partial sharing	t (165.850) = -.339, p = .735
	evasive hiding	t (261) = -2.657, ***p* = .008**
	playing dumb	t (106.303) = -2.746, ***p* = .007**
Video conferencing	***full sharing***	t (175.073) = 6.883, ***p* < .001**
	partial sharing	t (261) = -4.644, ***p* < .001**
	evasive hiding	t (261) = -.968, p = .334
	playing dumb	t (110.576) = -3.479, ***p* = .001**
Instant messaging	***full sharing***	t (261) = 5.610, ***p* < .001**
	partial sharing	t (261) = -5.747, ***p* < .001**
	evasive hiding	t (261) = -.152, p = .879
	playing dumb	t (261) = -.157, p = .875

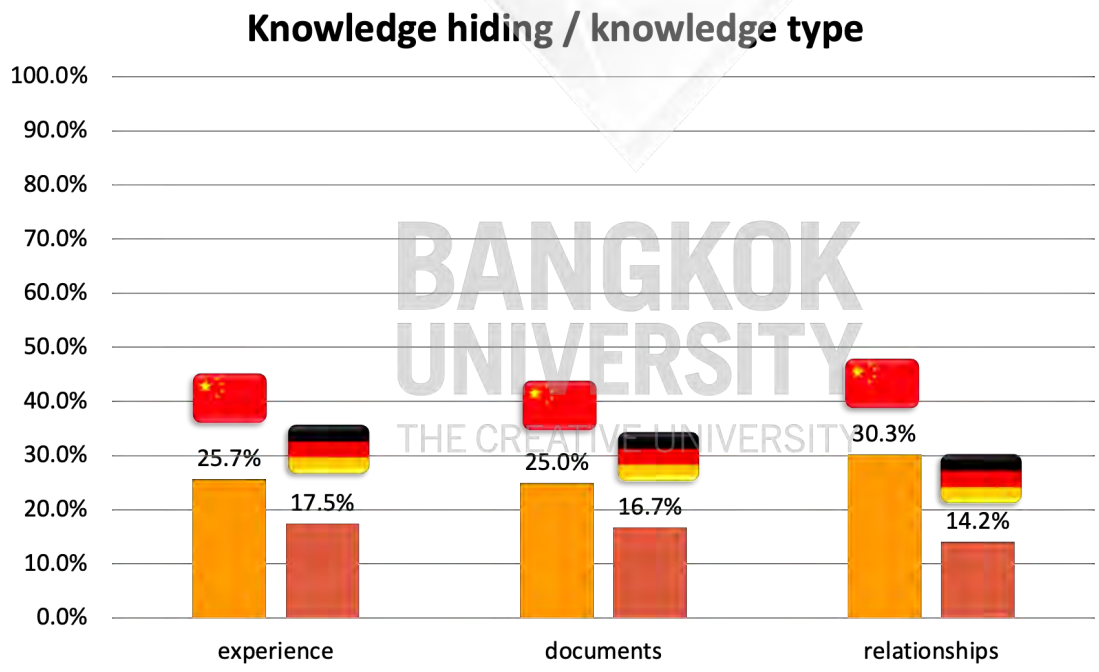
To conclude, when it comes to the media used to forward knowledge requests, differences in German and Chinese knowledge holders' responses were found when they were requested knowledge by all three media of focus in our study. German knowledge holders generally demonstrated more full sharing behavior irrespective of which media used to request knowledge from them. They partially shared less than Chinese knowledge holders when they received knowledge requests by video conferencing and instant messaging, and they pretended ignorant less often when requested by video conferencing and email, where they also evasively hid less often.

4.3.3.3 Chinese and German Knowledge Holders' Responses to Knowledge Requests for Different Types of Knowledge. It was interesting to note that while Chinese knowledge holders generally engaged in knowledge hiding more often than

their German counterparts in all cases when we focused our attention on their responses to different types of knowledge, they hid particularly more frequently than German knowledge holders when relationships were requested from them, as shown in Figure 4.35.

Figure 4.35

Chinese and German Knowledge Holders' Knowledge Hiding Response upon Requests for Different Types of Knowledge



The researcher then ran statistical analyses to check whether the differences were significant. It was found that when they were requested for different types of knowledge, Chinese and German knowledge workers responded differently in terms of the extent to which they shared their knowledge and the strategies they adopted to hide their knowledge.

Results of the independent-samples t-test, as shown in Table 4.24, disclose that German knowledge holders fully shared significantly more often while partially shared and played dumb significantly less often than Chinese knowledge holders when requested for experience, that they fully shared significantly more often while evasively hid less often than Chinese knowledge holders when requested for documents, and they fully shared significantly more often while partially shared, evasively hid, and played dumb significantly less often than Chinese knowledge holders when requested for relationships.

Table 4.24

Independent-samples t-test Results of Chinese and German Knowledge Holders' Responses to Knowledge Requests for Different Knowledge Types

Knowledge Types	Four Responses	Independent-samples t-test Results
Experience	***full sharing***	t (171.537) = 6.553, ***p* <.001**
	partial sharing	t (153.717) = -4.628, ***p* <.001**
	evasive hiding	t (186.969) = .641, p = .522
	playing dumb	t (95.515) = -3.619, ***p* <.001**
Documents	***full sharing***	t (261) = 3.757, ***p* <.001**
	partial sharing	t (261) = -1.895, p = .059
	evasive hiding	t (107.383) = -2.612, ***p* =.010**
	playing dumb	t (108.890) = -.921, p = .359
Relationships	***full sharing***	t (261) = 6.206, ***p* <.001**
	partial sharing	t (261) = -3.466, ***p* =.001**
	evasive hiding	t (108.528) = -2.431, ***p* =.017**
	playing dumb	t (121.897) = -2.512, ***p* =.013**

Again, full sharing behavior was more pronounced to German knowledge holders than to Chinese knowledge holders, no matter what type of knowledge they were requested for. In contrast, Chinese knowledge holders, as compared to German

knowledge holders, were more likely to partially share what they knew when they were requested for experience and relationships, while they pretended ignorant more often than German knowledge holders when requested for experience and relationships and faked a willingness to help or stalled the request when requested for documents and relationships.

Interestingly, significant differences were found in German and Chinese knowledge holders' four behavioral responses to requests for relationships. Except for full sharing response, Chinese knowledge holders articulated more partial sharing, evasive hiding, and playing dumb responses. Their withholding behavior and their sharing of incomplete knowledge, when it came to relationships, suggest their protection and hesitation in making their built relationships available to others.

4.4 Summary

In this chapter, the author testified the existence of knowledge hiding across organizations in different cultures, presented the prominent features of the research subjects' responsive behavior to knowledge requests from descriptive results, and further confirmed some differences with statistical tests. The identified similarities in the responsive behavioral features across the two samples confirmed the robustness of the research framework developed in the study. We then revealed significant differences in the extent to which knowledge workers shared what they knew and the strategies they used to withhold their knowledge, highlighting the role played by the media used to request knowledge and the type of knowledge in influencing knowledge workers' responses. The interpretations and implications of these findings are to be thoroughly discussed in the following chapter.

CHAPTER 5

DISCUSSION

In this chapter, we will dive into the interpretations of the hypotheses test results generated with the combined sample, the two samples from different cultural backgrounds, respectively, and the findings based on the comparisons between the two samples, exploring their commonalities and specifics.

5.1 Knowledge Holders' Responses to Knowledge Requests

Drawn on well-established theories widely applied in previous knowledge hiding studies and aiming to unveil the potential influence of situational factors and the factors concerning knowledge nature on organizational employees' sharing and hiding behaviors, this study generated several meaningful findings.

5.1.1 Reciprocity History and Knowledge Request Response (Hypothesis 1)

Our study shows that our sample knowledge holders shared/hid similarly to the one they had at least one positive knowledge exchange and the one they had at least one negative knowledge exchange, and they were likely to share what they knew in both cases, suggesting that the experience of positive reciprocity or negative reciprocity did not affect interpersonal knowledge exchanges as we expected and was not a prominent factor containing knowledge holders' sharing behavior. However, this similarity did not hold when looking into knowledge holders' four responses to requests for knowledge, implying a complex mechanism behind organizational employees' responses to knowledge requests.

It was found that knowledge holders responded similarly to the one they had at least one positive knowledge exchange and the one they had past positive and negative knowledge exchanges and that they shared what they knew more often than they hid in both cases, indicating the insignificant effect of the experience of negative reciprocity on interpersonal exchanges. In other words, the experience of negative reciprocity failed to outweigh the positive reciprocity history between the knowledge holder and the knowledge seeker.

Knowledge holders' responses to the one they had at least one past negative knowledge exchange and the one they had past positive and negative knowledge exchanges is another case that reveals the possible mechanism working across different levels, i.e., the sharing and hiding level and the four-behavior level. However, it produced effects in the opposite direction to that in the first case. That is, knowledge holders did not demonstrate similarity in their sharing and hiding behaviors in general, whereas they used full sharing, partial sharing, evasive hiding, and playing dumb in similar ways as responses to the one they had at least one past negative knowledge exchange and the one they had past positive and negative knowledge exchanges. This finding also suggests that the impact of a positive reciprocity history did not do as many wonders as we had expected, particularly when negative reciprocity came into play.

The finding that knowledge holders responded similarly to the one they had at least one past positive/negative knowledge exchange and the one they had no past exchange, and more of them shared what they knew in the mentioned cases indicates the knowledge holders' general inclination to share knowledge. This finding is also consistent with the previous case one and case three in that it somewhat informs that a

positive and a negative reciprocity history did not have a big role to play. In other words, the experience of positive reciprocity and negative reciprocity did not produce different effects on interpersonal knowledge exchanges as we expected.

Our study also found that knowledge holders shared/hid similarly to the one they had both positive and negative knowledge exchanges and the one they had no past exchange, and they were likely to share what they knew in both cases, suggesting that the experiences of positive and negative exchange might interact to produce either a neutral effect or no effect at all that is similar to the impact zero exchange history exerted on knowledge holders' responsive behaviors.

To conclude, inconsistent with the common belief that people bear the quality of interpersonal relationships and their past interactions with others on their decision as to whether to hide knowledge or not (Černe et al., 2014; Connelly et al., 2012), the findings from our study reveal that organizational employees' sharing and hiding behaviors as responses to knowledge requests from colleagues were not majorly influenced by the positive or negative reciprocity history they shared with the knowledge seeker and that no reciprocity and mixed reciprocity history did not result in varied responses from them.

5.1.2 Situational Factors and Knowledge Request Response

5.1.2.1 Knowledge Seeker's Rank and Knowledge Request Response

(Hypothesis 2). In the two extreme situations we devised in SOS the serious game where a past negative knowledge exchange happened between the knowledge holder and the knowledge seeker and where the knowledge seeker requests for high-level scarcity knowledge, knowledge holders in our study demonstrated significant

similarity in their sharing and hiding responses to the requests from a peer coworker and those from a superior. The result suggests that knowledge seekers' rank did not influence knowledge holders' responses to knowledge requests, at least under some particular situations, as what was testified in our study, the two extreme cases where they experienced a previous unsatisfying exchange with the knowledge seeker and where they were requested for high-level scarcity knowledge.

The similarity also held for the sub-level four behaviors, suggesting knowledge holders demonstrated similar sharing acts and hiding strategies to colleagues regardless of their ranks.

Participants in our study are from R&D or Production departments in automotive companies. Working as knowledge workers, specific professional knowledge and skills might equip them with their own competitive advantage and, therefore, allow them to survive in the organization without differentiating their behavioral manner to colleagues of different ranks. Moreover, an organizational culture that values flat structure and equal communication among employees in these companies could probably contribute to relieving employees' concern for hierarchical matters. Unfortunately, this assumption was not investigated in our study.

5.1.2.2 Knowledge Seeker's Gender and Knowledge Request Response (Hypothesis 3). We failed to validate that knowledge holders respond differently to knowledge seekers of different genders at the first sharing and hiding level. In contrast, based on the results, we can conclude that both female and male knowledge holders responded similarly to knowledge seekers of the same and different genders. That is to say, knowledge seekers' gender is not a factor influencing knowledge

holders' responsive behavior in our scenarios.

The further probe into their four responsive behaviors enhanced the result by revealing that the similarity in knowledge holders' responses specifically lied in female knowledge holders' full sharing and playing dumb behaviors while in male knowledge holders' all four behaviors. Evidence showed that female knowledge holders did not vary their full sharing and playing dumb behavior to female or male knowledge seekers. However, the similarity did not stand for their evasive hiding and partial sharing behavior. In the case of male knowledge holders, the consistency was found in all their four responsive behaviors. Male knowledge holders did not shift their responses to knowledge seekers of different genders, demonstrating a more unbiased and less thoughtful behavioral manner as compared to their female counterparts.

Our findings are consistent with a previous study that found that a male-dominated environment (automotive companies as in our study) decreases women's tendency to conform to their stereotypical gendered role, thus reducing the difference in knowledge hiding behaviors between genders (Andreeva & Zappa, 2023) in that both female and male knowledge holders in our study showed similarity in their playing dumb act towards different genders.

5.1.2.3 Communication Channel Richness and Knowledge Request Response (Hypothesis 4). The use of different communication channels to request knowledge did predict knowledge holders' responses, as confirmed in our study. However, the influence of each used media is different from what we expected. We conclude that instant messaging was the communication channel that was more likely

to be responded to by knowledge holders' sharing behavior as compared to video conferencing and email, which were more likely to induce knowledge holders' hiding responses (see Table 4.11 for the test results).

Different from what we expected, the richest media (video conferencing) among the three ones that were involved in the study (McShane & Glinow, 2017) was not as useful as a lean media (instant messaging) for the knowledge seeker to get what they wanted. This finding somewhat supports the acknowledgment made by Dennis and Valacich (1999) that media richness should be addressed with the consideration of the context since "richness" is a relative concept and defined by a given situation.

When specifically looking into knowledge holders' four responsive behaviors to knowledge requests, the significance also held. However, it manifested in varying ways across comparisons between different media, as shown in Table 4.16. First, Knowledge holders most often fully shared what they knew when the request for knowledge was made by instant messaging, while they least did so when the request was made by email. They partially shared what they knew more often when the knowledge requests were made by email than by video conferencing and instant messaging. Moreover, knowledge holders evasively hid most often upon knowledge requests made by video conferencing while least did so upon knowledge requests made by instant messaging, and they used the playing dumb strategy more often when the knowledge request was made by instant messaging and by email as compared to by video conferencing.

Our findings show that the most useful media for the knowledge seeker to fully get what they wanted from the knowledge holder was instant messaging, which was also the one most likely to evoke the knowledge holder's playing dumb responses.

Whereas by using email, it was more likely for the knowledge seeker to get partial knowledge from the knowledge holder or get their ignorance. Furthermore, video conferencing was the media that was most likely to induce knowledge holders' evasive hiding behavior.

There is a good reason for playing dumb to have happened more often when the knowledge holder was requested for knowledge by email and instant messaging. Knowledge holders could easily ignore the request, pretending they did not get it when the request was forwarded to them by email or instant messaging without arousing too many negative feelings in the seeker or bringing a destructive impact on their relationships with them. However, it would be hard for knowledge holders to say no directly to the seeker when the request was forwarded by video conferencing since a "no" would signify either a lack of professional competence or unwillingness to help. Of these considerations, faking a willingness to help while stalling the request would be a better strategy to help them avoid sharing their knowledge.

5.1.3 Factors Concerning Knowledge Nature and Knowledge Request Response

5.1.3.1 Knowledge Ownership and Knowledge Request Response

(Hypothesis 5). Out of our expectations, the replicated impact of knowledge holders' ownership sense to the requested knowledge on knowledge holders' hiding behavior did not get validated in our study, where the similarity in knowledge holders' responses to requests for knowledge acquired with minimum investment and to those for knowledge acquired with substantial investment were found at both sharing and hiding, a more general level, and the four-behavior, a more specific level. Our findings show that knowledge holders did not vary their responses based on how

much investment they made in acquiring the requested knowledge, which is inconsistent with previous studies that evidenced knowledge-based psychological ownership positively affects knowledge hiding (Peng, 2013; Tian et al., 2021).

The fact that most of the knowledge holders in our study shared knowledge of minimum investment with colleagues suggests that this kind of knowledge, as we expected, would not create knowledge holders' strong sense of ownership and would be readily made available to others upon request. However, most of the knowledge holders also shared knowledge involving substantial investment when requested by colleagues. Possible motivations, as we can think of, include the knowledge holders' demand for feedback, recognition, or payback from others. Or it happened because it was difficult to get players to realize the intended variable we hope to get highlighted in the scenario (Figure 5.1 presents the game instructions where we emphasized "substantial investment", a sub-level variable of knowledge ownership). Moreover, the limited number of scenarios (only one scenario involved each level, i.e., minimum and substantial investment in knowledge acquisition) could also be a factor resulting in the statistical insignificance.

Figure 5.1

Instructions to Build "Substantial Investment" in SOS the Serious Game

5.1.3.2 Knowledge Type and Knowledge Request Response (Hypothesis 6). The comparison between knowledge holders' general sharing and hiding responses to requests for different types of knowledge did not reveal any difference at the combined level. However, a closer look at knowledge holders' four responsive behaviors exposed us to several interesting findings (as shown in Table 4.16). First, knowledge holders did vary their responses to requests for different types of knowledge. Second, knowledge holders' responses to requests for different types of knowledge were different from what we had expected.

On the one hand, they fully shared relationships more frequently than they shared experiences and documents, and they partially shared experiences and documents more often than they shared relationships. Not as we expected, documents, which should be shared without much effort, got partially shared more frequently. Whereas the requests for relationships, the type of knowledge that we believed more valuable and meaningful, were more likely to be fully taken care of by knowledge

holders. On the other hand, knowledge holders faked a helping willingness more often when they were requested for experience and relationships than for documents, and they pretended to be ignorant more frequently when they were requested for documents than for experience and relationships. It makes more sense to the knowledge seeker that the knowledge holder stalls the requests for knowledge that is not easy to explain and claims that they did not document the requested particular issues.

To conclude, knowledge holders did vary their responses to requests for different types of knowledge, but the variance only existed at the level of the four specific behavioral responses. In other words, the types of requested knowledge did not predict if they would share or hide what they knew but rather informed of the extent to which they would share and the strategy they would employ to hide what was requested.

5.1.3.3 Knowledge Scarcity and Knowledge Request Response (Hypothesis 6). To our surprise, the study found that knowledge holders responded similarly to requests for low-level scarcity knowledge and high-level scarcity knowledge, suggesting that the scarcity level of the requested knowledge did not influence knowledge holders' responsive behaviors. This finding goes against the prevailing belief that it is human nature to protect and conserve resources, particularly when it is hardly available in the market (Feng & Wang, 2019; Škerlavaj et al., 2018).

It is possible that the knowledge holders in our study did not see the requested knowledge in the same way as we defined in the scenarios. The fact that most of them chose to share what they knew in both cases where they were requested for a widely

processed documents/materials and where they were requested for a creative practice suggests that different rating criteria in the value of knowledge might exist among individual knowledge holders. The difference in individuals' rating criteria explains why they treat knowledge of different scarcity level in a similar way. Another possibility is that the knowledge holders considered the sharing of a piece of highly scarce knowledge as an investment for future resource (i.e., knowledge) gains, as suggested by Feng and Wang (2019) and Anser et al. (2021).

5.2 Knowledge Holders' Responses Across Cultures

Further investigations into Chinese and German knowledge holders as separate groups allowed us to better decode knowledge sharing and knowledge hiding responses and the sub-level four acts individual employees engaged in at work settings.

Figure 5.2 and Figure 5.3 provide us with a direct visual of the differences between Chinese and German knowledge holders' responses to colleagues' requests for knowledge. In general, both Chinese and German knowledge holders demonstrated far more sharing behavior than hiding (see Figure 5.2). A closer look into the sub-level four behaviors, as shown in Figure 5.3, informs us that Chinese knowledge holders engaged in full sharing less often than partial sharing, whereas the distribution of their German counterparts' two sharing behaviors was roughly even. Their use of the two hiding strategies, however, does not show distinguishing differences, probably owing to the low frequency of the occurrences. One difference observed is the slightly higher frequency of Chinese knowledge holders' use of the two hiding strategies than German knowledge holders.

To acquire an accurate understanding of the potential differences in the responses of knowledge holders who are from different cultural backgrounds, we tested our hypotheses respectively with the two groups of participants.

Figure 5.2

Comparing Chinese and German Knowledge Holders' Responses by Knowledge Sharing and Knowledge Hiding

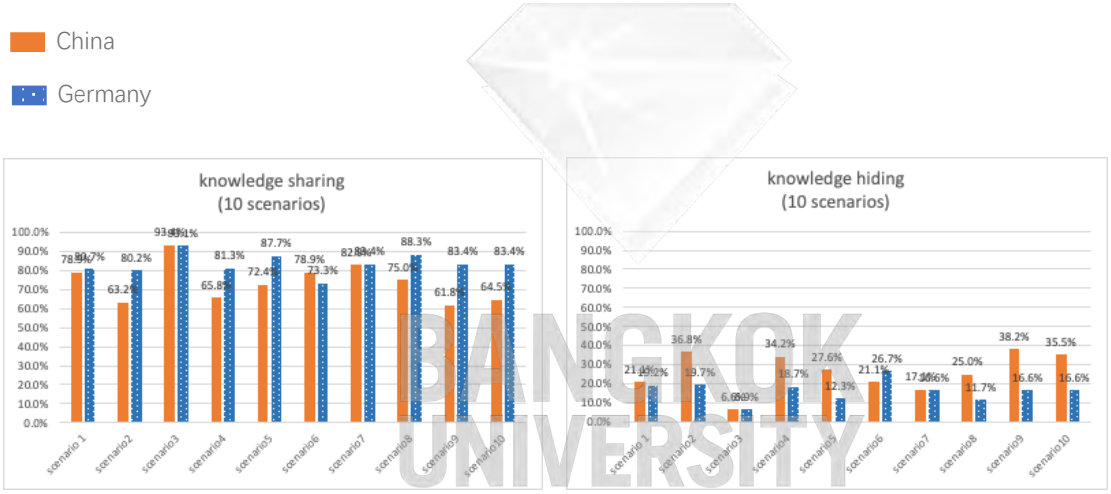
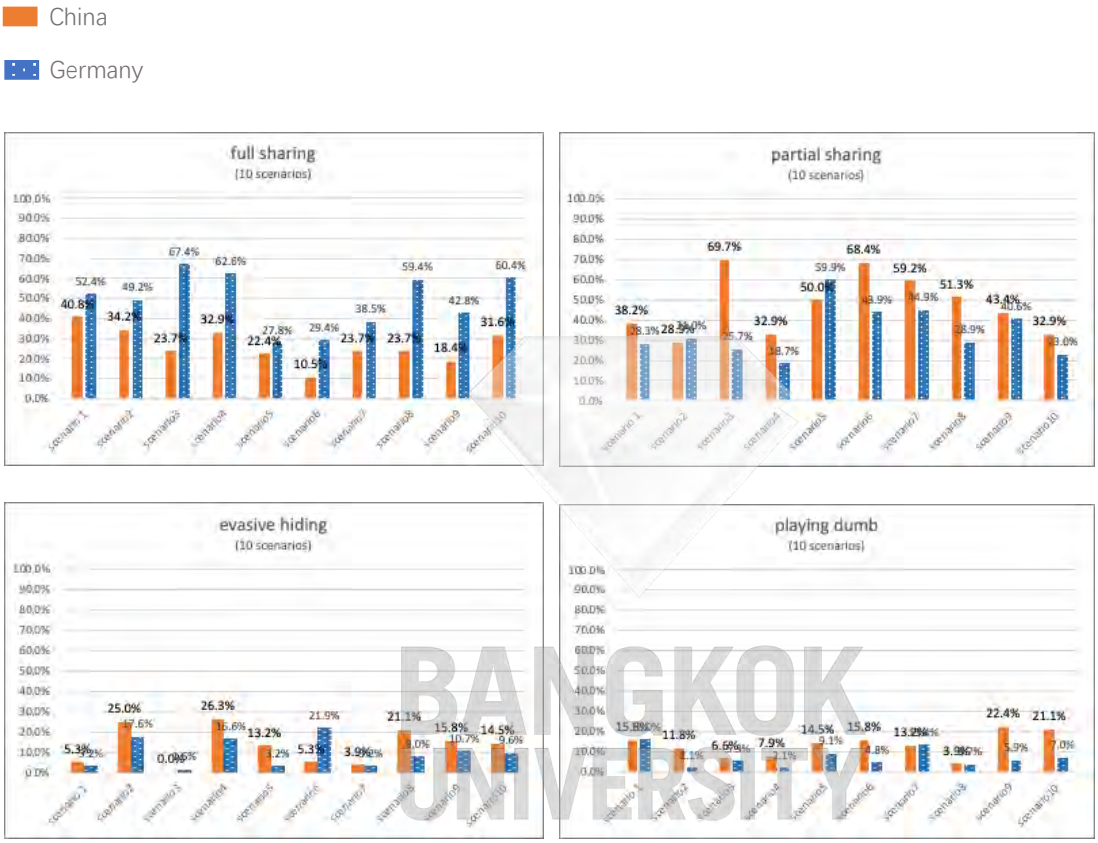


Figure 5.3

Comparing Chinese and German Knowledge Holders' Responses by Four Behaviors



5.2.1 Reciprocity History and Knowledge Holders' Responses

Scrutinizing the influence of reciprocity history between the knowledge holder and the knowledge seeker on knowledge holders' responses allowed us to conclude some features specific to the two samples secured from different countries.

Table 5.1 presents the research findings concerning the relationships between reciprocity history and knowledge holders' responses at two levels, i.e., the sharing and hiding level and the four behavior level. First, as we can see, the inconsistency of similarity across the sharing and hiding level and the four-behavior level remains

consistent for both Chinese and German knowledge holders, informing us, again, that a simplified sharing and hiding view is insufficient for our understanding of knowledge holders' responses to requests for knowledge and will lead to inaccurate conclusions. Second, although variations existed in their sharing and hiding responses in general, Chinese and German knowledge holders demonstrated uniformity in their four responsive acts to knowledge seekers with whom they shared various reciprocity histories, that is, they responded in a similar way in almost all pairwise comparisons of reciprocity history except for the first one, i.e., comparison between positive reciprocity and negative reciprocity. This result informs that neither Chinese nor German knowledge holders took into consideration the history between them and the knowledge seeker in most cases when they needed to decide how to respond to the seeker's knowledge request or how much they were to share with the knowledge seeker.

Table 5.1

Test Results for H1 of China and Germany

Reciprocity history	China		Germany	
	Sharing and hiding	Four behaviors	Sharing and hiding	Four behaviors
positive vs negative	similar	cannot conclude	cannot conclude	cannot conclude
positive vs positive & negative	cannot conclude	similar	similar	similar
negative vs positive & negative	cannot conclude	similar	similar	similar
positive vs no	similar	similar	cannot conclude	similar
negative vs no	cannot conclude	similar	similar	similar
positive & negative vs no	similar	similar	similar	similar

The result also confirmed that a positive knowledge exchange was not as beneficial while a negative knowledge exchange event was not as detrimental as what is usually expected. They produced no more good/harm than the case of no past reciprocity did.

Our findings are consistent with GLOBE ratings. See Figure 5.4 and Figure 5.5 for GLOBE ratings for China and Germany. As the figures show, both China and Germany score “relatively high” on “In-group Collectivism” values in GLOBE ratings. In-group Collectivism is the term used in the GLOBE project to refer to the degree to which individuals express (and should express) pride, loyalty, and cohesiveness in their organizations or families. Even though Germany scores lower than China on In-group Collectivism practice, its score is close to the medium level. Since harmony is highly valued and conflicts are undesirable and generally avoided in a collectivist culture, it is no wonder that people in those cultures featuring collectivist values tend to behave in a positive manner (e.g., to share their knowledge) to conform to the cultural norms.

Figure 5.4

Cultural Practices and Values in China from GLOBE Website (November 2nd, 2023) https://globeproject.com/results/countries/CHN?menu=list#country

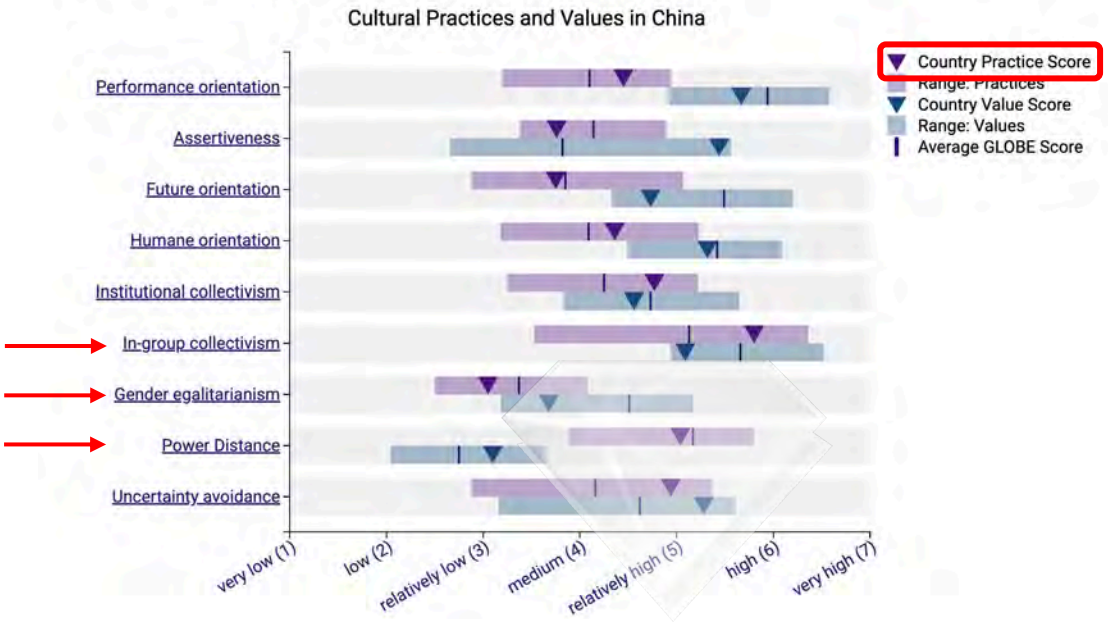
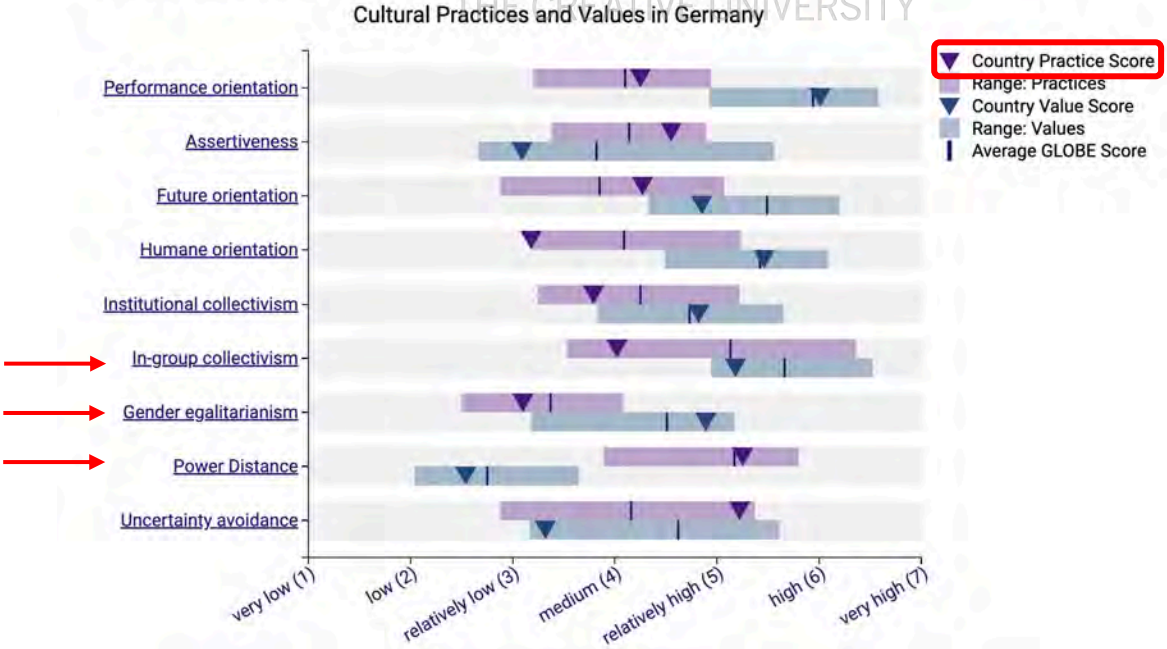


Figure 5.5

Cultural Practices and Values in Germany from GLOBE Website (November 2nd, 2023) https://globeproject.com/results/countries/DEU?menu=list#country



5.2.2 Situational Factors and Knowledge Holders' Responses

5.2.2.1 Knowledge Seeker's Rank and Knowledge Holders' Responses. The comparison between the two groups of knowledge holders' responses to knowledge seekers of different ranks revealed a prominent difference. It is found that Chinese knowledge holders responded in a similar way to requests from knowledge seekers of different ranks in the extreme situation whereas a past negative knowledge exchange happened between them and the knowledge seeker (extreme situation #1), but not in the extreme situations where the knowledge seeker requested high-level scarcity knowledge (extreme situation #2). However, the German knowledge holders' responses to different ranks were similar in both situations.

On the one hand, the finding further confirms the insignificance of negative reciprocity (devised in extreme situation #1) between the knowledge holder and the knowledge seeker. On the other hand, it suggests that German knowledge holders are less considerate of the rank of the knowledge seeker when responding to their requests for knowledge, while Chinese knowledge holders' concern for rank is situational. This finding is also consistent with GLOBE ratings, where China scores lower on "Power Distance" practice (the extent to which the community accepts status, authority, power differences, and status privileges/power domination) than Germany despite both countries scoring "relatively high" on the values of this dimension (see Figure 5.4 and Figure 5.5 for the scores).

5.2.2.2 Knowledge Seeker's Gender and Knowledge Holders' Responses. Comparing samples from China and Germany, we can see some patterns of knowledge holders' responses to different genders. First, as shown in Table 5.2, even

though German knowledge holders did not share/hide from their female and male colleagues in a similar way, the extent to which they shared and the strategies they adopted to hide demonstrated resemblance as in the case of Chinese knowledge holders. The second similarity in their behavior manifested in female knowledge holders' full sharing and playing dumb behaviors, but not in their partial sharing and evasive hiding behaviors. This relative uniformity partially evidenced that knowledge seekers' gender did not determine either Chinese or German knowledge holders' responses, particularly their full sharing and playing dumb behaviors. In other words, they responded equivalently to both genders when they helped dedicatedly and when they pretended ignorance, indicating somewhat extremeness of their responsive behaviors.

The finding that female and male knowledge holders in the two countries indistinguishably played dumb to knowledge seekers regardless of their gender shows consistency with GLOBE ratings, again, in that working in a male-dominated environment (a country scoring low on "Gender Egalitarianism" in this case) decreases women's tendency to conform to their stereotypical gendered role, thus reducing the difference in knowledge hiding behaviors between genders (Andreeva & Zappa, 2023). According to GLOBE ratings, both China and Germany score "relatively low" on Gender Egalitarianism practice despite their different scores on Gender Egalitarianism values, as shown in Figure 5.4 and Figure 5.5. In the same sense, this finding also echoes the ranking of "Masculinity Index (MAS) Value*s*" in Hofstede (2005)'s cultural dimension paradigm (see Table 3.4), where China and Germany ranked the same on the top of the 76 countries list.

The responses of female and male knowledge holders also demonstrated differences across cultures. The difference presented itself when we looked into male knowledge holders' responses. While Chinese male knowledge holders used only the playing dumb strategy unbiasedly to both female and male knowledge seekers, German male knowledge holders demonstrated behavioral similarities towards female and male knowledge seekers in all their four responsive acts, suggesting that they gave less consideration to genders than their Chinese counterparts when responding to knowledge seekers' requests. This broader range of "indiscrimination" potentially represents Germany's "relatively high" score on Gender Egalitarianism values in GLOBE ratings as an outlier that is influenced by a sub culture (e.g., industrial or institutional).

5.2.2.3 Communication Channel Richness and Knowledge Holders' Responses. When it comes to the effect of communication channel richness on knowledge holders' responses to requests, significant effects were found at the first level on sharing and hiding in general and also at the second level on Chinese knowledge holders' full sharing and evasive hiding behaviors while on four behaviors of German knowledge holders. Although no significant effect was found in pairwise comparisons between the three media of their effects on Chinese knowledge holders' full sharing behavior, probably due to a relatively smaller sample size, the mean scores suggest that Chinese knowledge holders fully shared what they knew more often when requested by instant messaging than by email and video conferencing (see Table 4.18 for test results). Therefore, the usefulness of instant messaging used by knowledge seekers to get what they want has been validated for both Chinese and

German samples. It turned out that both Chinese and German knowledge holders shared more/hid less when requested by instant messaging than by email and video conferencing. The usefulness of instant messaging also held for knowledge holders' full sharing and evasive hiding behaviors, meaning that it worked more efficiently for both Chinese and German knowledge seekers to get fully what they wanted and less possibly get misled by their colleagues as compared to the other two media.

The results also evidenced that media use affected partial sharing and playing dumb behaviors of German knowledge holders, but not of Chinese knowledge holders. Using email to request knowledge was more likely to get German knowledge holders' partial sharing of it, while the request made by instant messaging was more likely to get ignored. The latter reveals the double-edged effect of instant messaging in the German working environment.

From the author's knowledge, German participants use the messenger app Microsoft Team 365® with the computer for daily communication during work, while WeChat® is a highly used app for Chinese participants to communicate work online. Knowledge holders' familiarity with those apps for communication and the instant and interactive nature of those apps might jointly facilitate the knowledge exchanges between these knowledge workers and promote the occurrence of sharing and even full sharing behavior, as Lisiecka et al. (2016) suggested. However, ranking as the most popular app in China (see Figure 5.6 for the screenshot from the Statista website), WeChat®, with its great compatibility with smartphones, is also an app for daily use for its multiple functions like mobile payment, taxi-hailing, and even holiday planning. It will be hardly convincing to tell others that their message on WeChat® is missed.

On the other hand, the use of email is far rarer for Chinese as compared to their daily use of social apps as communication media in work settings. The rare use of email could serve as their excuse for not making what they know available to others. Whereas German knowledge holders partially shared more often upon requests made by email than those made by video conferencing and instant messaging. Taking into consideration the relatively high frequency of emailing in the work setting and less synchronicity and lower density of information cues it involves, it makes sense for the German knowledge holders to engage in this sharing behavior when they were requested for knowledge.

Table 5.2 presents a digest of the findings concerning situational factors in comparison.

Figure 5.6

Screenshot of "Monthly Active Users of the Leading Apps in China in July 2023 (in millions)" from Statista Website https://www.statista.com/statistics/1032630/china-leading-apps-by-monthly-active-users/

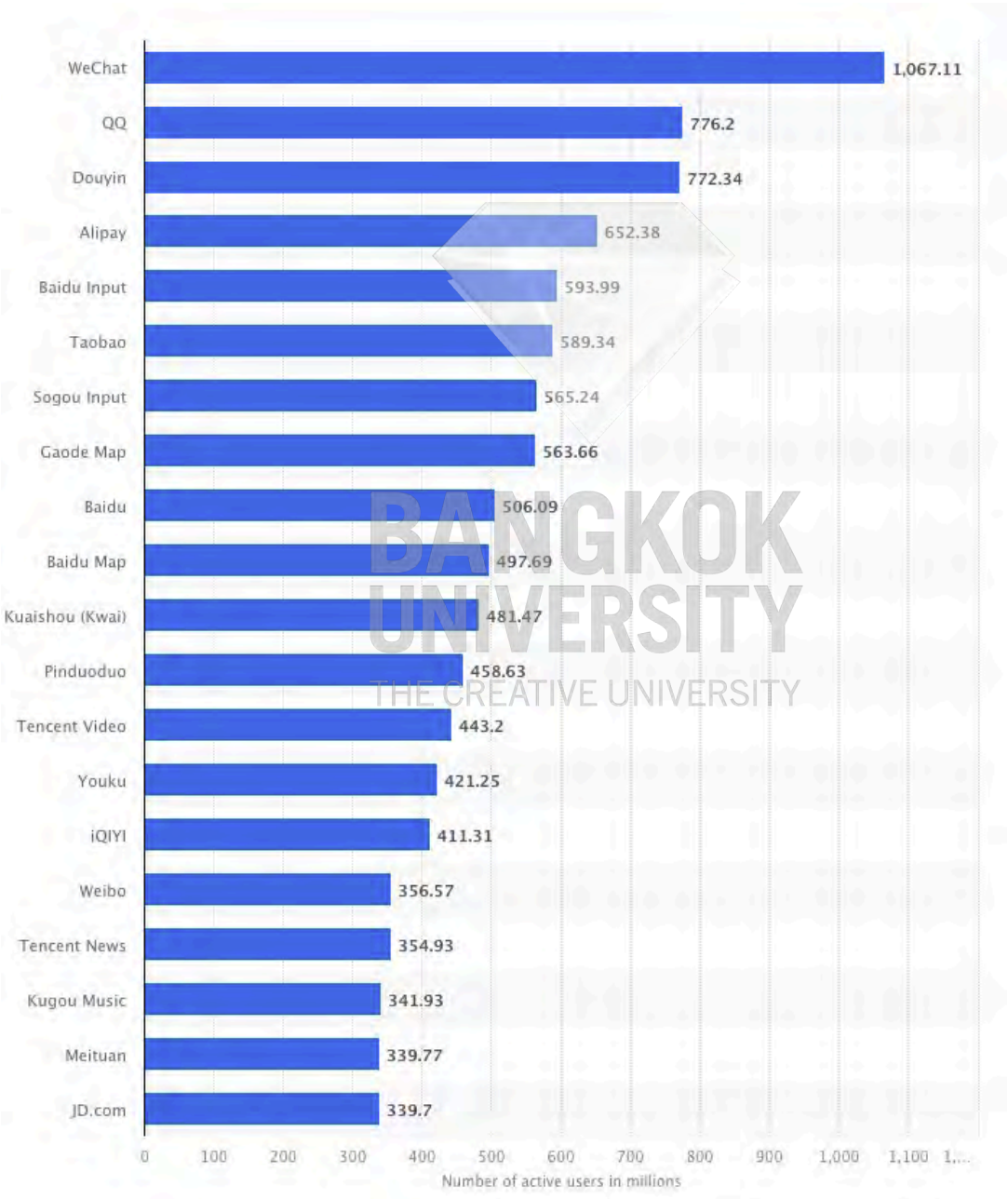


Table 5.2

Test Results for H2, H3, and H4 of China and Germany

Situational Factors		China		Germany	
		Sharing and hiding	Four behaviors	Sharing and hiding	Four behaviors
Rank of knowledge seeker	extreme situation #1	similar	similar	similar	similar
	extreme situation #2	cannot conclude	cannot conclude	similar	similar
Gender of knowledge seeker	FEMALE: female knowledge seeker vs male knowledge seeker	similar	Similarity found in full sharing and playing dumb behaviors	cannot conclude	Similarity found in full sharing and playing dumb behaviors
	MALE: female knowledge seeker vs male knowledge seeker	similar	Similarity found in playing dumb behavior	similar	Similarity found in full sharing, partial sharing, evasive hiding, and playing dumb behaviors
Communication media richness	email vs video conferencing	shared more/hid less by instant messaging than by email and video conferencing	● significant effect found on full sharing behavior, but not in pairwise comparisons between media ● knowledge holders evasively hid more frequently by email and video conferencing than by instant messaging	shared more/hided less by instant messaging than by video conferencing	Knowledge holder ● fully shared the most by instant messaging while least fully shared by email ● partially shared more by email than by video conferencing and by instant messaging ● evasively hid most often by video conferencing while least by instant messaging ● played dumb more often by instant messaging and by email than by video conferencing
	video conferencing vs instant messaging				
	instant messaging vs email				

5.2.3 Factors Concerning Knowledge Nature and Knowledge Holders' Responses

Investigation into the three factors that concern the nature of the requested knowledge uncovers more likeness in knowledge holders' responsive behavior to knowledge requests across cultures (as shown in Table 5.3). It is found that neither the amount of investment made in acquiring the requested knowledge nor the scarcity level of it influenced Chinese and German knowledge holders' responsive acts.

However, knowledge type was found to have significantly influenced Chinese knowledge holders' full sharing, partial sharing, and evasive hiding behaviors and German knowledge holders' four behaviors, despite no significant effect found at the sharing and hiding level. In consistence with our expectations, Chinese knowledge holders fully shared documents more often than experience; however, they partially shared experience more often than documents and relationships ("guanxi" in China, also referred to as networks). As the mean scores suggest, they probably evasively hid relationships more often than experience and documents (as presented in Table 4.18).

Surprisingly, German knowledge holders were more likely to fully share relationships than experience and documents, the requests for which, differently, were more often partly satisfied. On the other hand, German knowledge holders faked a helping willingness more often when they were requested for experience than documents, while they pretended ignorant more frequently when requested for documents than for experience and relationships. Compared with documents, experience is more representative of one's professional competence. Therefore, acting ignorant upon requests for experience would probably put the knowledge holder in an incompetent light.

These findings also make us wonder if the “shareability” of knowledge is one of the factors predicting the knowledge holders’ responses. The shareability of documents and relationships is comparatively higher than that of experience, which explains why requests for documents (in the case of the Chinese sample) and relationships (in the case of the German sample) are more frequently taken care of with full sharing responses. The “shareability” of knowledge also helps explain the relatively higher frequencies of partial sharing experience in both cases. Because sharing experience requires more time for exchange between the two involved parties.

Chinese and German knowledge holders’ shared reluctance to completely make their earned experience available to others in our study also mirrored the predicting effect of knowledge complexity on knowledge hiding that has been empirically evidenced and corroborated by previous studies (Sulistiawan et al., 2022; Yuan et al., 2020). The finding that German knowledge holders evasively hid experience more often than documents and relationships confirms, in some way, that evasive hiding tactic was preferable when individuals encountered requests for complex knowledge (Kumar Jha & Varkkey, 2018).

Table 5.3

Test Results for H5, H6, and H7 of China and Germany

Factors concerning knowledge nature		**China**		**Germany**	
		Sharing and hiding	Four behaviors	Sharing and hiding	Four behaviors
Knowledge ownership		similar	similar	similar	similar
Knowledge type	experience vs documents	cannot conclude	Knowledge holder ● fully shared documents more often than experiences ● partially shared experience more often than documents and relationships ● the effect of knowledge type on Chinese knowledge holders' evasive hiding behavior was significant, but not found in pairwise comparisons between knowledge types	cannot conclude	Knowledge holder ● fully shared relationships more often than experience and documents ● partially shared experience and documents more often than relationships ● evasively hid experience more often than documents and relationships ● played dumb more often when requested for documents than for experience and relationships
	documents vs relationships				
	experience vs relationships				
Knowledge scarcity		similar	similar	similar	similar

5.3 Comparing Chinese and German Knowledge Holders' Responses

Statistical analyses, i.e., independent samples t test confirmed the differences between Chinese and German knowledge holders' responses to requests from different genders, made by different media, and for different types of knowledge.

The variations in their responses to different genders surfaced in the way that Chinese female knowledge holders evasively hid more often than German female knowledge holders, while Chinese male knowledge holders fully shared less often and played dumb more often than German male knowledge holders. This finding indicates German female knowledge holders' more direct manner when they need to withhold their knowledge and German male knowledge holders' more unreserved sharing behavior and more implicit hiding behavior.

Responding to knowledge requests made by different media, German knowledge holders more frequently engaged in full sharing behavior no matter what media was used to request knowledge from them, showing a more open and generous behavioral feature when requested by different media. Chinese knowledge holders partially shared more often than German knowledge holders when receiving knowledge requests by video conferencing and instant messaging, confirming the limited usefulness of these two media for Chinese knowledge seekers. German knowledge holders used playing dumb strategy less often when requested by video conferencing and email than Chinese knowledge holders, and they also used evasive hiding less often. The existence of these differences in knowledge holders' responses to knowledge requests made by different media reveals that the usefulness of media is context-dependent and supports the argument that the general media richness concept

is not sufficient to help decide the most efficient media for a specific situation or task (Dennis & Valacich, 1999).

Chinese and German knowledge holders' different responses to requests for different types of knowledge, particularly the significant differences in all four responsive acts to requests for relationships, inform us of their different values of these types of knowledge and highlight the significance of relationships, i.e., "guanxi"[1] or networks, for Chinese knowledge holders. While they significantly less frequently fully shared their established relationships with colleagues than their German counterparts, they demonstrated more protection by engaging in more partial sharing, evasive hiding, and playing dumb behaviors than their counterparts.

[1] An indigenous Chinese construct, defined as "an informal, particularistic personal connection between two individuals who are bounded by an implicit psychological contract to follow the social norm of guanxi such as maintaining a long-term relationship, mutual commitment, loyalty, and obligation" (Chen & Chen, 2004).

CHAPTER 6

CONCLUSION

6.1 Review of Study

To answer the research question we proposed based on the knowledge gap surfaced by a systematic literature review, that is, *How do reciprocity history, rank, and gender influence the responses of the knowledge workers in Automotive companies in China and Germany to knowledge requests made via various communication media by colleagues?* we collected data from two automotive companies operating in China and Germany with a serious game we designed dedicated to this study, which complies with the intended quasi-experimental design.

Statistically testing hypotheses that addressed interpersonal factors, situational factors, and factors concerning the nature of knowledge generated fruitful findings. Firstly, the test results from the combined, the Chinese, and the German samples appeared to be identical, particularly at the general knowledge sharing and knowledge hiding level, where we failed to validate most of our hypotheses except for the ones regarding media richness and knowledge type, which were partially validated. Further investigation at the sub-level of four acts confirmed the first level finding and provided evidence for us to partially validate the influence of the knowledge seeker's gender on knowledge holders' responses in all three samples. The consistency across samples proved the robustness of our research framework.

Secondly, looking closer into the apparently similar results, we found that the validated differences in knowledge holders' responses to requests for different types

of knowledge, made by different media, and from different genders manifested differently within our two focal samples. i.e., the Chinese and the German. While male German knowledge holders demonstrated more similarities in their four responsive acts to male and female knowledge seekers, German knowledge holders generally varied all their four responsive behaviors to requests made by different media and for different types of knowledge. In comparison, fewer variations were observed in Chinese knowledge holders' responses.

Thirdly, statistical tests further confirmed the existence of significant differences in knowledge holders' responses across samples and revealed that full sharing behavior was more pronounced to German knowledge holders and that knowledge requests forwarded by different media were responded to with varying behaviors Chinese and German knowledge holders engaged in. Chinese knowledge holders, however, were more likely to avoid fully sharing what they knew when requested for different types of knowledge; they exhibited more consideration and protection of their relationships ("guanxi" or network).

6.2 Originality of Study

This explorative study manifested several originalities regarding research focus and methodology. First, we drew on three widely recognized theories in the knowledge hiding literature and empirically tested variables developed based on these theories. Whereas previous studies generally adopted those theories separately or combinedly as the theoretical lens(es) to study knowledge hiding.

Second, even though we started off with the purpose of deciphering knowledge hiding behavior in organizations, we involved knowledge sharing as another essential

component in our research framework. Developing a framework that comprises knowledge sharing and knowledge hiding and getting it empirically tested enabled us to enjoy a more extensive scope than previous knowledge hiding studies and thus to obtain more profound insight into knowledge workers' responsive behaviors when they were confronted with colleagues' requests for their knowledge. This contribution we made is highly relevant and meaningful given the recently generated comprehensive empirical evidence supporting the conceptual claim that knowledge hiding is not correlated with knowledge sharing (Skerlavaj et al., 2023) and the increasing awareness of the inadequacy of investigating knowledge hiding in isolation without having an eye on knowledge sharing (Ali et al., 2021; Issac et al., 2022).

Third, we innovated the research methodology by employing a quasi-experimental method in the form of a serious game. (Quasi-)experimental method is rarely utilized not only in knowledge hiding studies but also in the business and management research field at large, while it is hugely needed for it strengthens causal inference and enjoys high external validity (Podsakoff & Podsakoff, 2019). Taking advantage of simulation and engaging research subjects in a dedicated research context relieved our concern about underreporting from the research subjects, which usually troubles researchers who collect data with a self-report scale when investigating undesirable social behavior. With the use of a serious game, we were able to report a higher rate of knowledge hiding behavior (19.3% from the combined sample, 26.3% from the Chinese sample, and 16.5% from the German sample) than previous knowledge hiding studies, for example, the seminal one by Connelly et al. (2012) that reported 10% hiding incidents of the knowledge transfer events. This demonstrates the usefulness of the serious game approach to get closer to the reality.

Fourth, this research has been undertaken on the premise that knowledge workers' responses (i.e., knowledge sharing and knowledge hiding) to requests for knowledge made by coworkers vary across national cultures. Therefore, data were collected from two countries. The patterns of knowledge holders' responses across cultures and the specifics exclusive to one particular culture identified from this empirical study enriched the reservoir of knowledge management and culture knowledge.

Fifth, working professionals from two business organizations constituted our research sample. Having real organizational employees as research subjects addressed the concerns about recruiting students or individuals from different organizations, such as the generalization of the findings.

Addressing in the current study those factors, including social exchange and norm of reciprocity, country context, separate dimensions of knowledge hiding, experimental design, and different categories of knowledge, our study is on the exact track forward the advocated future direction of the research field identified by a latest meta-analysis (Skerlavaj et al., 2023).

6.3 Contributions

Our study reveals several similarities and variations in knowledge holders' responses under different situations and across countries, many of which are different from what we expected though. On the one hand, the similarities and variations manifested in knowledge holders' responses to requests from knowledge seekers, who shared with them various reciprocity histories or were of different ranks or genders, made by different communication media for different types of knowledge of which

the acquisition involves different levels of investment or knowledge available to few or many in the work environment. On the other hand, similarities and variations were found in different environments marked by country boundaries. Those similarities and variations provide us with meaningful implications.

6.3.1 Theoretical Implications

Compared with extensive knowledge hiding studies that considered and examined knowledge hiding as a holistic construct (the psychology behind knowledge hiding in an organization), the current study further the investigation by zooming into the roles of separate dimensions of knowledge hiding, i.e., evasive hiding and playing dumb, and placing them in a framework that also incorporated knowledge sharing. Generating a theoretical framework that integrates these two distinct while related constructs is fundamental considering that increasing evidence have confirmed the relevancy between them and varying mechanisms behind them. Such framework helps achieve a comprehensive and insightful understanding of the mixed and even converse motivations that result into various individual responses to a knowledge requests. Our study demonstrated that separate knowledge hiding strategies were indeed influenced by different factors. Moreover, in addition to answering the call for examining the separate approaches to hiding, rather than in an aggregated way, we complemented our study by measuring the hiding frequency suggested by Andreeva and Zappa (2023).

The model we proposed, which incorporates knowledge sharing and knowledge hiding, was tested at three levels with two samples, i.e., the Chinese and the German. The similarities identified across the two samples validated the robustness and

generalizability of our model. The differences between the Chinese and the German samples hinted at their respective features for future studies to explore.

We encompassed social exchange theory and conservation of resources theory in our study, which ranks top on the most widely used theory list (Skerlavaj et al., 2023), and psychological ownership theory. To the best of the authors' knowledge, (Oubrich et al., 2021)'s research is the only one combining the same three theories to examine knowledge hiding behavior. Compared with studies that starts off from one theoretical perspective, we extended the knowledge hiding research scope and generated meaningful findings.

The study makes another contribution by applying Communication Media Richness theory to the research on knowledge hiding, responding to previous call for examining this contextual factor (Connelly et al., 2012). Our findings suggest that the Media richness theory needs to develop with the technology and time progress and also with different preference developed in different work settings.

The employment of an innovative way of data collection, i.e., a serious game, and a quasi-experimental design to investigate knowledge hiding behavior enhanced the significance of the study. Representing a pioneer in this path, this study demonstrated the practicability and usefulness of simulation in knowledge management and management research at large, broadening the research scope in terms of research design. By involving participants into a simulated environment, we endeavored to counter the underreporting concern in the use of a self-report questionnaire.

Our findings that knowledge seekers' rank, gender and their reciprocity history with the knowledge holder was not prominent factors influencing the latter's

responses proved that the theories of cultural dimensions did work, at least to some extent, in deciphering knowledge sharing and knowledge hiding behaviors. Taking a cultural perspective in examining knowledge hiding behavior represents another contribution we made to knowledge hiding study, given that most previous literature were developed within one single cultural context.

6.3.2 Practical Implications

Instead of general research that examined knowledge hiding as a personal attitude, the current study investigated knowledge hiding as individuals' behavior, and crafted scenarios that created realism and stimulated immediate and hopefully honest responses from individuals. In this study, we focus on individuals' behavioral responses instead of their intentions and desires. Since one's intention does not guarantee their action, our study on behaviors can serve as a solid reference for organizational management.

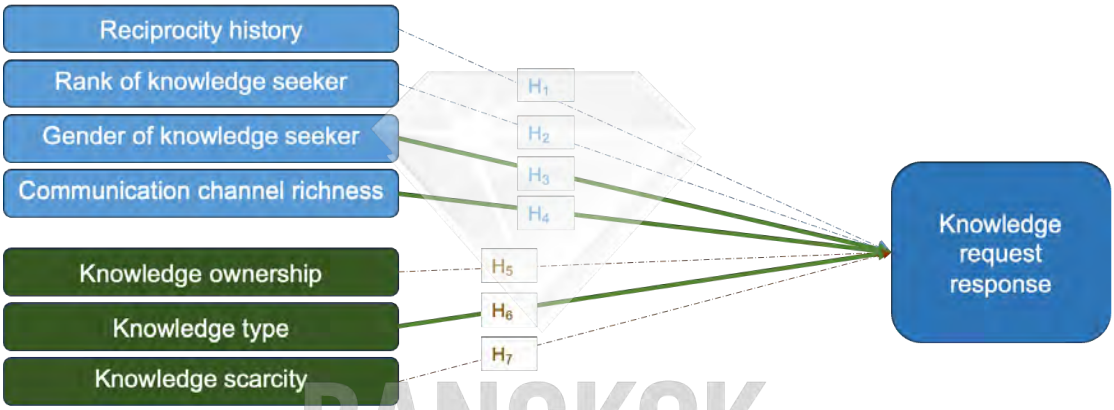
Our findings suggest a more complex mechanism behind organizational employees' sharing and hiding behaviors, given the variations found across the sharing and hiding level and the four behavior level. Therefore, a simple categorization of knowledge sharing and knowledge hiding will not serve sufficiently to decipher individuals' responses to colleagues' knowledge requests in organizational settings. Specifically, our study validated, although partially, several relationships between influencing factors and knowledge holders' responses to requests, as shown in Figure 6.1.

Gender differences in knowledge holders' responses to requests made by different genders found in our study underscore for the management the importance of

figuring out how to help knowledge holders get rid of gender role expectations, when making a decision on sharing or hiding, or when requesting knowledge, if they hope for the spread of the sharing culture in the organization.

Figure 6.1

Validated Relationships in Research Framework



The usefulness of instant messaging was validated in both cultures, guaranteeing the promotion of using it in organizations. However, the double-edged nature of instant messaging in German work settings is worth management's attention. Using instant messaging to request knowledge will be most often responded to by not only German knowledge holders' full sharing but also their playing dumb behavior, as compared to the other two media. How to reduce the frequency of the latter hiding acts deserves adequate consideration.

We found that most of the knowledge holders also shared knowledge of substantial investment when requested by colleagues, suggesting they were possibly driven by the demand for feedback, recognition, or appreciation from others. Companies devising a feasible feedback-providing system or highlighting the

contribution made by individuals who shared what they knew would help amplify their sharing behavior.

It was found that requests for relationships and documents were more often responded to by knowledge holders' full sharing, while requests for experience more frequently induced their partial sharing behavior, indicating that the shareability of knowledge requires management's efforts. Issuing clear guidelines and a standardized format on how to better document what they know, particularly their experience acquired through work, will help individual employees increase the shareability of their earned knowledge and increase the probability of their sharing of it. Furthermore, it is necessary for the management in Chinese organizations to devote more consideration to "relationships", given the Chinese knowledge holders' less willingness to fully share their maintained relationships.

Knowledge holders' undifferentiating responsive behaviors towards knowledge of different levels of scarcity inform the potential existence of different rating criteria in knowledge value among individual knowledge holders. Only by understanding those various cognition among them can management be able to have the employees' active reactions and support.

This research being of explorative nature and dealing with two specific companies only, these practical recommendations can be made for these two companies only and cannot be generalized. Further studies might be required to see if these patterns are repeated across companies.

In spite of the substantial findings from it, our study is not an exception that suffers from no limitations. We consider the major limitations of our study arose from

the following several aspects. To properly address those limitations, there are some avenues for future studies in this flow to further.

6.4 Limitations and Future Avenues

Our study encompassed three widely recognized theories in the knowledge hiding studies and empirically tested variables based on these theories. However, the interactional effect of the focal factors from the theories did not get tested due to the scenario design of the study. The possibility by which psychological ownership theory and social exchange theory relate together to predict knowledge hiding addressed by (Abubakar et al., 2019) should be properly taken care of by future studies.

Even though we purposefully selected two different countries as our sample source to collect data, our study did not measure organizational or national cultures, and our sample size is relatively small. Therefore, we need to carefully attribute the resemblance in knowledge holders' behaviors to country boundaries without having an eye on their perception of the national culture and its influence on their behaviors. The absence of this aspect limits the explicability of our findings. Future studies can further the study by measuring and investigating the cultural aspect when studying knowledge hiding so as to generate precise findings relating knowledge hiding to culture.

The results may have been impacted by selection bias since our participants volunteered from one single company in each of the two countries, despite that collecting data from a single organization could reduce the unfavorable influence of inter-organizational differences (e.g., organizational culture, structure, and policy) on conclusions (Zhao & Xia, 2019). Involving participants from different companies in

the same industry and even from different industries will enable future studies to yield more generalizable findings.

Since our study is an explorative study in terms of research design, i.e., we developed a series of scenarios for data collection, the room for improvement of the scenario design needs to be properly addressed. Contexts crafted in the scenarios for our participants to experience need to be further refined and specified. First, the way a knowledge request is expressed (request politeness) affects knowledge hiding (Xia et al., 2021). Second, the duration and reason for reciprocity are not defined in our scenario but could be a factor deserving research attention in future research, considering reciprocity emerges when employees interact for a long time. Thirdly, the sequence of scenarios might potentially influence measuring participants' responses, which we did not attend to in the current study. In addition, if future studies followed the same way that developing scenarios to comprise more than one independent variable, it would be better to control one variable at a time for each scenario. Lastly, the balance between the entertaining purpose of the game and the pedagogical purpose deserves the attention of the researchers interested in using serious games for research purposes.

Notably, our study found significant differences in knowledge holders' responses to requests for different types of knowledge made by different media from different genders, either within one sample or across two samples from different cultures. However, no significant differences have been found regarding the influence of reciprocity, the rank of knowledge seeker, knowledge ownership, and knowledge scarcity. Limited scenarios concerning those variables could be why we failed to see any variations in knowledge holders' responses to those requests. Therefore,

amplifying the number of relevant scenarios while balancing the variable distribution remains a challenge for future studies.

It was found in our study that the types of the requested knowledge influenced knowledge holders' responses and that the shareability of it could be a potential aspect that knowledge holders took into consideration when responding to knowledge requests. This initial finding needs to be testified by future studies. This research focuses mainly on explicit knowledge, but exploring tacit knowledge sharing is also of great value.

Considering the scarce efforts devoted to the influence of knowledge seekers' gender and rank and these factors' impact on knowledge holders' four responsive acts, we suggest future studies to further the path of knowledge hiding. It will be interesting to collect more demographics of respondents to make comparisons, for example, between the responses of knowledge workers of different ages, of different ranks, etc. Individuals' personality traits will make another factor that is worth research efforts.

Hiding knowledge out of positive intentions has so far received little research attention. Delving into the possible impact of knowledge holders' positive intentions on their use of knowledge hiding strategies will help us to acquire a more comprehensive understanding of this commonly believed "unethical" and "detrimental" behavior.

Our study revealed that how to respond to a knowledge request is a complicated decision to make! It is not just a matter of sharing or hiding what one knows; it is more of responding with what extent of sharing or what strategy of hiding. The findings yielded from our study are "initial" and cannot be generalized at this early

stage, but we hope this will be one of the building stones of future cross-cultural research on knowledge hiding. With an increasing number of individuals, industries, and even countries involved in our future study, we are now proceeding to achieve it, we are confident fruitful research findings will be generated, and more significant theoretical and practical contributions will result.

6.5 Final Words

This research journey was very valuable for me and insightful in many ways.

Firstly, it allowed me to explore the relatively new and exciting field of knowledge hiding. It allowed me to carry on with my previous experience and passion for looking at cultural differences in the field of knowledge hiding. It allowed me to develop a serious game and to work with a Chinese and a German automotive company. I worked closely with them to make this game realistic and ensured that the rigor and the science behind collecting information from their employees were followed. So, this was a significant and insightful learning experience for me.

Furthermore, I had the opportunity to collaborate with a research team from University Grenoble Alps, a very dynamic team, and lots of knowledge sharing and knowledge exchange happened during these sessions. I'm thankful for this opportunity to work with Professor Anne, their research team, and the Ph.D. students.

I saw changes happen to me throughout the journey, and I feel like I'm a different person now than I was three and a half years ago. Being able to go on this research journey somehow makes me look at things in a different way, which I believe would be helpful for my future research. I know there are, for sure, lots of

opportunities for me, and I'm very much interested in conducting this research further and further exploring it in different ways. So, this is just the beginning of my personal research journey.

Not only was it a solid and meaningful experience for me, but the findings of this exploratory research are quite novel and insightful. Getting participants to admit that they would hide knowledge 20% of the time is quite an accomplishment. It was very satisfactory to be able to demonstrate that by using a serious game, people felt more like they were in a real and natural context and openly shared their actual behavior anonymously. We were able to confirm that, and this will also help to develop further serious games in that direction.

Finally, the findings of this research are very rich. There is a lot to be learned from this study, and dig deeper for a better understanding of what drive different behaviors in different situation. I sincerely hope that these findings will help practitioners or organizations better realize the value of further exploring what drives people to hide knowledge and to be able to propose some solutions to reduce these knowledge hiding behaviors, which remains one of the main challenges for knowledge management practices to be successful.

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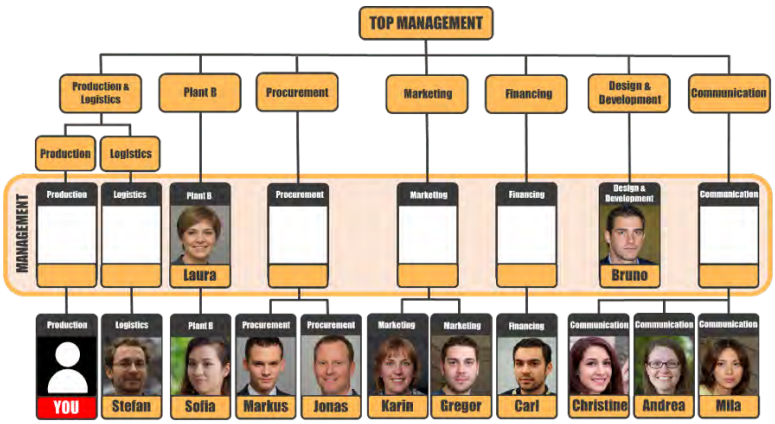
APPENDICES

Appendix 1: Video Recording Guidelines for SOS the Serious Game Role Players

The video you are to record will make an essential and indispensable part of SOS the serious game that aims to investigate knowledge exchange behavior in organizations across countries. We highly appreciate your generous help. Thank you!
The following are some recommendations to make your video recording process more efficient 😊

1. Watching the 1-minute sample video before you make one will give you a better understanding of what the finalized video (based on your work) will look like.
2. Try to memorize the lines and then have your eyes on the camera while articulating the lines from your memory when recording video(s). This will help create authentic eye contact with the video viewer.
3. Record two videos for the two parts of lines as shown in black (we will combine them later on with the lines in orange representing a reply from an interlocutor, as you can see in the sample video). Or feel free to record only one if line memorizing is not at all a problem for you, but please pause (2-3 seconds) between two parts (for our editing).
4. Also, please have a 2-3 second pause at both the beginning and the end of each recording for editing purposes.
5. We suggest you use your phone or Zoom recording (where you can set up the video background).
6. A formal office background in the video is highly recommended.
7. Recording in horizontal mode is preferred.
8. Please provide video(s) of no less than 1920*1080 resolution.

p.s. We can have a screenshot of your image that will be used as the video cover, but it would be much better if you could provide a pic where you appear with a more natural look. Since it will also be used in the organization chart (as presented below), it can be a bit more professional.
Please contact Karrie at karrieyoung@aliyun.com for any possible questions or clarifications.
Thanks again for your kind help!



Appendix 2: SPSS Test for the Full Sample

```
FREQUENCIES VARIABLES=scenario1
  /PIECHART FREQ
  /ORDER=ANALYSIS.
```

Frequencies

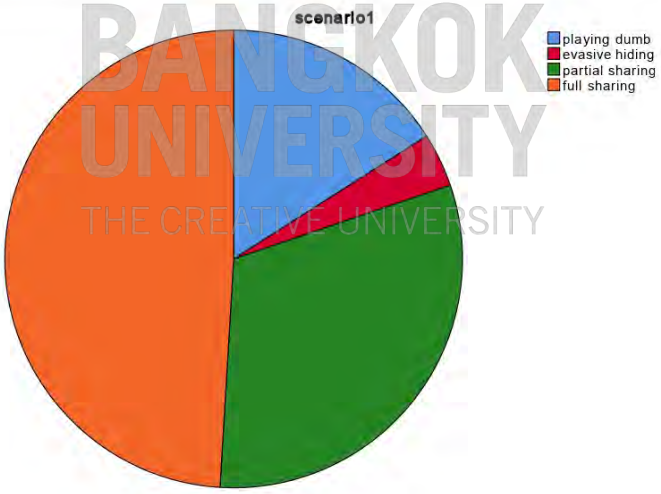
Statistics

scenario1

N	Valid	263
	Missing	0

scenario1

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	playing dumb	42	16.0	16.0	16.0
	evasive hiding	10	3.8	3.8	19.8
	partial sharing	82	31.2	31.2	51.0
	full sharing	129	49.0	49.0	100.0
	Total	263	100.0	100.0	




```
FREQUENCIES VARIABLES=scenario2
  /PIECHART FREQ
  /ORDER=ANALYSIS.
```

Frequencies

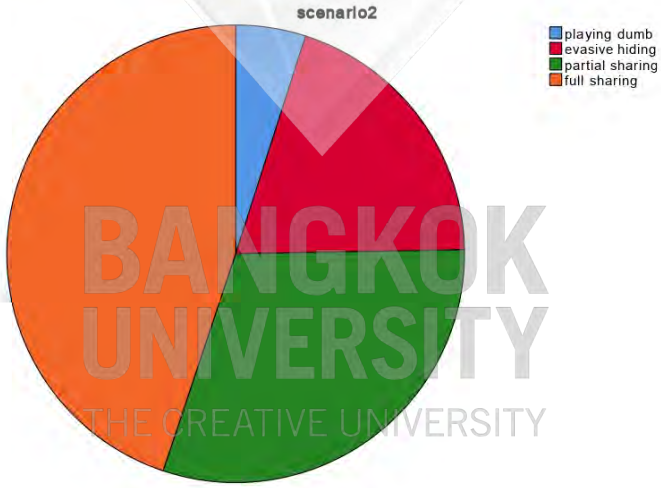
Statistics

scenario2

N	Valid	263
	Missing	0

scenario2

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	playing dumb	13	4.9	4.9	4.9
	evasive hiding	52	19.8	19.8	24.7
	partial sharing	80	30.4	30.4	55.1
	full sharing	118	44.9	44.9	100.0
	Total	263	100.0	100.0	




```
FREQUENCIES VARIABLES=scenario3
  /PIECHART FREQ
  /ORDER=ANALYSIS.
```

Frequencies

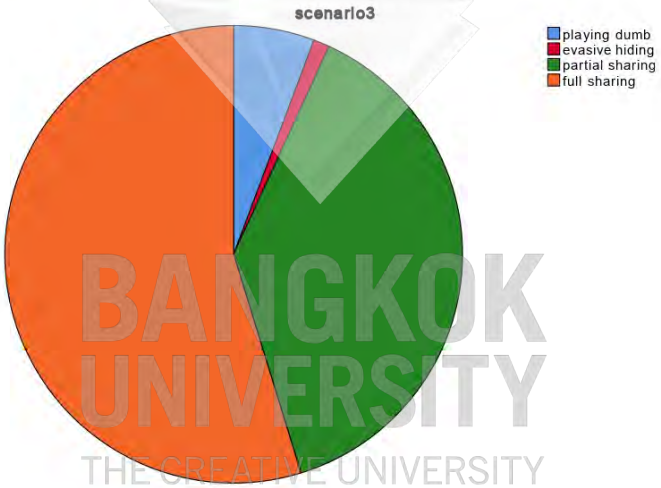
Statistics

scenario3

N	Valid	263
	Missing	0

scenario3

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	playing dumb	15	5.7	5.7	5.7
	evasive hiding	3	1.1	1.1	6.8
	partial sharing	101	38.4	38.4	45.2
	full sharing	144	54.8	54.8	100.0
	Total	263	100.0	100.0	




```
FREQUENCIES VARIABLES=scenario4
  /PIECHART FREQ
  /ORDER=ANALYSIS.
```

Frequencies

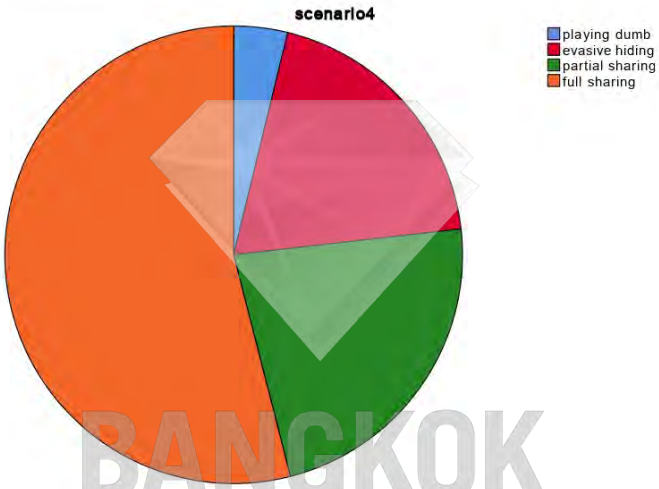
Statistics

scenario4

N	Valid	263
	Missing	0

scenario4

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	playing dumb	10	3.8	3.8	3.8
	evasive hiding	51	19.4	19.4	23.2
	partial sharing	60	22.8	22.8	46.0
	full sharing	142	54.0	54.0	100.0
	Total	263	100.0	100.0	




```
FREQUENCIES VARIABLES=scenario5
  /PIECHART FREQ
  /ORDER=ANALYSIS.
```

Frequencies

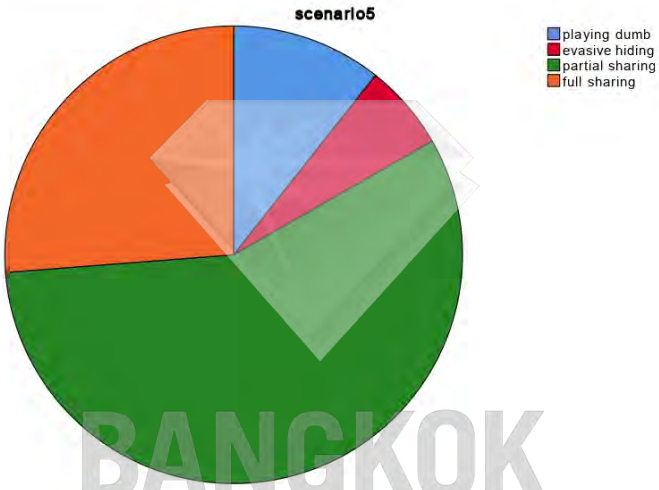
Statistics

scenario5

N	Valid	263
	Missing	0

scenario5

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	playing dumb	28	10.6	10.6	10.6
	evasive hiding	16	6.1	6.1	16.7
	partial sharing	150	57.0	57.0	73.8
	full sharing	69	26.2	26.2	100.0
	Total	263	100.0	100.0	




```
FREQUENCIES VARIABLES=scenario7
  /PIECHART FREQ
  /ORDER=ANALYSIS.
```

Frequencies

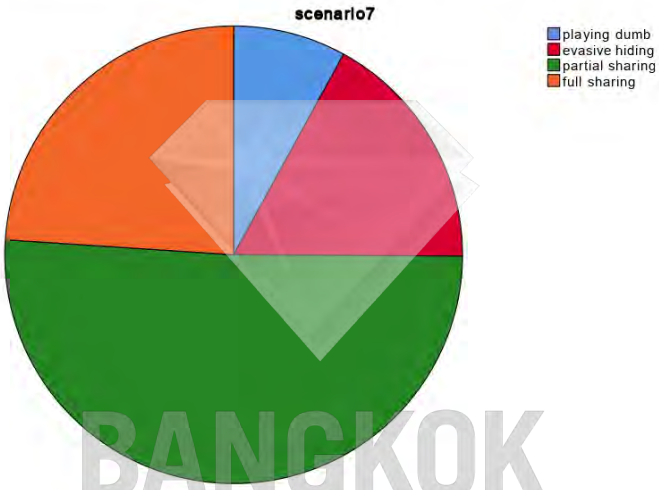
Statistics

scenario7

N	Valid	263
	Missing	0

scenario7

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	playing dumb	21	8.0	8.0	8.0
	evasive hiding	45	17.1	17.1	25.1
	partial sharing	134	51.0	51.0	76.0
	full sharing	63	24.0	24.0	100.0
	Total	263	100.0	100.0	




```
FREQUENCIES VARIABLES=scenario8
  /PIECHART FREQ
  /ORDER=ANALYSIS.
```

Frequencies

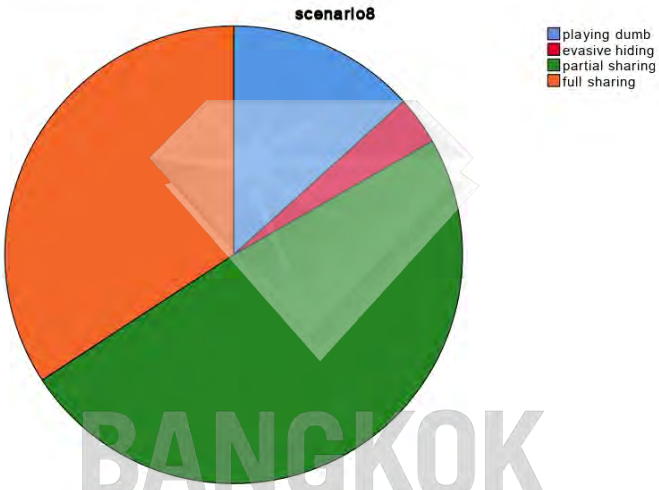
Statistics

scenario8

N	Valid	263
	Missing	0

scenario8

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	playing dumb	35	13.3	13.3	13.3
	evasive hiding	9	3.4	3.4	16.7
	partial sharing	129	49.0	49.0	65.8
	full sharing	90	34.2	34.2	100.0
	Total	263	100.0	100.0	




```
FREQUENCIES VARIABLES=scenario9
  /PIECHART FREQ
  /ORDER=ANALYSIS.
```

Frequencies

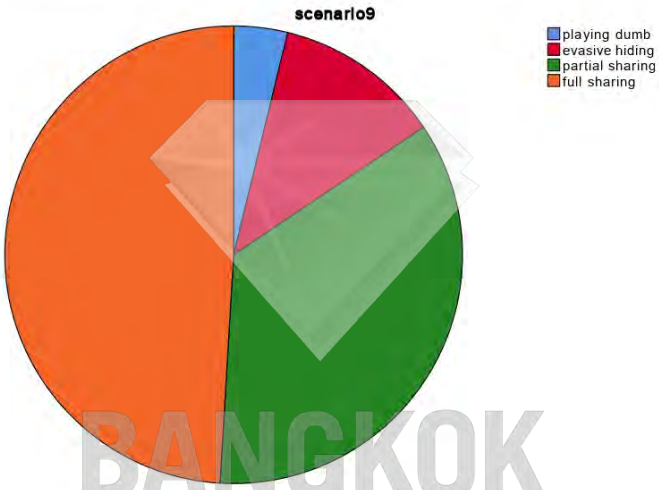
Statistics

scenario9

N	Valid	263
	Missing	0

scenario9

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	playing dumb	10	3.8	3.8	3.8
	evasive hiding	31	11.8	11.8	15.6
	partial sharing	93	35.4	35.4	51.0
	full sharing	129	49.0	49.0	100.0
	Total	263	100.0	100.0	




```
FREQUENCIES VARIABLES=scenario10
  /PIECHART FREQ
  /ORDER=ANALYSIS.
```

Frequencies

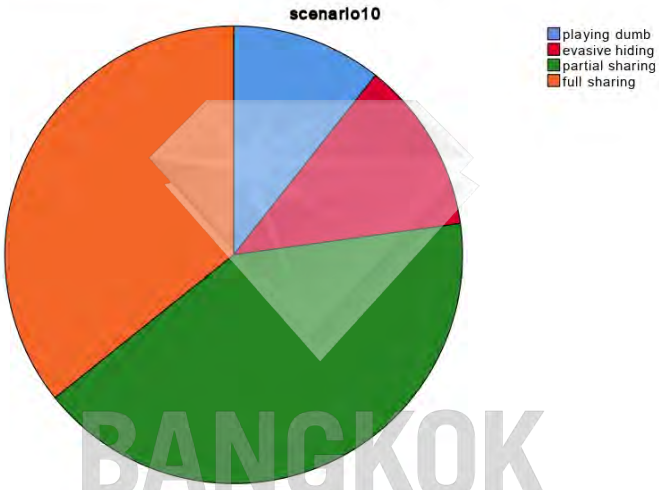
Statistics

scenario10

N	Valid	263
	Missing	0

scenario10

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	playing dumb	28	10.6	10.6	10.6
	evasive hiding	32	12.2	12.2	22.8
	partial sharing	109	41.4	41.4	64.3
	full sharing	94	35.7	35.7	100.0
	Total	263	100.0	100.0	




```
FREQUENCIES VARIABLES=scenario11
  /PIECHART FREQ
  /ORDER=ANALYSIS.
```

Frequencies

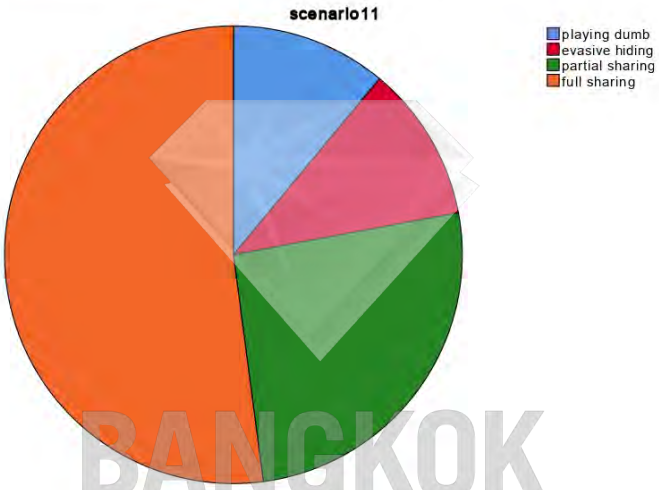
Statistics

scenario11

N	Valid	263
	Missing	0

scenario11

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	playing dumb	29	11.0	11.0	11.0
	evasive hiding	29	11.0	11.0	22.1
	partial sharing	68	25.9	25.9	47.9
	full sharing	137	52.1	52.1	100.0
	Total	263	100.0	100.0	




```
CROSSTABS
  /TABLES=scenario2_s_h BY scenario4_s_h
  /FORMAT=AVALUE TABLES
  /STATISTICS=CHISQ
  /CELLS=COUNT EXPECTED
  /COUNT ROUND CELL.
```

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
scenario2_s_h * scenario4_s_h	263	100.0%	0	0.0%	263	100.0%

scenario2_s_h * scenario4_s_h Crosstabulation

			scenario4_s_h		
			hiding	sharing	Total
scenario2_s_h	hiding	Count	20	45	65
		Expected Count	15.1	49.9	65.0
	sharing	Count	41	157	198
		Expected Count	45.9	152.1	198.0
Total		Count	61	202	263
		Expected Count	61.0	202.0	263.0

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2.781[a]	1	.095		
Continuity Correction[b]	2.245	1	.134		
Likelihood Ratio	2.665	1	.103		
Fisher's Exact Test				.127	.069
Linear-by-Linear Association	2.771	1	.096		
N of Valid Cases	263				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 15.08.

b. Computed only for a 2x2 table


```
CROSSTABS
  /TABLES=scenario2_s_h BY scenario1_s_h
  /FORMAT=AVALUE TABLES
  /STATISTICS=CHISQ
  /CELLS=COUNT EXPECTED
  /COUNT ROUND CELL.
```

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
scenario2_s_h * scenario1_s_h	263	100.0%	0	0.0%	263	100.0%

scenario2_s_h * scenario1_s_h Crosstabulation

			scenario1_s_h		
			hiding	sharing	Total
scenario2_s_h	hiding	Count	30	35	65
		Expected Count	12.9	52.1	65.0
	sharing	Count	22	176	198
		Expected Count	39.1	158.9	198.0
Total		Count	52	211	263
		Expected Count	52.0	211.0	263.0

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	37.883[a]	1	.000		
Continuity Correction[b]	35.706	1	.000		
Likelihood Ratio	33.678	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	37.739	1	.000		
N of Valid Cases	263				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 12.85.

b. Computed only for a 2x2 table


```
CROSSTABS
  /TABLES=scenario2_s_h BY scenario10_s_h
  /FORMAT=AVALUE TABLES
  /STATISTICS=CHISQ
  /CELLS=COUNT EXPECTED
  /COUNT ROUND CELL.
```

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
scenario2_s_h * scenario10_s_h	263	100.0%	0	0.0%	263	100.0%

scenario2_s_h * scenario10_s_h Crosstabulation

			scenario10_s_h		
			hiding	sharing	Total
scenario2_s_h	hiding	Count	27	38	65
		Expected Count	14.8	50.2	65.0
	sharing	Count	33	165	198
		Expected Count	45.2	152.8	198.0
Total		Count	60	203	263
		Expected Count	60.0	203.0	263.0

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	17.191[a]	1	.000		
Continuity Correction[b]	15.808	1	.000		
Likelihood Ratio	15.809	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	17.126	1	.000		
N of Valid Cases	263				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 14.83.

b. Computed only for a 2x2 table


```
CROSSTABS
  /TABLES=scenario4_s_h BY scenario1_s_h
  /FORMAT=AVALUE TABLES
  /STATISTICS=CHISQ
  /CELLS=COUNT EXPECTED
  /COUNT ROUND CELL.
```

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
scenario4_s_h * scenario1_s_h	263	100.0%	0	0.0%	263	100.0%

scenario4_s_h * scenario1_s_h Crosstabulation

			scenario1_s_h		
			hiding	sharing	Total
scenario4_s_h	hiding	Count	13	48	61
		Expected Count	12.1	48.9	61.0
	sharing	Count	39	163	202
		Expected Count	39.9	162.1	202.0
Total		Count	52	211	263
		Expected Count	52.0	211.0	263.0

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.119[a]	1	.730		
Continuity Correction[b]	.026	1	.872		
Likelihood Ratio	.117	1	.732		
Fisher's Exact Test				.717	.428
Linear-by-Linear Association	.118	1	.731		
N of Valid Cases	263				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 12.06.

b. Computed only for a 2x2 table


```
CROSSTABS
  /TABLES=scenario4_s_h BY scenario10_s_h
  /FORMAT=AVALUE TABLES
  /STATISTICS=CHISQ
  /CELLS=COUNT EXPECTED
  /COUNT ROUND CELL.
```

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
scenario4_s_h * scenario10_s_h	263	100.0%	0	0.0%	263	100.0%

scenario4_s_h * scenario10_s_h Crosstabulation

			scenario10_s_h		
			hiding	sharing	Total
scenario4_s_h	hiding	Count	24	37	61
		Expected Count	13.9	47.1	61.0
	sharing	Count	36	166	202
		Expected Count	46.1	155.9	202.0
Total		Count	60	203	263
		Expected Count	60.0	203.0	263.0

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	12.325[a]	1	.000		
Continuity Correction[b]	11.133	1	.001		
Likelihood Ratio	11.351	1	.001		
Fisher's Exact Test				.001	.001
Linear-by-Linear Association	12.278	1	.000		
N of Valid Cases	263				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 13.92.

b. Computed only for a 2x2 table


```
CROSSTABS
  /TABLES=scenario1_s_h BY scenario10_s_h
  /FORMAT=AVALUE TABLES
  /STATISTICS=CHISQ
  /CELLS=COUNT EXPECTED
  /COUNT ROUND CELL.
```

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
scenario1_s_h * scenario10_s_h	263	100.0%	0	0.0%	263	100.0%

scenario1_s_h * scenario10_s_h Crosstabulation

			scenario10_s_h		
			hiding	sharing	Total
scenario1_s_h	hiding	Count	21	31	52
		Expected Count	11.9	40.1	52.0
	sharing	Count	39	172	211
		Expected Count	48.1	162.9	211.0
Total		Count	60	203	263
		Expected Count	60.0	203.0	263.0

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	11.364[a]	1	.001		
Continuity Correction[b]	10.154	1	.001		
Likelihood Ratio	10.330	1	.001		
Fisher's Exact Test				.001	.001
Linear-by-Linear Association	11.321	1	.001		
N of Valid Cases	263				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 11.86.

b. Computed only for a 2x2 table


```
CROSSTABS
  /TABLES=scenario2 BY scenario4
  /FORMAT=AVALUE TABLES
  /STATISTICS=CHISQ
  /CELLS=COUNT EXPECTED
  /COUNT ROUND CELL
  /METHOD=EXACT TIMER(5).
```

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
scenario2 * scenario4	263	100.0%	0	0.0%	263	100.0%

scenario2 * scenario4 Crosstabulation

			scenario4		
			playing dumb	evasive hiding	partial sharing
scenario2	playing dumb	Count	1	4	2
		Expected Count	.5	2.5	3.0
	evasive hiding	Count	3	12	14
		Expected Count	2.0	10.1	11.9
	partial sharing	Count	3	16	24
		Expected Count	3.0	15.5	18.3
	full sharing	Count	3	19	20
		Expected Count	4.5	22.9	26.9
Total		Count	10	51	60
		Expected Count	10.0	51.0	60.0

scenario2 * scenario4 Crosstabulation

			scenario4	
			full sharing	Total
scenario2	playing dumb	Count	6	13
		Expected Count	7.0	13.0
	evasive hiding	Count	23	52
		Expected Count	28.1	52.0
	partial sharing	Count	37	80
		Expected Count	43.2	80.0
	full sharing	Count	76	118
		Expected Count	63.7	118.0
Total		Count	142	263
		Expected Count	142.0	263.0

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	12.059[a]	9	.210	.206	
Likelihood Ratio	11.825	9	.223	.267	
Fisher's Exact Test	12.936			.134	
Linear-by-Linear Association	7.032	1	.008	.[b]	.[b]
N of Valid Cases	263				

a. 6 cells (37.5%) have expected count less than 5. The minimum expected count is .49.

b. Cannot be computed because there is insufficient memory.

```
CROSSTABS
  /TABLES=scenario2 BY scenario1
  /FORMAT=AVALUE TABLES
  /STATISTICS=CHISQ
  /CELLS=COUNT EXPECTED
  /COUNT ROUND CELL
```

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
scenario2 * scenario1	263	100.0%	0	0.0%	263	100.0%

scenario2 * scenario1 Crosstabulation

			scenario1		
			playing dumb	evasive hiding	partial sharing
scenario2	playing dumb	Count	3	1	5
		Expected Count	2.1	.5	4.1
	evasive hiding	Count	24	2	14
		Expected Count	8.3	2.0	16.2
	partial sharing	Count	7	6	38
		Expected Count	12.8	3.0	24.9
	full sharing	Count	8	1	25
		Expected Count	18.8	4.5	36.8
Total		Count	42	10	82
		Expected Count	42.0	10.0	82.0

scenario2 * scenario1 Crosstabulation

			scenario1	
			full sharing	Total
scenario2	playing dumb	Count	4	13
		Expected Count	6.4	13.0
	evasive hiding	Count	12	52
		Expected Count	25.5	52.0
	partial sharing	Count	29	80
		Expected Count	39.2	80.0
	full sharing	Count	84	118
		Expected Count	57.9	118.0
Total		Count	129	263
		Expected Count	129.0	263.0

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	78.669[a]	9	.000	.[b]	
Likelihood Ratio	71.502	9	.000	.[b]	
Fisher's Exact Test	.[b]			.[b]	
Linear-by-Linear Association	44.820[c]	1	.000	.000	.000
N of Valid Cases	263				

Chi-Square Tests

	Point Probability
Pearson Chi-Square	
Likelihood Ratio	
Fisher's Exact Test	
Linear-by-Linear Association	.000
N of Valid Cases	

a. 6 cells (37.5%) have expected count less than 5. The minimum expected count is .49.

b. Cannot be computed because there is insufficient memory.

c. The standardized statistic is 6.695.


```
 /* remove evasive hiding cases for scenario 1"/
USE ALL.
COMPUTE filter_$=(scenario1 < 2 or scenario1 > 2).
VARIABLE LABELS filter_$ 'scenario1 < 2 or scenario1 > 2 (FILTER)'.
VALUE LABELS filter_$ 0 'Not Selected' 1 'Selected'.
FORMATS filter_$ (fl.0).
FILTER BY filter_$.
EXECUTE.
CROSSTABS
  /TABLES=scenario2 BY scenario1
  /FORMAT=AVALUE TABLES
  /STATISTICS=CHISQ
  /CELLS=COUNT EXPECTED
  /COUNT ROUND CELL
  /METHOD=EXACT TIMER(5).
```

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
scenario2 * scenario1	253	100.0%	0	0.0%	253	100.0%

scenario2 * scenario1 Crosstabulation

			scenario1		
			playing dumb	partial sharing	full sharing
scenario2	playing dumb	Count	3	5	4
		Expected Count	2.0	3.9	6.1
	evasive hiding	Count	24	14	12
		Expected Count	8.3	16.2	25.5
	partial sharing	Count	7	38	29
		Expected Count	12.3	24.0	37.7
	full sharing	Count	8	25	84
		Expected Count	19.4	37.9	59.7
Total		Count	42	82	129
		Expected Count	42.0	82.0	129.0

scenario2 * scenario1 Crosstabulation

			Total
scenario2	playing dumb	Count	12
		Expected Count	12.0
	evasive hiding	Count	50
		Expected Count	50.0
	partial sharing	Count	74
		Expected Count	74.0
	full sharing	Count	117
		Expected Count	117.0
Total		Count	253
		Expected Count	253.0

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	72.237[a]	6	.000	.000	
Likelihood Ratio	64.656	6	.000	.000	
Fisher's Exact Test	63.925			.000	
Linear-by-Linear Association	42.280[b]	1	.000	.000	.000
N of Valid Cases	253				

Chi-Square Tests

	Point Probability
Pearson Chi-Square	
Likelihood Ratio	
Fisher's Exact Test	
Linear-by-Linear Association	.000
N of Valid Cases	

a. 2 cells (16.7%) have expected count less than 5. The minimum expected count is 1.99.

b. The standardized statistic is 6.502.


```
 FILTER OFF.
USE ALL.
EXECUTE.
CROSSTABS
  /TABLES=scenario2 BY scenario10
  /FORMAT=AVALUE TABLES
  /STATISTICS=CHISQ
  /CELLS=COUNT EXPECTED
  /COUNT ROUND CELL
  /METHOD=EXACT TIMER(5).
```

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
scenario2 * scenario10	263	100.0%	0	0.0%	263	100.0%

scenario2 * scenario10 Crosstabulation

			scenario10		
			playing dumb	evasive hiding	partial sharing
scenario2	playing dumb	Count	5	0	4
		Expected Count	1.4	1.6	5.4
	evasive hiding	Count	11	11	17
		Expected Count	5.5	6.3	21.6
	partial sharing	Count	7	13	42
		Expected Count	8.5	9.7	33.2
	full sharing	Count	5	8	46
		Expected Count	12.6	14.4	48.9
Total		Count	28	32	109
		Expected Count	28.0	32.0	109.0

scenario2 * scenario10 Crosstabulation

			scenario10	
			full sharing	Total
scenario2	playing dumb	Count	4	13
		Expected Count	4.6	13.0
	evasive hiding	Count	13	52
		Expected Count	18.6	52.0
	partial sharing	Count	18	80
		Expected Count	28.6	80.0
	full sharing	Count	59	118
		Expected Count	42.2	118.0
Total		Count	94	263
		Expected Count	94.0	263.0

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	44.862[a]	9	.000	.[b]	
Likelihood Ratio	42.565	9	.000	.[b]	
Fisher's Exact Test	.[b]			.[b]	
Linear-by-Linear Association	26.510	1	.000	.[b]	.[b]
N of Valid Cases	263				

a. 3 cells (18.8%) have expected count less than 5. The minimum expected count is 1.38.

b. Cannot be computed because there is insufficient memory.

```
CROSSTABS
  /TABLES=scenario4 BY scenario1
  /FORMAT=AVALUE TABLES
  /STATISTICS=CHISQ
  /CELLS=COUNT EXPECTED
  /COUNT ROUND CELL
```

Crosstabs

Warnings

Some or all exact significances cannot be computed because the time limit has been exceeded.

Execution of this command stops.

scenario4 * scenario1 Crosstabulation

			scenario1		
			playing dumb	evasive hiding	partial sharing
scenario4	playing dumb	Count	5	0	2
		Expected Count	1.6	.4	3.1
	evasive hiding	Count	7	1	21
		Expected Count	8.1	1.9	15.9
	partial sharing	Count	11	3	26
		Expected Count	9.6	2.3	18.7
	full sharing	Count	19	6	33
		Expected Count	22.7	5.4	44.3
Total		Count	42	10	82
		Expected Count	42.0	10.0	82.0

scenario4 * scenario1 Crosstabulation

			scenario1	
			full sharing	Total
scenario4	playing dumb	Count	3	10
		Expected Count	4.9	10.0
	evasive hiding	Count	22	51
		Expected Count	25.0	51.0
	partial sharing	Count	20	60
		Expected Count	29.4	60.0
	full sharing	Count	84	142
		Expected Count	69.7	142.0
Total		Count	129	263
		Expected Count	129.0	263.0

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)
Pearson Chi-Square	24.178[a]	9	.004	.007
Likelihood Ratio	22.239	9	.008	.010
Linear-by-Linear Association	5.715	1	.017	
N of Valid Cases	263			

a. 6 cells (37.5%) have expected count less than 5. The minimum expected count is .38.

```
Any changes made to the working file since 21-OCT-2023 10:57:43 have been l
ost.
The time now is 11:16:25.
/* remove playing dumb cases for scenario 4"/
USE ALL.
COMPUTE filter_$=(scenario4 > 1).
VARIABLE LABELS filter_$ 'scenario4 > 1 (FILTER)'.
VALUE LABELS filter_$ 0 'Not Selected' 1 'Selected'.
FORMATS filter_$ (f1.0).
FILTER BY filter_$.
EXECUTE.
CROSSTABS
  /TABLES=scenario4 BY scenario1
  /FORMAT=AVALUE TABLES
  /STATISTICS=CHISQ
  /CELLS=COUNT EXPECTED
  /COUNT ROUND CELL
  /METHOD=EXACT TIMER(5).
```


Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
scenario4 * scenario1	253	100.0%	0	0.0%	253	100.0%

scenario4 * scenario1 Crosstabulation

			scenario1		
			playing dumb	evasive hiding	partial sharing
scenario4	evasive hiding	Count	7	1	21
		Expected Count	7.5	2.0	16.1
	partial sharing	Count	11	3	26
		Expected Count	8.8	2.4	19.0
	full sharing	Count	19	6	33
		Expected Count	20.8	5.6	44.9
Total		Count	37	10	80
		Expected Count	37.0	10.0	80.0

scenario4 * scenario1 Crosstabulation

			scenario1	
			full sharing	Total
scenario4	evasive hiding	Count	22	51
		Expected Count	25.4	51.0
	partial sharing	Count	20	60
		Expected Count	29.9	60.0
	full sharing	Count	84	142
		Expected Count	70.7	142.0
Total		Count	126	253
		Expected Count	126.0	253.0

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	14.895[a]	6	.021	.020	
Likelihood Ratio	15.196	6	.019	.024	
Fisher's Exact Test	15.068			.015	
Linear-by-Linear Association	1.817[b]	1	.178	.188	.096
N of Valid Cases	253				

Chi-Square Tests

	Point Probability
Pearson Chi-Square	
Likelihood Ratio	
Fisher's Exact Test	
Linear-by-Linear Association	.012
N of Valid Cases	

a. 2 cells (16.7%) have expected count less than 5. The minimum expected count is 2.02.

b. The standardized statistic is 1.348.

```
 FILTER OFF.
USE ALL.
EXECUTE.
CROSSTABS
  /TABLES=scenario4 BY scenario10
  /FORMAT=AVALUE TABLES
  /STATISTICS=CHISQ
  /CELLS=COUNT EXPECTED
  /COUNT ROUND CELL
  /METHOD=EXACT TIMER(5).
```

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
scenario4 * scenario10	263	100.0%	0	0.0%	263	100.0%

scenario4 * scenario10 Crosstabulation

			scenario10		
			playing dumb	evasive hiding	partial sharing
scenario4	playing dumb	Count	5	1	2
		Expected Count	1.1	1.2	4.1
	evasive hiding	Count	9	9	21
		Expected Count	5.4	6.2	21.1
	partial sharing	Count	7	16	33
		Expected Count	6.4	7.3	24.9
	full sharing	Count	7	6	53
		Expected Count	15.1	17.3	58.9
Total		Count	28	32	109
		Expected Count	28.0	32.0	109.0

scenario4 * scenario10 Crosstabulation

			scenario10	
			full sharing	Total
scenario4	playing dumb	Count	2	10
		Expected Count	3.6	10.0
	evasive hiding	Count	12	51
		Expected Count	18.2	51.0
	partial sharing	Count	4	60
		Expected Count	21.4	60.0
	full sharing	Count	76	142
		Expected Count	50.8	142.0
Total		Count	94	263
		Expected Count	94.0	263.0

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	74.262[a]	9	.000	.[b]	
Likelihood Ratio	73.754	9	.000	.[b]	
Fisher's Exact Test	.[b]			.[b]	
Linear-by-Linear Association	39.330	1	.000	.[b]	.[b]
N of Valid Cases	263				

a. 4 cells (25.0%) have expected count less than 5. The minimum expected count is 1.06.

b. Cannot be computed because there is insufficient memory.

```
 /* remove playing dumb cases for scenario 4"/
USE ALL.
COMPUTE filter_$=(scenario4 > 1).
VARIABLE LABELS filter_$ 'scenario4 > 1 (FILTER)'.
VALUE LABELS filter_$ 0 'Not Selected' 1 'Selected'.
FORMATS filter_$ (f1.0).
FILTER BY filter_$.
EXECUTE.
CROSSTABS
  /TABLES=scenario4 BY scenario10
  /FORMAT=AVALUE TABLES
  /STATISTICS=CHISQ
  /CELLS=COUNT EXPECTED
  /COUNT ROUND CELL
```

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
scenario4 * scenario10	253	100.0%	0	0.0%	253	100.0%

scenario4 * scenario10 Crosstabulation

			scenario10		
			playing dumb	evasive hiding	partial sharing
scenario4	evasive hiding	Count	9	9	21
		Expected Count	4.6	6.2	21.6
	partial sharing	Count	7	16	33
		Expected Count	5.5	7.4	25.4
	full sharing	Count	7	6	53
		Expected Count	12.9	17.4	60.1
Total		Count	23	31	107
		Expected Count	23.0	31.0	107.0

scenario4 * scenario10 Crosstabulation

			scenario10 full sharing	Total
scenario4	evasive hiding	Count	12	51
		Expected Count	18.5	51.0
	partial sharing	Count	4	60
		Expected Count	21.8	60.0
	full sharing	Count	76	142
		Expected Count	51.6	142.0
Total		Count	92	253
		Expected Count	92.0	253.0

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	57.594[a]	6	.000	.000	
Likelihood Ratio	63.238	6	.000	.000	
Fisher's Exact Test	62.156			.000	
Linear-by-Linear Association	31.607[b]	1	.000	.000	.000
N of Valid Cases	253				

Chi-Square Tests

	Point Probability
Pearson Chi-Square	
Likelihood Ratio	
Fisher's Exact Test	
Linear-by-Linear Association	.000
N of Valid Cases	

a. 1 cells (8.3%) have expected count less than 5. The minimum expected count is 4.64.

b. The standardized statistic is 5.622.


```
 FILTER OFF.
USE ALL.
EXECUTE.
CROSSTABS
  /TABLES=scenario1 BY scenario10
  /FORMAT=AVALUE TABLES
  /STATISTICS=CHISQ
```

```
/CELLS=COUNT EXPECTED
/COUNT ROUND CELL
/METHOD=EXACT TIMER(5).
```

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
scenario1 * scenario10	263	100.0%	0	0.0%	263	100.0%

scenario1 * scenario10 Crosstabulation

			scenario10		
			playing dumb	evasive hiding	partial sharing
scenario1	playing dumb	Count	10	6	12
		Expected Count	4.5	5.1	17.4
	evasive hiding	Count	2	3	2
		Expected Count	1.1	1.2	4.1
	partial sharing	Count	11	16	38
		Expected Count	8.7	10.0	34.0
	full sharing	Count	5	7	57
		Expected Count	13.7	15.7	53.5
Total		Count	28	32	109
		Expected Count	28.0	32.0	109.0

scenario1 * scenario10 Crosstabulation

			scenario10	
			full sharing	Total
scenario1	playing dumb	Count	14	42
		Expected Count	15.0	42.0
	evasive hiding	Count	3	10
		Expected Count	3.6	10.0
	partial sharing	Count	17	82
		Expected Count	29.3	82.0
	full sharing	Count	60	129
		Expected Count	46.1	129.0
Total		Count	94	263
		Expected Count	94.0	263.0

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	38.037[a]	9	.000	.[b]	
Likelihood Ratio	38.781	9	.000	.[b]	
Fisher's Exact Test	.[b]			.[b]	
Linear-by-Linear Association	17.954	1	.000	.[b]	.[b]
N of Valid Cases	263				

a. 5 cells (31.3%) have expected count less than 5. The minimum expected count is 1.06.

b. Cannot be computed because there is insufficient memory.

```
 /* remove evasive hiding cases for scenario 1"/
USE ALL.
COMPUTE filter_$=(scenario1 < 2 or scenario1 > 2).
VARIABLE LABELS filter_$ 'scenario1 < 2 or scenario1 > 2 (FILTER)'.
VALUE LABELS filter_$ 0 'Not Selected' 1 'Selected'.
FORMATS filter_$ (f1.0).
FILTER BY filter_$.
EXECUTE.
CROSSTABS
  /TABLES=scenario1 BY scenario10
  /FORMAT=AVALUE TABLES
  /STATISTICS=CHISQ
  /CELLS=COUNT EXPECTED
  /COUNT ROUND CELL
  /METHOD=EXACT TIMER(5).
```


Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
scenario1 * scenario10	253	100.0%	0	0.0%	253	100.0%

scenario1 * scenario10 Crosstabulation

			scenario10		
			playing dumb	evasive hiding	partial sharing
scenario1	playing dumb	Count	10	6	12
		Expected Count	4.3	4.8	17.8
	partial sharing	Count	11	16	38
		Expected Count	8.4	9.4	34.7
	full sharing	Count	5	7	57
		Expected Count	13.3	14.8	54.6
Total		Count	26	29	107
		Expected Count	26.0	29.0	107.0

scenario1 * scenario10 Crosstabulation

			scenario10	
			full sharing	Total
scenario1	playing dumb	Count	14	42
		Expected Count	15.1	42.0
	partial sharing	Count	17	82
		Expected Count	29.5	82.0
	full sharing	Count	60	129
		Expected Count	46.4	129.0
Total		Count	91	253
		Expected Count	91.0	253.0

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	34.098[a]	6	.000	.000	
Likelihood Ratio	34.624	6	.000	.000	
Fisher's Exact Test	34.284			.000	
Linear-by-Linear Association	16.588[b]	1	.000	.000	.000
N of Valid Cases	253				

Chi-Square Tests

	Point Probability
Pearson Chi-Square	
Likelihood Ratio	
Fisher's Exact Test	
Linear-by-Linear Association	.000
N of Valid Cases	

a. 2 cells (16.7%) have expected count less than 5. The minimum expected count is 4.32.

b. The standardized statistic is 4.073.

```
 FILTER OFF.
USE ALL.
EXECUTE.
CROSSTABS
  /TABLES=scenario4_s_h BY scenario11_s_h
  /FORMAT=AVALUE TABLES
  /STATISTICS=CHISQ
  /CELLS=COUNT EXPECTED
  /COUNT ROUND CELL.
```

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
scenario4_s_h * scenario11_s_h	263	100.0%	0	0.0%	263	100.0%

scenario4_s_h * scenario11_s_h Crosstabulation

			scenario11_s_h		
			hiding	sharing	Total
scenario4_s_h	hiding	Count	30	31	61
		Expected Count	13.5	47.5	61.0
	sharing	Count	28	174	202
		Expected Count	44.5	157.5	202.0
Total		Count	58	205	263
		Expected Count	58.0	205.0	263.0

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	33.999[a]	1	.000		
Continuity Correction[b]	31.976	1	.000		
Likelihood Ratio	30.375	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	33.870	1	.000		
N of Valid Cases	263				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 13.45.

b. Computed only for a 2x2 table

```
CROSSTABS
  /TABLES=scenario4 BY scenario11
  /FORMAT=AVALUE TABLES
  /STATISTICS=CHISQ
  /CELLS=COUNT EXPECTED
  /COUNT ROUND CELL.
```

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
scenario4 * scenario11	263	100.0%	0	0.0%	263	100.0%

scenario4 * scenario11 Crosstabulation

			scenario11		
			playing dumb	evasive hiding	partial sharing
scenario4	playing dumb	Count	5	1	2
		Expected Count	1.1	1.1	2.6
	evasive hiding	Count	12	12	16
		Expected Count	5.6	5.6	13.2
	partial sharing	Count	7	9	34
		Expected Count	6.6	6.6	15.5
	full sharing	Count	5	7	16
		Expected Count	15.7	15.7	36.7
Total		Count	29	29	68
		Expected Count	29.0	29.0	68.0

scenario4 * scenario11 Crosstabulation

			scenario11 full sharing	Total
scenario4	playing dumb	Count	2	10
		Expected Count	5.2	10.0
	evasive hiding	Count	11	51
		Expected Count	26.6	51.0
	partial sharing	Count	10	60
		Expected Count	31.3	60.0
	full sharing	Count	114	142
		Expected Count	74.0	142.0
Total		Count	137	263
		Expected Count	137.0	263.0

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	122.834[a]	9	.000
Likelihood Ratio	119.487	9	.000
Linear-by-Linear Association	71.955	1	.000
N of Valid Cases	263		

a. 3 cells (18.8%) have expected count less than 5. The minimum expected count is 1.10.


```
CROSSTABS
  /TABLES=scenario7_s_h BY scenario9_s_h
  /FORMAT=AVALUE TABLES
  /STATISTICS=CHISQ
  /CELLS=COUNT EXPECTED
  /COUNT ROUND CELL.
```

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
scenario7_s_h * scenario9_s_h	263	100.0%	0	0.0%	263	100.0%

scenario7_s_h * scenario9_s_h Crosstabulation

			scenario9_s_h		
			hiding	sharing	Total
scenario7_s_h	hiding	Count	18	48	66
		Expected Count	10.3	55.7	66.0
	sharing	Count	23	174	197
		Expected Count	30.7	166.3	197.0
Total		Count	41	222	263
		Expected Count	41.0	222.0	263.0

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	9.140[a]	1	.003		
Continuity Correction[b]	7.993	1	.005		
Likelihood Ratio	8.307	1	.004		
Fisher's Exact Test				.005	.003
Linear-by-Linear Association	9.105	1	.003		
N of Valid Cases	263				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 10.29.

b. Computed only for a 2x2 table


```
CROSSTABS
  /TABLES=scenario7 BY scenario9
  /FORMAT=AVALUE TABLES
  /STATISTICS=CHISQ
  /CELLS=COUNT EXPECTED
  /COUNT ROUND CELL
  /METHOD=EXACT TIMER(5).
```

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
scenario7 * scenario9	263	100.0%	0	0.0%	263	100.0%

scenario7 * scenario9 Crosstabulation

			scenario9		
			playing dumb	evasive hiding	partial sharing
scenario7	playing dumb	Count	4	5	5
		Expected Count	.8	2.5	7.4
	evasive hiding	Count	2	7	13
		Expected Count	1.7	5.3	15.9
	partial sharing	Count	4	17	62
		Expected Count	5.1	15.8	47.4
	full sharing	Count	0	2	13
		Expected Count	2.4	7.4	22.3
Total		Count	10	31	93
		Expected Count	10.0	31.0	93.0

scenario7 * scenario9 Crosstabulation

			scenario9	
			full sharing	Total
scenario7	playing dumb	Count	7	21
		Expected Count	10.3	21.0
	evasive hiding	Count	23	45
		Expected Count	22.1	45.0
	partial sharing	Count	51	134
		Expected Count	65.7	134.0
	full sharing	Count	48	63
		Expected Count	30.9	63.0
Total		Count	129	263
		Expected Count	129.0	263.0

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	46.245[a]	9	.000	.[b]	
Likelihood Ratio	42.759	9	.000	.[b]	
Fisher's Exact Test	.[b]			.[b]	
Linear-by-Linear Association	22.020[c]	1	.000	.000	.000
N of Valid Cases	263				

Chi-Square Tests

	Point Probability
Pearson Chi-Square	
Likelihood Ratio	
Fisher's Exact Test	
Linear-by-Linear Association	.000
N of Valid Cases	

a. 4 cells (25.0%) have expected count less than 5. The minimum expected count is .80.

b. Cannot be computed because there is insufficient memory.

c. The standardized statistic is 4.693.

```
 /* remove playing dumb cases for scenario 9"/
USE ALL.
COMPUTE filter_$=(scenario9 > 1).
VARIABLE LABELS filter_$ 'scenario9 > 1 (FILTER)'.
VALUE LABELS filter_$ 0 'Not Selected' 1 'Selected'.
FORMATS filter_$ (f1.0).
FILTER BY filter_$.
EXECUTE.
CROSSTABS
  /TABLES=scenario7 BY scenario9
  /FORMAT=AVALUE TABLES
  /STATISTICS=CHISQ
  /CELLS=COUNT EXPECTED
  /COUNT ROUND CELL
  /METHOD=EXACT TIMER(5).
```


Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
scenario7 * scenario9	253	100.0%	0	0.0%	253	100.0%

scenario7 * scenario9 Crosstabulation

			scenario9		
			evasive hiding	partial sharing	full sharing
scenario7	playing dumb	Count	5	5	7
		Expected Count	2.1	6.2	8.7
	evasive hiding	Count	7	13	23
		Expected Count	5.3	15.8	21.9
	partial sharing	Count	17	62	51
		Expected Count	15.9	47.8	66.3
	full sharing	Count	2	13	48
		Expected Count	7.7	23.2	32.1
Total		Count	31	93	129
		Expected Count	31.0	93.0	129.0

scenario7 * scenario9 Crosstabulation

			Total
scenario7	playing dumb	Count	17
		Expected Count	17.0
	evasive hiding	Count	43
		Expected Count	43.0
	partial sharing	Count	130
		Expected Count	130.0
	full sharing	Count	63
		Expected Count	63.0
Total		Count	253
		Expected Count	253.0

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	30.141[a]	6	.000	.000	
Likelihood Ratio	30.539	6	.000	.000	
Fisher's Exact Test	29.875			.000	
Linear-by-Linear Association	11.770[b]	1	.001	.001	.000
N of Valid Cases	253				

Chi-Square Tests

	Point Probability
Pearson Chi-Square	
Likelihood Ratio	
Fisher's Exact Test	
Linear-by-Linear Association	.000
N of Valid Cases	

a. 1 cells (8.3%) have expected count less than 5. The minimum expected count is 2.08.

b. The standardized statistic is 3.431.

```
 FILTER OFF.
USE ALL.
EXECUTE.
FREQUENCIES VARIABLES=GENDER
  /PIECHART FREQ
  /ORDER=ANALYSIS.
```

Frequencies

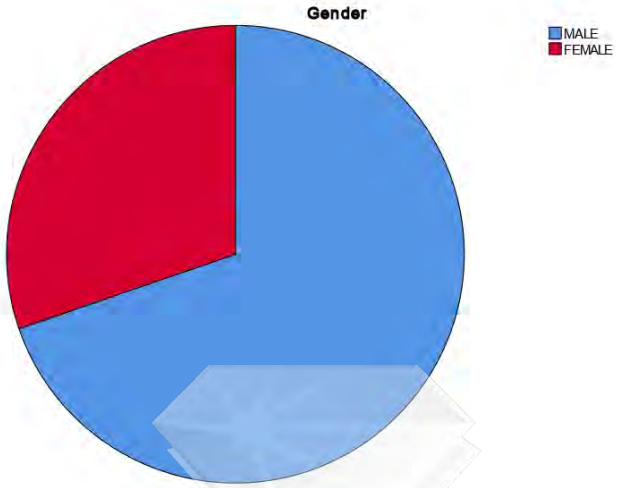
Statistics

Gender

N	Valid	251
	Missing	12

Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	MALE	175	66.5	69.7	69.7
	FEMALE	76	28.9	30.3	100.0
	Total	251	95.4	100.0	
Missing	System	12	4.6		
Total		263	100.0		




```
 /* select female cases "/
USE ALL.
COMPUTE filter_$=(GENDER = 2).
VARIABLE LABELS filter_$ 'GENDER = 2 (FILTER)'.
VALUE LABELS filter_$ 0 'Not Selected' 1 'Selected'.
FORMATS filter_$ (f1.0).
FILTER BY filter_$.
EXECUTE.
CROSSTABS
  /TABLES=femalescenario_sharing_countBY malescenario_sharing_count
  /FORMAT=AVALUE TABLES
  /STATISTICS=CHISQ
  /CELLS=COUNT EXPECTED
  /COUNT ROUND CELL
  /METHOD=EXACT TIMER(5).
```


Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
femalescenario_sharing_count * malescenario_sharing_count	76	100.0%	0	0.0%	76	100.0%

femalescenario_sharing_count * malescenario_sharing_count Crosstabulation

			malescenario_sharing_count			
			0	1	2	3
femalescenario_sharing_count	0	Count	1	1	0	0
		Expected Count	.0	.1	.1	.2
	1	Count	0	2	2	0
		Expected Count	.1	.2	.4	.6
	2	Count	0	0	1	2
		Expected Count	.1	.2	.3	.5
	3	Count	0	0	0	1
		Expected Count	.1	.3	.5	.8
	4	Count	0	0	1	2
		Expected Count	.3	.9	1.4	2.3
	5	Count	0	0	1	3
		Expected Count	.4	1.3	2.2	3.5
Total		Count	1	3	5	8
		Expected Count	1.0	3.0	5.0	8.0

femalescenario_sharing_count * malescenario_sharing_count Crosstabulation

			malescenario_sharing_...		
			4	5	Total
femalescenario_sharing_count	0	Count	0	0	2
		Expected Count	.7	.9	2.0
	1	Count	1	1	6
		Expected Count	2.1	2.6	6.0
	2	Count	1	1	5
		Expected Count	1.7	2.2	5.0
	3	Count	6	1	8
		Expected Count	2.7	3.5	8.0
	4	Count	8	11	22
		Expected Count	7.5	9.6	22.0
	5	Count	10	19	33
		Expected Count	11.3	14.3	33.0
Total		Count	26	33	76
		Expected Count	26.0	33.0	76.0

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	89.566[a]	25	.000	.[b]	
Likelihood Ratio	44.858	25	.009	.001	
Fisher's Exact Test	44.563			.000	
Linear-by-Linear Association	28.127[c]	1	.000	.000	.000
N of Valid Cases	76				

Chi-Square Tests

	Point Probability
Pearson Chi-Square	
Likelihood Ratio	
Fisher's Exact Test	
Linear-by-Linear Association	.000
N of Valid Cases	

a. 32 cells (88.9%) have expected count less than 5. The minimum expected count is .03.

b. Cannot be computed because there is insufficient memory.

c. The standardized statistic is 5.304.


```
CROSSTABS
  /TABLES=femalescenario_hiding_countBY malescenario_hiding_count
  /FORMAT=AVALUE TABLES
  /STATISTICS=CHISQ
  /CELLS=COUNT EXPECTED
  /COUNT ROUND CELL
  /METHOD=EXACT TIMER(5).
```

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
femalescenario_hiding_count * malescenario_hiding_count	76	100.0%	0	0.0%	76	100.0%

femalescenario_hiding_count * malescenario_hiding_count Crosstabulation

			malescenario_hiding_count			
			0	1	2	3
femalescenario_hiding_count	0	Count	19	10	3	1
		Expected Count	14.3	11.3	3.5	2.2
	1	Count	11	8	2	1
		Expected Count	9.6	7.5	2.3	1.4
	2	Count	1	6	1	0
		Expected Count	3.5	2.7	.8	.5
	3	Count	1	1	2	1
		Expected Count	2.2	1.7	.5	.3
	4	Count	1	1	0	2
		Expected Count	2.6	2.1	.6	.4
	5	Count	0	0	0	0
		Expected Count	.9	.7	.2	.1
Total		Count	33	26	8	5
		Expected Count	33.0	26.0	8.0	5.0

femalescenario_hiding_count * malescenario_hiding_count Crosstabulation

			malescenario_hiding_c..		
			4	5	Total
femalescenario_hiding_count	0	Count	0	0	33
		Expected Count	1.3	.4	33.0
	1	Count	0	0	22
		Expected Count	.9	.3	22.0
	2	Count	0	0	8
		Expected Count	.3	.1	8.0
	3	Count	0	0	5
		Expected Count	.2	.1	5.0
	4	Count	2	0	6
		Expected Count	.2	.1	6.0
	5	Count	1	1	2
		Expected Count	.1	.0	2.0
Total		Count	3	1	76
		Expected Count	3.0	1.0	76.0

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	89.566[a]	25	.000	.[b]	
Likelihood Ratio	44.858	25	.009	.001	
Fisher's Exact Test	44.563			.000	
Linear-by-Linear Association	28.127[c]	1	.000	.000	.000
N of Valid Cases	76				

Chi-Square Tests

	Point Probability
Pearson Chi-Square	
Likelihood Ratio	
Fisher's Exact Test	
Linear-by-Linear Association	.000
N of Valid Cases	

a. 32 cells (88.9%) have expected count less than 5. The minimum expected count is .03.

b. Cannot be computed because there is insufficient memory.

c. The standardized statistic is 5.304.


```
CROSSTABS
  /TABLES=femalescenario_fullsharing_count BY malescenario_fullsharing_coun
t
  /FORMAT=AVALUE TABLES
  /STATISTICS=CHISQ
  /CELLS=COUNT EXPECTED
  /COUNT ROUND CELL
  /METHOD=EXACT TIMER(5).
```

Crosstabs

Warnings

Some or all exact significances cannot be computed because the time limit has been exceeded.
Execution of this command stops.

femalescenario_fullsharing_count * malescenario_fullsharing_count Crosstabulation

			malescenario_fullsharing_count			
			0	1	2	3
femalescenario_fullsharing_count	0	Count	4	9	5	4
		Expected Count	3.2	5.2	5.8	3.8
	1	Count	5	2	2	1
		Expected Count	1.9	3.1	3.4	2.2
	2	Count	1	6	8	4
		Expected Count	3.2	5.2	5.8	3.8
	3	Count	1	0	2	3
		Expected Count	1.3	2.1	2.4	1.5
	4	Count	0	1	3	0
		Expected Count	1.0	1.7	1.8	1.2
	5	Count	0	0	0	1
		Expected Count	.4	.7	.8	.5
Total		Count	11	18	20	13
		Expected Count	11.0	18.0	20.0	13.0

femalescenario_fullsharing_count * malescenario_fullsharing_count Crosstabulation

			malescenario_fullshari..		
			4	5	Total
femalescenario_fullsharing_count	0	Count	0	0	22
		Expected Count	2.9	1.2	22.0
	1	Count	3	0	13
		Expected Count	1.7	.7	13.0
	2	Count	3	0	22
		Expected Count	2.9	1.2	22.0
	3	Count	1	2	9
		Expected Count	1.2	.5	9.0
	4	Count	3	0	7
		Expected Count	.9	.4	7.0
	5	Count	0	2	3
		Expected Count	.4	.2	3.0
Total		Count	10	4	76
		Expected Count	10.0	4.0	76.0

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	60.379[a]	25	.000
Likelihood Ratio	52.323	25	.001
Linear-by-Linear Association	16.756	1	.000
N of Valid Cases	76		

a. 32 cells (88.9%) have expected count less than 5. The minimum expected count is .16.

```
Any changes made to the working file since 21-OCT-2023 11:39:43 have been l
ost.
The time now is 11:47:10.
/* remove 5 count cases"/
USE ALL.
COMPUTE filter_$=(GENDER = 2 & femalescenario_fullsharing_count< 5 &
    malescenario_fullsharing_count< 5).
VARIABLE LABELS filter_$ 'GENDER = 2 & femalescenario_fullsharing_count< 5
 & '+
    'malescenario_fullsharing_count< 5 (FILTER)'.
VALUE LABELS filter_$ 0 'Not Selected' 1 'Selected'.
FORMATS filter_$ (f1.0).
FILTER BY filter_$.
EXECUTE.
CROSSTABS
  /TABLES=femalescenario_fullsharing_count BY malescenario_fullsharing_coun
t
  /FORMAT=AVALUE TABLES
  /STATISTICS=CHISQ
  /CELLS=COUNT EXPECTED
  /COUNT ROUND CELL
  /METHOD=EXACT TIMER(5).
```


Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
femalescenario_fullsharing_count * malescenario_fullsharing_count	71	100.0%	0	0.0%	71	100.0%

femalescenario_fullsharing_count * malescenario_fullsharing_count Crosstabulation

			malescenario_fullsharing_count			
			0	1	2	3
femalescenario_fullsharing_count	0	Count	4	9	5	4
		Expected Count	3.4	5.6	6.2	3.7
	1	Count	5	2	2	1
		Expected Count	2.0	3.3	3.7	2.2
	2	Count	1	6	8	4
		Expected Count	3.4	5.6	6.2	3.7
	3	Count	1	0	2	3
		Expected Count	1.1	1.8	2.0	1.2
	4	Count	0	1	3	0
		Expected Count	1.1	1.8	2.0	1.2
Total		Count	11	18	20	12
		Expected Count	11.0	18.0	20.0	12.0

femalescenario_fullsharing_count * malescenario_fullsharing_count Crosstabulation

			malescena...	
			4	Total
femalescenario_fullsharing_count	0	Count	0	22
		Expected Count	3.1	22.0
	1	Count	3	13
		Expected Count	1.8	13.0
	2	Count	3	22
		Expected Count	3.1	22.0
	3	Count	1	7
		Expected Count	1.0	7.0
	4	Count	3	7
		Expected Count	1.0	7.0
Total		Count	10	71
		Expected Count	10.0	71.0

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	26.754[a]	16	.044	.[b]	
Likelihood Ratio	30.847	16	.014	.036	
Fisher's Exact Test	23.987			.036	
Linear-by-Linear Association	8.387[c]	1	.004	.004	.002
N of Valid Cases	71				

Chi-Square Tests

	Point Probability
Pearson Chi-Square	
Likelihood Ratio	
Fisher's Exact Test	
Linear-by-Linear Association	.000
N of Valid Cases	

a. 21 cells (84.0%) have expected count less than 5. The minimum expected count is .99.

b. Cannot be computed because there is insufficient memory.

c. The standardized statistic is 2.896.


```
 USE ALL.
COMPUTE filter_$=(GENDER = 2).
VARIABLE LABELS filter_$ 'GENDER = 2 (FILTER)'.
VALUE LABELS filter_$ 0 'Not Selected' 1 'Selected'.
FORMATS filter_$ (f1.0).
FILTER BY filter_$.
EXECUTE.
CROSSTABS
  /TABLES=femalescenario_partialsharing_count BY malescenario_partialsharin
g_count
  /FORMAT=AVALUE TABLES
  /STATISTICS=CHISQ
  /CELLS=COUNT EXPECTED
  /COUNT ROUND CELL
  /METHOD=EXACT TIMER(5).
```

Crosstabs

Warnings

Some or all exact significances cannot be computed because the time limit has been exceeded.
Execution of this command stops.

femalescenario_partialsharing_count * malescenario_partialsharing_count Crosstabulation

			malescenario_partialsharing_count			
			0	1	2	3
femalescenario_partialsharing_count	0	Count	4	3	2	0
		Expected Count	1.6	2.2	2.6	2.4
	1	Count	3	4	4	4
		Expected Count	2.5	3.6	4.2	3.8
	2	Count	3	5	3	2
		Expected Count	2.2	3.1	3.7	3.3
	3	Count	2	4	6	9
		Expected Count	3.9	5.6	6.6	5.9
	4	Count	0	1	3	2
		Expected Count	1.3	1.8	2.1	1.9
	5	Count	0	0	2	1
		Expected Count	.5	.7	.8	.7
Total		Count	12	17	20	18
		Expected Count	12.0	17.0	20.0	18.0

femalescenario_partialsharing_count * malescenario_partialsharing_count Crosstabulation

			malescenario_partialsh..		
			4	5	Total
femalescenario_partialsharing_count	0	Count	0	1	10
		Expected Count	.9	.3	10.0
	1	Count	1	0	16
		Expected Count	1.5	.4	16.0
	2	Count	1	0	14
		Expected Count	1.3	.4	14.0
	3	Count	3	1	25
		Expected Count	2.3	.7	25.0
	4	Count	2	0	8
		Expected Count	.7	.2	8.0
	5	Count	0	0	3
		Expected Count	.3	.1	3.0
Total		Count	7	2	76
		Expected Count	7.0	2.0	76.0

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	23.993[a]	25	.520
Likelihood Ratio	27.715	25	.321
Linear-by-Linear Association	8.032	1	.005
N of Valid Cases	76		

a. 33 cells (91.7%) have expected count less than 5. The minimum expected count is .08.

```
Any changes made to the working file since 21-OCT-2023 11:52:05 have been l
ost.
The time now is 11:57:47.
/* remove 5 count cases"/
USE ALL.
COMPUTE filter_$=(GENDER = 2 & femalescenario_partialsharing_count< 5 &
    malescenario_partialsharing_count< 5).
VARIABLE LABELS filter_$ 'GENDER = 2 & femalescenario_partialsharing_count
< 5 & '+
    'malescenario_partialsharing_count< 5 (FILTER)'.
VALUE LABELS filter_$ 0 'Not Selected' 1 'Selected'.
FORMATS filter_$ (f1.0).
FILTER BY filter_$.
EXECUTE.
CROSSTABS
  /TABLES=femalescenario_partialsharing_coun BY malescenario_partialsharin
g_count
  /FORMAT=AVALUE TABLES
  /STATISTICS=CHISQ
  /CELLS=COUNT EXPECTED
  /COUNT ROUND CELL
  /METHOD=EXACT TIMER(5).
```


Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
femalescenario_partialsharing_count * malescenario_partialsharing_count	71	100.0%	0	0.0%	71	100.0%

femalescenario_partialsharing_count * malescenario_partialsharing_count Crosstabulation

			malescenario_partialsharing_count			
			0	1	2	3
femalescenario_partialsharing_count	0	Count	4	3	2	0
		Expected Count	1.5	2.2	2.3	2.2
	1	Count	3	4	4	4
		Expected Count	2.7	3.8	4.1	3.8
	2	Count	3	5	3	2
		Expected Count	2.4	3.4	3.5	3.4
	3	Count	2	4	6	9
		Expected Count	4.1	5.7	6.1	5.7
	4	Count	0	1	3	2
		Expected Count	1.4	1.9	2.0	1.9
Total		Count	12	17	18	17
		Expected Count	12.0	17.0	18.0	17.0

femalescenario_partialsharing_count * malescenario_partialsharing_count Crosstabulation

			malescena...	
			4	Total
femalescenario_partialsharing_count	0	Count	0	9
		Expected Count	.9	9.0
	1	Count	1	16
		Expected Count	1.6	16.0
	2	Count	1	14
		Expected Count	1.4	14.0
	3	Count	3	24
		Expected Count	2.4	24.0
	4	Count	2	8
		Expected Count	.8	8.0
Total		Count	7	71
		Expected Count	7.0	71.0

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	17.128[a]	16	.377	.[b]	
Likelihood Ratio	19.734	16	.232	.392	
Fisher's Exact Test	15.492			.438	
Linear-by-Linear Association	11.528[c]	1	.001	.001	.000
N of Valid Cases	71				

Chi-Square Tests

	Point Probability
Pearson Chi-Square	
Likelihood Ratio	
Fisher's Exact Test	
Linear-by-Linear Association	.000
N of Valid Cases	

a. 22 cells (88.0%) have expected count less than 5. The minimum expected count is .79.

b. Cannot be computed because there is insufficient memory.

c. The standardized statistic is 3.395.


```
 USE ALL.
COMPUTE filter_$=(GENDER = 2).
VARIABLE LABELS filter_$ 'GENDER = 2 (FILTER)'.
VALUE LABELS filter_$ 0 'Not Selected' 1 'Selected'.
FORMATS filter_$ (f1.0).
FILTER BY filter_$.
EXECUTE.
CROSSTABS
  /TABLES=femalescenario_evasivehiding_count BY malescenario_evasivehiding_
count
  /FORMAT=AVALUE TABLES
  /STATISTICS=CHISQ
  /CELLS=COUNT EXPECTED
  /COUNT ROUND CELL
  /METHOD=EXACT TIMER(5).
```

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
femalescenario_evasivehiding_count * malescenario_evasivehiding_count	76	100.0%	0	0.0%	76	100.0%

femalescenario_evasivehiding_count * malescenario_evasivehiding_count Crosstabulation

			malescenario_evasivehiding_count			
			0	1	2	3
femalescenario_evasivehiding_count	0	Count	26	12	3	1
		Expected Count	24.3	12.2	4.4	1.1
	1	Count	13	7	2	1
		Expected Count	13.3	6.7	2.4	.6
	2	Count	2	3	3	0
		Expected Count	4.6	2.3	.8	.2
	3	Count	3	0	0	0
		Expected Count	1.7	.9	.3	.1
Total		Count	44	22	8	2
		Expected Count	44.0	22.0	8.0	2.0

femalescenario_evasivehiding_count * malescenario_evasivehiding_count Crosstabulation

			Total
femalescenario_evasivehiding_count	0	Count	42
		Expected Count	42.0
	1	Count	23
		Expected Count	23.0
	2	Count	8
		Expected Count	8.0
	3	Count	3
		Expected Count	3.0
Total		Count	76
		Expected Count	76.0

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	10.561[a]	9	.307	.285	
Likelihood Ratio	10.056	9	.346	.376	
Fisher's Exact Test	9.802			.325	
Linear-by-Linear Association	.553[b]	1	.457	.483	.253
N of Valid Cases	76				

Chi-Square Tests

	Point Probability
Pearson Chi-Square	
Likelihood Ratio	
Fisher's Exact Test	
Linear-by-Linear Association	.051
N of Valid Cases	

a. 12 cells (75.0%) have expected count less than 5. The minimum expected count is .08.

b. The standardized statistic is .744.


```
CROSSTABS
  /TABLES=femalescenario_playingdumb_count BY malescenario_playingdumb_coun
t
  /FORMAT=AVALUE TABLES
  /STATISTICS=CHISQ
  /CELLS=COUNT EXPECTED
  /COUNT ROUND CELL
  /METHOD=EXACT TIMER(5).
```

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
femalescenario_playingdumb_count * malescenario_playingdumb_count	76	100.0%	0	0.0%	76	100.0%

femalescenario_playingdumb_count * malescenario_playingdumb_count Crosstabulation

			malescenario_playingdumb_count			
			0	1	2	3
femalescenario_playingdumb_count	0	Count	44	9	1	0
		Expected Count	39.8	9.9	2.1	1.4
	1	Count	7	3	0	0
		Expected Count	7.4	1.8	.4	.3
	2	Count	3	2	2	1
		Expected Count	5.9	1.5	.3	.2
	3	Count	2	0	0	1
		Expected Count	2.2	.6	.1	.1
	4	Count	0	0	0	0
		Expected Count	.7	.2	.0	.0
Total		Count	56	14	3	2
		Expected Count	56.0	14.0	3.0	2.0

femalescenario_playingdumb_count * malescenario_playingdumb_count Crosstabulation

			malescena...	
			4	Total
femalescenario_playingdumb_count	0	Count	0	54
		Expected Count	.7	54.0
	1	Count	0	10
		Expected Count	.1	10.0
	2	Count	0	8
		Expected Count	.1	8.0
	3	Count	0	3
		Expected Count	.0	3.0
	4	Count	1	1
		Expected Count	.0	1.0
Total		Count	1	76
		Expected Count	1.0	76.0

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	104.938[a]	16	.000	.000	
Likelihood Ratio	28.752	16	.026	.002	
Fisher's Exact Test	36.185			.001	
Linear-by-Linear Association	22.447[b]	1	.000	.000	.000
N of Valid Cases	76				

Chi-Square Tests

	Point Probability
Pearson Chi-Square	
Likelihood Ratio	
Fisher's Exact Test	
Linear-by-Linear Association	.000
N of Valid Cases	

a. 21 cells (84.0%) have expected count less than 5. The minimum expected count is .01.

b. The standardized statistic is 4.738.


```
 /* select male cases "/
USE ALL.
COMPUTE filter_$=(GENDER = 1).
VARIABLE LABELS filter_$ 'GENDER = 1 (FILTER)'.
VALUE LABELS filter_$ 0 'Not Selected' 1 'Selected'.
FORMATS filter_$ (f1.0).
FILTER BY filter_$.
EXECUTE.
CROSSTABS
  /TABLES=femalescenario_sharing_countBY malescenario_sharing_count
  /FORMAT=AVALUE TABLES
  /STATISTICS=CHISQ
  /CELLS=COUNT EXPECTED
  /COUNT ROUND CELL
  /METHOD=EXACT TIMER(5).
```

Crosstabs

Warnings

Some or all exact significances cannot be computed because the time limit has been exceeded.
Execution of this command stops.

femalescenario_sharing_count * malescenario_sharing_count Crosstabulation

			malescenario_sharing_count			
			0	1	2	3
femalescenario_sharing_count	0	Count	2	1	1	1
		Expected Count	.1	.1	.2	.7
	1	Count	0	2	0	2
		Expected Count	.1	.1	.2	.7
	2	Count	0	0	1	3
		Expected Count	.1	.2	.4	1.5
	3	Count	0	0	2	10
		Expected Count	.3	.5	1.2	4.3
	4	Count	0	0	3	6
		Expected Count	.4	.6	1.5	5.5
	5	Count	0	0	0	4
		Expected Count	1.0	1.5	3.6	13.2
Total		Count	2	3	7	26
		Expected Count	2.0	3.0	7.0	26.0

femalescenario_sharing_count * malescenario_sharing_count Crosstabulation

			malescenario_sharing_...		
			4	5	Total
femalescenario_sharing_count	0	Count	0	0	5
		Expected Count	1.6	2.3	5.0
	1	Count	0	1	5
		Expected Count	1.6	2.3	5.0
	2	Count	4	2	10
		Expected Count	3.3	4.6	10.0
	3	Count	12	5	29
		Expected Count	9.4	13.3	29.0
	4	Count	14	14	37
		Expected Count	12.1	16.9	37.0
	5	Count	27	58	89
		Expected Count	29.0	40.7	89.0
Total		Count	57	80	175
		Expected Count	57.0	80.0	175.0

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	173.157[a]	25	.000
Likelihood Ratio	89.172	25	.000
Linear-by-Linear Association	68.402	1	.000
N of Valid Cases	175		

a. 28 cells (77.8%) have expected count less than 5. The minimum expected count is .06.

```
Any changes made to the working file since 21-OCT-2023 12:01:07 have been l
ost.
The time now is 12:06:20.
/* remove 0&1 count cases for malescenario_sharing_count*/
USE ALL.
COMPUTE filter_$=(GENDER = 1 & malescenario_sharing_count> 1).
VARIABLE LABELS filter_$ 'GENDER = 1 & malescenario_sharing_count> 1 (FILT
ER)'.
VALUE LABELS filter_$ 0 'Not Selected' 1 'Selected'.
FORMATS filter_$ (f1.0).
FILTER BY filter_$.
EXECUTE.
CROSSTABS
  /TABLES=femalescenario_sharing_countBY malescenario_sharing_count
  /FORMAT=AVALUE TABLES
  /STATISTICS=CHISQ
  /CELLS=COUNT EXPECTED
  /COUNT ROUND CELL
  /METHOD=EXACT TIMER(5).
```


Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
femalescenario_sharing_count * malescenario_sharing_count	170	100.0%	0	0.0%	170	100.0%

femalescenario_sharing_count * malescenario_sharing_count Crosstabulation

			malescenario_sharing_count			
			2	3	4	5
femalescenario_sharing_count	0	Count	1	1	0	0
		Expected Count	.1	.3	.7	.9
	1	Count	0	2	0	1
		Expected Count	.1	.5	1.0	1.4
	2	Count	1	3	4	2
		Expected Count	.4	1.5	3.4	4.7
	3	Count	2	10	12	5
		Expected Count	1.2	4.4	9.7	13.6
	4	Count	3	6	14	14
		Expected Count	1.5	5.7	12.4	17.4
	5	Count	0	4	27	58
		Expected Count	3.7	13.6	29.8	41.9
Total		Count	7	26	57	80
		Expected Count	7.0	26.0	57.0	80.0

femalescenario_sharing_count * malescenario_sharing_count Crosstabulation

			Total
femalescenario_sharing_count	0	Count	2
		Expected Count	2.0
	1	Count	3
		Expected Count	3.0
	2	Count	10
		Expected Count	10.0
	3	Count	29
		Expected Count	29.0
	4	Count	37
		Expected Count	37.0
	5	Count	89
		Expected Count	89.0
Total		Count	170
		Expected Count	170.0

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	56.561[a]	15	.000	.[b]	
Likelihood Ratio	54.312	15	.000	.[b]	
Fisher's Exact Test	.[b]			.[b]	
Linear-by-Linear Association	39.169[c]	1	.000	.000	.000
N of Valid Cases	170				

Chi-Square Tests

	Point Probability
Pearson Chi-Square	
Likelihood Ratio	
Fisher's Exact Test	
Linear-by-Linear Association	.000
N of Valid Cases	

a. 16 cells (66.7%) have expected count less than 5. The minimum expected count is .08.

b. Cannot be computed because there is insufficient memory.

c. The standardized statistic is 6.258.


```
/* remove 0&1 count cases for malescenario_sharing_count& 0 count cases fo
r femalescenario_sharing_count*/
USE ALL.
COMPUTE filter_$=(GENDER = 1 & malescenario_sharing_count> 1 & femalescena
rio_sharing_count> 0).
VARIABLE LABELS filter_$ 'GENDER = 1 & malescenario_sharing_count> 1 & '+
    'femalescenario_sharing_count> 0 (FILTER)'.
VALUE LABELS filter_$ 0 'Not Selected' 1 'Selected'.
FORMATS filter_$ (f1.0).
FILTER BY filter_$.
EXECUTE.
CROSSTABS
  /TABLES=femalescenario_sharing_countBY malescenario_sharing_count
  /FORMAT=AVALUE TABLES
  /STATISTICS=CHISQ
  /CELLS=COUNT EXPECTED
  /COUNT ROUND CELL
  /METHOD=EXACT TIMER(5).
```

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
femalescenario_sharing_count * malescenario_sharing_count	168	100.0%	0	0.0%	168	100.0%

femalescenario_sharing_count * malescenario_sharing_count Crosstabulation

			malescenario_sharing_count			
			2	3	4	5
femalescenario_sharing_count	1	Count	0	2	0	1
		Expected Count	.1	.4	1.0	1.4
	2	Count	1	3	4	2
		Expected Count	.4	1.5	3.4	4.8
	3	Count	2	10	12	5
		Expected Count	1.0	4.3	9.8	13.8
	4	Count	3	6	14	14
		Expected Count	1.3	5.5	12.6	17.6
	5	Count	0	4	27	58
		Expected Count	3.2	13.2	30.2	42.4
Total		Count	6	25	57	80
		Expected Count	6.0	25.0	57.0	80.0

femalescenario_sharing_count * malescenario_sharing_count Crosstabulation

			Total
femalescenario_sharing_count	1	Count	3
		Expected Count	3.0
	2	Count	10
		Expected Count	10.0
	3	Count	29
		Expected Count	29.0
	4	Count	37
		Expected Count	37.0
	5	Count	89
		Expected Count	89.0
Total		Count	168
		Expected Count	168.0

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	44.356[a]	12	.000	.[b]	
Likelihood Ratio	46.784	12	.000	.[b]	
Fisher's Exact Test	.[b]			.[b]	
Linear-by-Linear Association	32.402[c]	1	.000	.000	.000
N of Valid Cases	168				

Chi-Square Tests

	Point Probability
Pearson Chi-Square	
Likelihood Ratio	
Fisher's Exact Test	
Linear-by-Linear Association	.000
N of Valid Cases	

a. 12 cells (60.0%) have expected count less than 5. The minimum expected count is .11.

b. Cannot be computed because there is insufficient memory.

c. The standardized statistic is 5.692.


```
/* remove 0&1 count cases for malescenario_sharing_count& 0&1 count cases
for femalescenario_sharing_count*/
USE ALL.
COMPUTE filter_$=(GENDER = 1 & malescenario_sharing_count> 1 & femalescena
rio_sharing_count> 1).
VARIABLE LABELS filter_$ 'GENDER = 1 & malescenario_sharing_count> 1 & '+
    'femalescenario_sharing_count> 1 (FILTER)'.
VALUE LABELS filter_$ 0 'Not Selected' 1 'Selected'.
FORMATS filter_$ (f1.0).
FILTER BY filter_$.
EXECUTE.
CROSSTABS
  /TABLES=femalescenario_sharing_countBY malescenario_sharing_count
  /FORMAT=AVALUE TABLES
  /STATISTICS=CHISQ
  /CELLS=COUNT EXPECTED
  /COUNT ROUND CELL
  /METHOD=EXACT TIMER(5).
```

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
femalescenario_sharing_count * malescenario_sharing_count	165	100.0%	0	0.0%	165	100.0%

femalescenario_sharing_count * malescenario_sharing_count Crosstabulation

			malescenario_sharing_count			
			2	3	4	5
femalescenario_sharing_count	2	Count	1	3	4	2
		Expected Count	.4	1.4	3.5	4.8
	3	Count	2	10	12	5
		Expected Count	1.1	4.0	10.0	13.9
	4	Count	3	6	14	14
		Expected Count	1.3	5.2	12.8	17.7
	5	Count	0	4	27	58
		Expected Count	3.2	12.4	30.7	42.6
Total		Count	6	23	57	79
		Expected Count	6.0	23.0	57.0	79.0

femalescenario_sharing_count * malescenario_sharing_count Crosstabulation

			Total
femalescenario_sharing_count	2	Count	10
		Expected Count	10.0
	3	Count	29
		Expected Count	29.0
	4	Count	37
		Expected Count	37.0
	5	Count	89
		Expected Count	89.0
Total		Count	165
		Expected Count	165.0

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	38.391[a]	9	.000	.000	
Likelihood Ratio	41.375	9	.000	.000	
Fisher's Exact Test	40.553			.000	
Linear-by-Linear Association	32.931[b]	1	.000	.000	.000
N of Valid Cases	165				

Chi-Square Tests

	Point Probability
Pearson Chi-Square	
Likelihood Ratio	
Fisher's Exact Test	
Linear-by-Linear Association	.000
N of Valid Cases	

a. 8 cells (50.0%) have expected count less than 5. The minimum expected count is .36.

b. The standardized statistic is 5.739.


```
 /* select male cases "/
USE ALL.
COMPUTE filter_$=(GENDER = 1).
VARIABLE LABELS filter_$ 'GENDER = 1 (FILTER)'.
VALUE LABELS filter_$ 0 'Not Selected' 1 'Selected'.
FORMATS filter_$ (f1.0).
FILTER BY filter_$.
EXECUTE.
CROSSTABS
  /TABLES=femalescenario_hiding_countBY malescenario_hiding_count
  /FORMAT=AVALUE TABLES
  /STATISTICS=CHISQ
  /CELLS=COUNT EXPECTED
  /COUNT ROUND CELL
  /METHOD=EXACT TIMER(5).
```

Crosstabs

Warnings

Some or all exact significances cannot be computed because the time limit has been exceeded.
Execution of this command stops.

femalescenario_hiding_count * malescenario_hiding_count Crosstabulation

			malescenario_hiding_count			
			0	1	2	3
femalescenario_hiding_count	0	Count	58	27	4	0
		Expected Count	40.7	29.0	13.2	3.6
	1	Count	14	14	6	3
		Expected Count	16.9	12.1	5.5	1.5
	2	Count	5	12	10	2
		Expected Count	13.3	9.4	4.3	1.2
	3	Count	2	4	3	1
		Expected Count	4.6	3.3	1.5	.4
	4	Count	1	0	2	0
		Expected Count	2.3	1.6	.7	.2
	5	Count	0	0	1	1
		Expected Count	2.3	1.6	.7	.2
Total		Count	80	57	26	7
		Expected Count	80.0	57.0	26.0	7.0

femalescenario_hiding_count * malescenario_hiding_count Crosstabulation

			malescenario_hiding_c..		
			4	5	Total
femalescenario_hiding_count	0	Count	0	0	89
		Expected Count	1.5	1.0	89.0
	1	Count	0	0	37
		Expected Count	.6	.4	37.0
	2	Count	0	0	29
		Expected Count	.5	.3	29.0
	3	Count	0	0	10
		Expected Count	.2	.1	10.0
	4	Count	2	0	5
		Expected Count	.1	.1	5.0
	5	Count	1	2	5
		Expected Count	.1	.1	5.0
Total		Count	3	2	175
		Expected Count	3.0	2.0	175.0

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	173.157[a]	25	.000
Likelihood Ratio	89.172	25	.000
Linear-by-Linear Association	68.402	1	.000
N of Valid Cases	175		

a. 28 cells (77.8%) have expected count less than 5. The minimum expected count is .06.

```
Any changes made to the working file since 21-OCT-2023 12:10:25 have been l
ost.
The time now is 12:15:34.
/* remove 4&5 count cases for malescenario_hiding_count& 4&5 count cases f
or femalescenario_hiding_count*/
USE ALL.
COMPUTE filter_$=(GENDER = 1 & femalescenario_hiding_count< 4 & malescenar
io_hiding_count< 4).
VARIABLE LABELS filter_$ 'GENDER = 1 & femalescenario_hiding_count< 4 & '+
    'malescenario_hiding_count< 4 (FILTER)'.
VALUE LABELS filter_$ 0 'Not Selected' 1 'Selected'.
FORMATS filter_$ (f1.0).
FILTER BY filter_$.
EXECUTE.
CROSSTABS
  /TABLES=femalescenario_hiding_countBY malescenario_hiding_count
  /FORMAT=AVALUE TABLES
  /STATISTICS=CHISQ
  /CELLS=COUNT EXPECTED
  /COUNT ROUND CELL
  /METHOD=EXACT TIMER(5).
```


Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
femalescenario_hiding_count * malescenario_hiding_count	165	100.0%	0	0.0%	165	100.0%

femalescenario_hiding_count * malescenario_hiding_count Crosstabulation

			malescenario_hiding_count			
			0	1	2	3
femalescenario_hiding_count	0	Count	58	27	4	0
		Expected Count	42.6	30.7	12.4	3.2
	1	Count	14	14	6	3
		Expected Count	17.7	12.8	5.2	1.3
	2	Count	5	12	10	2
		Expected Count	13.9	10.0	4.0	1.1
	3	Count	2	4	3	1
		Expected Count	4.8	3.5	1.4	.4
Total		Count	79	57	23	6
		Expected Count	79.0	57.0	23.0	6.0

femalescenario_hiding_count * malescenario_hiding_count Crosstabulation

			Total
femalescenario_hiding_count	0	Count	89
		Expected Count	89.0
	1	Count	37
		Expected Count	37.0
	2	Count	29
		Expected Count	29.0
	3	Count	10
		Expected Count	10.0
Total		Count	165
		Expected Count	165.0

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	38.391[a]	9	.000	.000	
Likelihood Ratio	41.375	9	.000	.000	
Fisher's Exact Test	40.553			.000	
Linear-by-Linear Association	32.931[b]	1	.000	.000	.000
N of Valid Cases	165				

Chi-Square Tests

	Point Probability
Pearson Chi-Square	
Likelihood Ratio	
Fisher's Exact Test	
Linear-by-Linear Association	.000
N of Valid Cases	

a. 8 cells (50.0%) have expected count less than 5. The minimum expected count is .36.

b. The standardized statistic is 5.739.

```
 /* select male cases "/
USE ALL.
COMPUTE filter_$=(GENDER = 1).
VARIABLE LABELS filter_$ 'GENDER = 1 (FILTER)'.
VALUE LABELS filter_$ 0 'Not Selected' 1 'Selected'.
FORMATS filter_$ (f1.0).
FILTER BY filter_$.
EXECUTE.
/* compare 4 behaviors by gender"/
DATASET ACTIVATE DataSet1.
CROSSTABS
  /TABLES=femalescenario_fullsharing_countBY malescenario_fullsharing_coun
t
  /FORMAT=AVALUE TABLES
  /STATISTICS=CHISQ
  /CELLS=COUNT EXPECTED
  /COUNT ROUND CELL
  /METHOD=EXACT TIMER(5).
```


Crosstabs

Warnings

Some or all exact significances cannot be computed because the time limit has been exceeded.
Execution of this command stops.

femalescenario_fullsharing_count * malescenario_fullsharing_count Crosstabulation

			malescenario_fullsharing_count			
			0	1	2	3
femalescenario_fullsharing_count	0	Count	18	9	8	4
		Expected Count	6.9	6.9	7.1	8.7
	1	Count	9	8	9	8
		Expected Count	6.4	6.4	6.6	8.0
	2	Count	4	5	7	7
		Expected Count	5.1	5.1	5.3	6.5
	3	Count	0	8	5	9
		Expected Count	5.0	5.0	5.1	6.2
	4	Count	0	1	2	5
		Expected Count	3.0	3.0	3.1	3.8
	5	Count	0	0	1	6
		Expected Count	4.6	4.6	4.8	5.8
Total		Count	31	31	32	39
		Expected Count	31.0	31.0	32.0	39.0

femalescenario_fullsharing_count * malescenario_fullsharing_count Crosstabulation

			malescenario_fullshari..		
			4	5	Total
femalescenario_fullsharing_count	0	Count	0	0	39
		Expected Count	5.3	4.0	39.0
	1	Count	2	0	36
		Expected Count	4.9	3.7	36.0
	2	Count	4	2	29
		Expected Count	4.0	3.0	29.0
	3	Count	5	1	28
		Expected Count	3.8	2.9	28.0
	4	Count	3	6	17
		Expected Count	2.3	1.7	17.0
	5	Count	10	9	26
		Expected Count	3.6	2.7	26.0
Total		Count	24	18	175
		Expected Count	24.0	18.0	175.0

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	103.482[a]	25	.000
Likelihood Ratio	117.253	25	.000
Linear-by-Linear Association	77.321	1	.000
N of Valid Cases	175		

a. 20 cells (55.6%) have expected count less than 5. The minimum expected count is 1.75.

```
Any changes made to the working file since 21-OCT-2023 12:20:57 have been l
ost.
The time now is 12:26:14.
/* remove 5 count cases for malescenario_fullsharing_count& 4 count cases
for femalescenario_fullsharing_count"/
USE ALL.
COMPUTE filter_$=(GENDER = 1 & (femalescenario_fullsharing_count< 4 or
    femalescenario_fullsharing_count> 4) & malescenario_fullsharing_count
< 5).
VARIABLE LABELS filter_$ 'GENDER = 1 & (femalescenario_fullsharing_count<
4 or '+
    'femalescenario_fullsharing_count> 4) & malescenario_fullsharing_count
 < 5 (FILTER)'.
VALUE LABELS filter_$ 0 'Not Selected' 1 'Selected'.
FORMATS filter_$ (f1.0).
FILTER BY filter_$.
EXECUTE.
CROSSTABS
  /TABLES=femalescenario_fullsharing_countBY malescenario_fullsharing_coun
t
  /FORMAT=AVALUE TABLES
  /STATISTICS=CHISQ
  /CELLS=COUNT EXPECTED
  /COUNT ROUND CELL
  /METHOD=EXACT TIMER(5).
```

Crosstabs

Warnings

Some or all exact significances cannot be computed because the time limit has been exceeded.
Execution of this command stops.

femalescenario_fullsharing_count * malescenario_fullsharing_count Crosstabulation

			malescenario_fullsharing_count			
			0	1	2	3
femalescenario_fullsharing_count	0	Count	18	9	8	4
		Expected Count	8.3	8.0	8.0	9.1
	1	Count	9	8	9	8
		Expected Count	7.6	7.4	7.4	8.4
	2	Count	4	5	7	7
		Expected Count	5.7	5.5	5.5	6.3
	3	Count	0	8	5	9
		Expected Count	5.7	5.5	5.5	6.3
	5	Count	0	0	1	6
		Expected Count	3.6	3.5	3.5	4.0
Total		Count	31	30	30	34
		Expected Count	31.0	30.0	30.0	34.0

femalescenario_fullsharing_count * malescenario_fullsharing_count Crosstabulation

			malescena...	
			4	Total
femalescenario_fullsharing_count	0	Count	0	39
		Expected Count	5.6	39.0
	1	Count	2	36
		Expected Count	5.2	36.0
	2	Count	4	27
		Expected Count	3.9	27.0
	3	Count	5	27
		Expected Count	3.9	27.0
	5	Count	10	17
		Expected Count	2.4	17.0
Total		Count	21	146
		Expected Count	21.0	146.0

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	65.267[a]	16	.000
Likelihood Ratio	72.152	16	.000
Linear-by-Linear Association	48.437	1	.000
N of Valid Cases	146		

a. 7 cells (28.0%) have expected count less than 5. The minimum expected count is 2.45.

```
/* remove 5 count cases for malescenario_fullsharing_count< 4&5 count case
s for femalescenario_fullsharing_count"/
USE ALL.
COMPUTE filter_$=(GENDER = 1 & femalescenario_fullsharing_count< 4  &
    malescenario_fullsharing_count< 5).
VARIABLE LABELS filter_$ 'GENDER = 1 & femalescenario_fullsharing_count< 4
  & '+
    'malescenario_fullsharing_count< 5 (FILTER)'.
VALUE LABELS filter_$ 0 'Not Selected' 1 'Selected'.
FORMATS filter_$ (f1.0).
FILTER BY filter_$.
EXECUTE.
/* compare 4 behaviors by gender"/
DATASET ACTIVATE DataSet1.
CROSSTABS
  /TABLES=femalescenario_fullsharing_countBY malescenario_fullsharing_coun
t
  /FORMAT=AVALUE TABLES
  /STATISTICS=CHISQ
  /CELLS=COUNT EXPECTED
  /COUNT ROUND CELL
  /METHOD=EXACT TIMER(5).
```


Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
femalescenario_fullsharing_count * malescenario_fullsharing_count	129	100.0%	0	0.0%	129	100.0%

femalescenario_fullsharing_count * malescenario_fullsharing_count Crosstabulation

			malescenario_fullsharing_count			
			0	1	2	3
femalescenario_fullsharing_count	0	Count	18	9	8	4
		Expected Count	9.4	9.1	8.8	8.5
	1	Count	9	8	9	8
		Expected Count	8.7	8.4	8.1	7.8
	2	Count	4	5	7	7
		Expected Count	6.5	6.3	6.1	5.9
	3	Count	0	8	5	9
		Expected Count	6.5	6.3	6.1	5.9
Total		Count	31	30	29	28
		Expected Count	31.0	30.0	29.0	28.0

femalescenario_fullsharing_count * malescenario_fullsharing_count Crosstabulation

			malescena...	
			4	Total
femalescenario_fullsharing_count	0	Count	0	39
		Expected Count	3.3	39.0
	1	Count	2	36
		Expected Count	3.1	36.0
	2	Count	4	27
		Expected Count	2.3	27.0
	3	Count	5	27
		Expected Count	2.3	27.0
Total		Count	11	129
		Expected Count	11.0	129.0

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	29.023[a]	12	.004	.[b]	
Likelihood Ratio	36.621	12	.000	.[b]	
Fisher's Exact Test	.[b]			.[b]	
Linear-by-Linear Association	23.274	1	.000	.[b]	.[b]
N of Valid Cases	129				

a. 4 cells (20.0%) have expected count less than 5. The minimum expected count is 2.30.

b. Cannot be computed because there is insufficient memory.

```
/* remove 4&5 count cases for malescenario_fullsharing_count& 4&5 count ca
ses for femalescenario_fullsharing_count"/
USE ALL.
COMPUTE filter_$=(GENDER = 1 & femalescenario_fullsharing_count< 4  &
    malescenario_fullsharing_count< 4).
VARIABLE LABELS filter_$ 'GENDER = 1 & femalescenario_fullsharing_count< 4
  & '+
    'malescenario_fullsharing_count< 4 (FILTER)'.
VALUE LABELS filter_$ 0 'Not Selected' 1 'Selected'.
FORMATS filter_$ (f1.0).
FILTER BY filter_$.
EXECUTE.
/* compare 4 behaviors by gender"/
DATASET ACTIVATE DataSet1.
CROSSTABS
  /TABLES=femalescenario_fullsharing_countBY malescenario_fullsharing_coun
t
  /FORMAT=AVALUE TABLES
  /STATISTICS=CHISQ
  /CELLS=COUNT EXPECTED
  /COUNT ROUND CELL
  /METHOD=EXACT TIMER(5).
```

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
femalescenario_fullsharing_count * malescenario_fullsharing_count	118	100.0%	0	0.0%	118	100.0%

femalescenario_fullsharing_count * malescenario_fullsharing_count Crosstabulation

			malescenario_fullsharing_count			
			0	1	2	3
femalescenario_fullsharing_count	0	Count	18	9	8	4
		Expected Count	10.2	9.9	9.6	9.3
	1	Count	9	8	9	8
		Expected Count	8.9	8.6	8.4	8.1
	2	Count	4	5	7	7
		Expected Count	6.0	5.8	5.7	5.5
	3	Count	0	8	5	9
		Expected Count	5.8	5.6	5.4	5.2
Total		Count	31	30	29	28
		Expected Count	31.0	30.0	29.0	28.0

femalescenario_fullsharing_count * malescenario_fullsharing_count Crosstabulation

			Total
femalescenario_fullsharing_count	0	Count	39
		Expected Count	39.0
	1	Count	34
		Expected Count	34.0
	2	Count	23
		Expected Count	23.0
	3	Count	22
		Expected Count	22.0
Total		Count	118
		Expected Count	118.0

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	20.450[a]	9	.015	.[b]	
Likelihood Ratio	25.400	9	.003	.[b]	
Fisher's Exact Test	22.287			.006	
Linear-by-Linear Association	15.091[c]	1	.000	.000	.000
N of Valid Cases	118				

Chi-Square Tests

	Point Probability
Pearson Chi-Square	
Likelihood Ratio	
Fisher's Exact Test	
Linear-by-Linear Association	.000
N of Valid Cases	

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 5.22.

b. Cannot be computed because there is insufficient memory.

c. The standardized statistic is 3.885.

```
 USE ALL.
COMPUTE filter_$=(GENDER = 1).
VARIABLE LABELS filter_$ 'GENDER = 1 (FILTER)'.
VALUE LABELS filter_$ 0 'Not Selected' 1 'Selected'.
FORMATS filter_$ (f1.0).
FILTER BY filter_$.
EXECUTE.
CROSSTABS
  /TABLES=femalescenario_partialsharing_count BY malescenario_partialsharin
g_count
  /FORMAT=AVALUE TABLES
  /STATISTICS=CHISQ
  /CELLS=COUNT EXPECTED
  /COUNT ROUND CELL
  /METHOD=EXACT TIMER(5).
```


Crosstabs

Warnings

Some or all exact significances cannot be computed because the time limit has been exceeded.
Execution of this command stops.

femalescenario_partialsharing_count * malescenario_partialsharing_count Crosstabulation

			malescenario_partialsharing_count			
			0	1	2	3
femalescenario_partialsharing_count	0	Count	18	11	4	3
		Expected Count	7.4	7.2	10.1	6.8
	1	Count	10	7	14	6
		Expected Count	7.8	7.6	10.6	7.2
	2	Count	4	11	15	10
		Expected Count	9.5	9.2	12.9	8.7
	3	Count	3	4	10	8
		Expected Count	6.2	6.0	8.4	5.7
	4	Count	1	1	3	5
		Expected Count	3.3	3.2	4.5	3.0
	5	Count	0	1	3	1
		Expected Count	1.9	1.8	2.5	1.7
Total		Count	36	35	49	33
		Expected Count	36.0	35.0	49.0	33.0

femalescenario_partialsharing_count * malescenario_partialsharing_count Crosstabulation

			malescenario_partialsh..		
			4	5	Total
femalescenario_partialsharing_count	0	Count	0	0	36
		Expected Count	3.5	1.0	36.0
	1	Count	1	0	38
		Expected Count	3.7	1.1	38.0
	2	Count	5	1	46
		Expected Count	4.5	1.3	46.0
	3	Count	3	2	30
		Expected Count	2.9	.9	30.0
	4	Count	5	1	16
		Expected Count	1.6	.5	16.0
	5	Count	3	1	9
		Expected Count	.9	.3	9.0
Total		Count	17	5	175
		Expected Count	17.0	5.0	175.0

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	64.800[a]	25	.000
Likelihood Ratio	65.889	25	.000
Linear-by-Linear Association	44.655	1	.000
N of Valid Cases	175		

a. 20 cells (55.6%) have expected count less than 5. The minimum expected count is .26.

```
Any changes made to the working file since 21-OCT-2023 12:41:09 have been l
ost.
The time now is 12:46:24.
/* remove 5 count cases"/
USE ALL.
COMPUTE filter_$=(GENDER = 1 & femalescenario_partialsharing_count< 5 &
    malescenario_partialsharing_count< 5).
VARIABLE LABELS filter_$ 'GENDER = 1 & femalescenario_partialsharing_count
< 5 & '+
    'malescenario_partialsharing_count< 5 (FILTER)'.
VALUE LABELS filter_$ 0 'Not Selected' 1 'Selected'.
FORMATS filter_$ (f1.0).
FILTER BY filter_$.
EXECUTE.
CROSSTABS
  /TABLES=femalescenario_partialsharing_coun BY malescenario_partialsharin
g_count
  /FORMAT=AVALUE TABLES
  /STATISTICS=CHISQ
  /CELLS=COUNT EXPECTED
  /COUNT ROUND CELL
  /METHOD=EXACT TIMER(5).
```


Crosstabs

Warnings

Some or all exact significances cannot be computed because the time limit has been exceeded.
Execution of this command stops.

femalescenario_partialsharing_count * malescenario_partialsharing_count Crosstabulation

			malescenario_partialsharing_count			
			0	1	2	3
femalescenario_partialsharing_count	0	Count	18	11	4	3
		Expected Count	8.0	7.6	10.2	7.1
	1	Count	10	7	14	6
		Expected Count	8.4	8.0	10.8	7.5
	2	Count	4	11	15	10
		Expected Count	10.0	9.4	12.8	8.9
	3	Count	3	4	10	8
		Expected Count	6.2	5.9	8.0	5.5
	4	Count	1	1	3	5
		Expected Count	3.3	3.1	4.3	3.0
Total		Count	36	34	46	32
		Expected Count	36.0	34.0	46.0	32.0

femalescenario_partialsharing_count * malescenario_partialsharing_count Crosstabulation

			malescena...	
			4	Total
femalescenario_partialsharing_count	0	Count	0	36
		Expected Count	3.1	36.0
	1	Count	1	38
		Expected Count	3.3	38.0
	2	Count	5	45
		Expected Count	3.9	45.0
	3	Count	3	28
		Expected Count	2.4	28.0
	4	Count	5	15
		Expected Count	1.3	15.0
Total		Count	14	162
		Expected Count	14.0	162.0

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	50.787[a]	16	.000
Likelihood Ratio	50.512	16	.000
Linear-by-Linear Association	36.326	1	.000
N of Valid Cases	162		

a. 9 cells (36.0%) have expected count less than 5. The minimum expected count is 1.30.

```
Any changes made to the working file since 21-OCT-2023 12:46:50 have been l
ost.
The time now is 12:52:01.
/* remove 4&5 count cases"/
USE ALL.
COMPUTE filter_$=(GENDER = 1 & femalescenario_partialsharing_count< 4 &
    malescenario_partialsharing_count< 4).
VARIABLE LABELS filter_$ 'GENDER = 1 & femalescenario_partialsharing_count
< 4 & '+
    'malescenario_partialsharing_count< 4 (FILTER)'.
VALUE LABELS filter_$ 0 'Not Selected' 1 'Selected'.
FORMATS filter_$ (f1.0).
FILTER BY filter_$.
EXECUTE.
CROSSTABS
  /TABLES=femalescenario_partialsharing_coun BY malescenario_partialsharin
g_count
  /FORMAT=AVALUE TABLES
  /STATISTICS=CHISQ
  /CELLS=COUNT EXPECTED
  /COUNT ROUND CELL
  /METHOD=EXACT TIMER(5).
```


Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
femalescenario_partialsharing_count * malescenario_partialsharing_count	138	100.0%	0	0.0%	138	100.0%

femalescenario_partialsharing_count * malescenario_partialsharing_count Crosstabulation

			malescenario_partialsharing_count			
			0	1	2	3
femalescenario_partialsharing_count	0	Count	18	11	4	3
		Expected Count	9.1	8.6	11.2	7.0
	1	Count	10	7	14	6
		Expected Count	9.4	8.8	11.5	7.2
	2	Count	4	11	15	10
		Expected Count	10.1	9.6	12.5	7.8
	3	Count	3	4	10	8
		Expected Count	6.3	6.0	7.8	4.9
Total		Count	35	33	43	27
		Expected Count	35.0	33.0	43.0	27.0

femalescenario_partialsharing_count * malescenario_partialsharing_count Crosstabulation

			Total
femalescenario_partialsharing_count	0	Count	36
		Expected Count	36.0
	1	Count	37
		Expected Count	37.0
	2	Count	40
		Expected Count	40.0
	3	Count	25
		Expected Count	25.0
Total		Count	138
		Expected Count	138.0

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	27.488[a]	9	.001	.[b]	
Likelihood Ratio	28.885	9	.001	.[b]	
Fisher's Exact Test	.[b]			.[b]	
Linear-by-Linear Association	20.637	1	.000	.[b]	.[b]
N of Valid Cases	138				

a. 1 cells (6.3%) have expected count less than 5. The minimum expected count is 4.89.

b. Cannot be computed because there is insufficient memory.

```
 USE ALL.
COMPUTE filter_$=(GENDER = 1).
VARIABLE LABELS filter_$ 'GENDER = 1 (FILTER)'.
VALUE LABELS filter_$ 0 'Not Selected' 1 'Selected'.
FORMATS filter_$ (f1.0).
FILTER BY filter_$.
EXECUTE.
CROSSTABS
  /TABLES=femalescenario_evasivehiding_countBY malescenario_evasivehiding_
count
  /FORMAT=AVALUE TABLES
  /STATISTICS=CHISQ
  /CELLS=COUNT EXPECTED
  /COUNT ROUND CELL
  /METHOD=EXACT TIMER(5).
```

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
femalescenario_evasivehiding_count * malescenario_evasivehiding_count	175	100.0%	0	0.0%	175	100.0%

femalescenario_evasivehiding_count * malescenario_evasivehiding_count Crosstabulation

			malescenario_evasivehiding_count			
			0	1	2	3
femalescenario_evasivehiding_count	0	Count	86	26	4	2
		Expected Count	73.5	32.4	10.1	2.0
	1	Count	16	14	4	0
		Expected Count	21.2	9.3	2.9	.6
	2	Count	6	7	5	0
		Expected Count	11.2	4.9	1.5	.3
	3	Count	1	0	2	1
		Expected Count	2.5	1.1	.3	.1
	4	Count	0	1	0	0
		Expected Count	.6	.3	.1	.0
Total		Count	109	48	15	3
		Expected Count	109.0	48.0	15.0	3.0

femalescenario_evasivehiding_count * malescenario_evasivehiding_count Crosstabulation

			Total
femalescenario_evasivehiding_count	0	Count	118
		Expected Count	118.0
	1	Count	34
		Expected Count	34.0
	2	Count	18
		Expected Count	18.0
	3	Count	4
		Expected Count	4.0
	4	Count	1
		Expected Count	1.0
Total		Count	175
		Expected Count	175.0

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	48.308[a]	12	.000	.018	
Likelihood Ratio	35.424	12	.000	.000	
Fisher's Exact Test	38.743			.000	
Linear-by-Linear Association	23.969[b]	1	.000	.000	.000
N of Valid Cases	175				

Chi-Square Tests

	Point Probability
Pearson Chi-Square	
Likelihood Ratio	
Fisher's Exact Test	
Linear-by-Linear Association	.000
N of Valid Cases	

a. 14 cells (70.0%) have expected count less than 5. The minimum expected count is .02.

b. The standardized statistic is 4.896.


```
CROSSTABS
  /TABLES=femalescenario_playingdumb_count BY malescenario_playingdumb_coun
```

```
t
  /FORMAT=AVALUE TABLES
  /STATISTICS=CHISQ
  /CELLS=COUNT EXPECTED
  /COUNT ROUND CELL
  /METHOD=EXACT TIMER(5).
```

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
femalescenario_playingdumb_count * malescenario_playingdumb_count	175	100.0%	0	0.0%	175	100.0%

femalescenario_playingdumb_count * malescenario_playingdumb_count Crosstabulation

			malescenario_playingdumb_count			
			0	1	2	3
femalescenario_playingdumb_count	0	Count	90	28	1	0
		Expected Count	83.6	28.6	5.4	.7
	1	Count	25	9	2	0
		Expected Count	25.3	8.6	1.6	.2
	2	Count	8	3	3	1
		Expected Count	10.5	3.6	.7	.1
	3	Count	0	2	0	0
		Expected Count	2.1	.7	.1	.0
	4	Count	0	0	1	0
		Expected Count	.7	.2	.0	.0
	5	Count	0	0	1	0
		Expected Count	.7	.2	.0	.0
Total		Count	123	42	8	1
		Expected Count	123.0	42.0	8.0	1.0

femalescenario_playingdumb_count * malescenario_playingdumb_count Crosstabulation

			malescena...	
			4	Total
femalescenario_playingdumb_count	0	Count	0	119
		Expected Count	.7	119.0
	1	Count	0	36
		Expected Count	.2	36.0
	2	Count	0	15
		Expected Count	.1	15.0
	3	Count	1	3
		Expected Count	.0	3.0
	4	Count	0	1
		Expected Count	.0	1.0
	5	Count	0	1
		Expected Count	.0	1.0
Total		Count	1	175
		Expected Count	1.0	175.0

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	126.986[a]	20	.000	.023	
Likelihood Ratio	42.427	20	.002	.000	
Fisher's Exact Test	62.648			.000	
Linear-by-Linear Association	32.837[b]	1	.000	.000	.000
N of Valid Cases	175				

Chi-Square Tests

	Point Probability
Pearson Chi-Square	
Likelihood Ratio	
Fisher's Exact Test	
Linear-by-Linear Association	.000
N of Valid Cases	

a. 24 cells (80.0%) have expected count less than 5. The minimum expected count is .01.

b. The standardized statistic is 5.730.

```
 FILTER OFF.
USE ALL.
EXECUTE.
GLM percent_email_sharing_countpercent_video_sharing_countpercent_chat_sh
aring_count
  /WSFACTOR=media 3 Polynomial
  /METHOD=SSTYPE(3)
  /EMMEANS=TABLES(media) COMPARE ADJ(BONFERRONI)
  /PRINT=DESCRIPTIVE
  /CRITERIA=ALPHA(.05)
```

General Linear Model

Within-Subjects Factors

Measure: MEASURE_1

media	Dependent Variable
1	percent_email_sharing_count
2	percent_video_sharing_count
3	percent_chat_sharing_count

Descriptive Statistics

	Mean	Std. Deviation	N
percent_email_sharing_count	.7975	.26595	263
percent_video_sharing_count	.7852	.27272	263
percent_chat_sharing_count	.8669	.24590	263

Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df	Sig.
media	Pillai's Trace	.073	10.344[b]	2.000	261.000	.000
	Wilks' Lambda	.927	10.344[b]	2.000	261.000	.000
	Hotelling's Trace	.079	10.344[b]	2.000	261.000	.000
	Roy's Largest Root	.079	10.344[b]	2.000	261.000	.000

a. Design: Intercept
Within Subjects Design: media

b. Exact statistic

Mauchly's Test of Sphericity[a]

Measure: MEASURE_1

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon[b] Greenhouse-Geisser
media	.877	34.397	2	.000	.890

Mauchly's Test of Sphericity[a]

Measure: MEASURE_1

Within Subjects Effect	Epsilon[b] Huynh-Feldt	Lower-bound
media	.896	.500

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. Design: Intercept
Within Subjects Design: media

b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square	F
media	Sphericity Assumed	1.021	2	.511	13.202
	Greenhouse-Geisser	1.021	1.780	.574	13.202
	Huynh-Feldt	1.021	1.792	.570	13.202
	Lower-bound	1.021	1.000	1.021	13.202
Error(media)	Sphericity Assumed	20.270	524	.039	
	Greenhouse-Geisser	20.270	466.410	.043	
	Huynh-Feldt	20.270	469.380	.043	
	Lower-bound	20.270	262.000	.077	

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Sig.
media	Sphericity Assumed	.000
	Greenhouse-Geisser	.000
	Huynh-Feldt	.000
	Lower-bound	.000
Error(media)	Sphericity Assumed	
	Greenhouse-Geisser	
	Huynh-Feldt	
	Lower-bound	

Tests of Within-Subjects Contrasts

Measure: MEASURE_1

Source	media	Type III Sum of Squares	df	Mean Square	F	Sig.
media	Linear	.633	1	.633	17.890	.000
	Quadratic	.388	1	.388	9.248	.003
Error(media)	Linear	9.273	262	.035		
	Quadratic	10.997	262	.042		

Tests of Between-Subjects Effects

Measure: MEASURE_1

Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	526.056	1	526.056	4103.206	.000
Error	33.590	262	.128		

Estimated Marginal Means

media

Estimates

Measure: MEASURE_1

media	Mean	Std. Error	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
1	.798	.016	.765	.830
2	.785	.017	.752	.818
3	.867	.015	.837	.897

Pairwise Comparisons

Measure: MEASURE_1

(I) media	(J) media	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b] Lower Bound	Upper Bound
1	2	.012	.015	1.000	-.023	.048
	3	-.069*	.016	.000	-.109	-.030
2	1	-.012	.015	1.000	-.048	.023
	3	-.082*	.020	.000	-.130	-.034
3	1	.069*	.016	.000	.030	.109
	2	.082*	.020	.000	.034	.130

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

b. Adjustment for multiple comparisons: Bonferroni.

Multivariate Tests

	Value	F	Hypothesis df	Error df	Sig.
Pillai's trace	.073	10.344[a]	2.000	261.000	.000
Wilks' lambda	.927	10.344[a]	2.000	261.000	.000
Hotelling's trace	.079	10.344[a]	2.000	261.000	.000
Roy's largest root	.079	10.344[a]	2.000	261.000	.000

Each F tests the multivariate effect of media. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.

a. Exact statistic


```
GLM percent_email_hiding_countpercent_video_hiding_countpercent_chat_hidi
ng_count
  /WSFACTOR=media 3 Polynomial
  /METHOD=SSTYPE(3)
  /EMMEANS=TABLES(media) COMPARE ADJ(BONFERRONI)
  /PRINT=DESCRIPTIVE
  /CRITERIA=ALPHA(.05)
  /WSDESIGN=media.
```

General Linear Model

Within-Subjects Factors

Measure: MEASURE_1

media	Dependent Variable
1	percent_email_hiding_count
2	percent_video_hiding_count
3	percent_chat_hiding_count

Descriptive Statistics

	Mean	Std. Deviation	N
percent_email_hiding_count	.2025	.26595	263
percent_video_hiding_count	.2148	.27272	263
percent_chat_hiding_count	.1331	.24590	263

Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df	Sig.
media	Pillai's Trace	.073	10.344[b]	2.000	261.000	.000
	Wilks' Lambda	.927	10.344[b]	2.000	261.000	.000
	Hotelling's Trace	.079	10.344[b]	2.000	261.000	.000
	Roy's Largest Root	.079	10.344[b]	2.000	261.000	.000

a. Design: Intercept
Within Subjects Design: media

b. Exact statistic

Mauchly's Test of Sphericity[a]

Measure: MEASURE_1

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon[b] Greenhouse-Geisser
media	.877	34.397	2	.000	.890

Mauchly's Test of Sphericity[a]

Measure: MEASURE_1

Within Subjects Effect	Epsilon[b] Huynh-Feldt	Lower-bound
media	.896	.500

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. Design: Intercept
Within Subjects Design: media

b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square	F
media	Sphericity Assumed	1.021	2	.511	13.202
	Greenhouse-Geisser	1.021	1.780	.574	13.202
	Huynh-Feldt	1.021	1.792	.570	13.202
	Lower-bound	1.021	1.000	1.021	13.202
Error(media)	Sphericity Assumed	20.270	524	.039	
	Greenhouse-Geisser	20.270	466.410	.043	
	Huynh-Feldt	20.270	469.380	.043	
	Lower-bound	20.270	262.000	.077	

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Sig.
media	Sphericity Assumed	.000
	Greenhouse-Geisser	.000
	Huynh-Feldt	.000
	Lower-bound	.000
Error(media)	Sphericity Assumed	
	Greenhouse-Geisser	
	Huynh-Feldt	
	Lower-bound	

Tests of Within-Subjects Contrasts

Measure: MEASURE_1

Source	media	Type III Sum of Squares	df	Mean Square	F	Sig.
media	Linear	.633	1	.633	17.890	.000
	Quadratic	.388	1	.388	9.248	.003
Error(media)	Linear	9.273	262	.035		
	Quadratic	10.997	262	.042		

Tests of Between-Subjects Effects

Measure: MEASURE_1

Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	26.556	1	26.556	207.134	.000
Error	33.590	262	.128		

Estimated Marginal Means

media

Estimates

Measure: MEASURE_1

media	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
1	.202	.016	.170	.235
2	.215	.017	.182	.248
3	.133	.015	.103	.163

Pairwise Comparisons

Measure: MEASURE_1

(I) media	(J) media	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b]	
					Lower Bound	Upper Bound
1	2	-.012	.015	1.000	-.048	.023
	3	.069*	.016	.000	.030	.109
2	1	.012	.015	1.000	-.023	.048
	3	.082*	.020	.000	.034	.130
3	1	-.069*	.016	.000	-.109	-.030
	2	-.082*	.020	.000	-.130	-.034

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

b. Adjustment for multiple comparisons: Bonferroni.

Multivariate Tests

	Value	F	Hypothesis df	Error df	Sig.
Pillai's trace	.073	10.344 [a]	2.000	261.000	.000
Wilks' lambda	.927	10.344 [a]	2.000	261.000	.000
Hotelling's trace	.079	10.344 [a]	2.000	261.000	.000
Roy's largest root	.079	10.344 [a]	2.000	261.000	.000

Each F tests the multivariate effect of media. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.

a. Exact statistic

```
/* repeated measures anova comparing media use fullsharing difference "/

GLM percent_email_fullsharing_countpercent_video_fullsharing_countpercent
_chat_fullsharing_count
  /WSFACTOR=media 3 Polynomial
  /METHOD=SSTYPE(3)
  /EMMEANS=TABLES(media) COMPARE ADJ(BONFERRONI)
  /PRINT=DESCRIPTIVE
  /CRITERIA=ALPHA(.05)
  /WSDESIGN=media.
```

General Linear Model

Within-Subjects Factors

Measure: MEASURE_1

media	Dependent Variable
1	percent_email_fullsharing_count
2	percent_video_fullsharing_count
3	percent_chat_fullsharing_count

Descriptive Statistics

	Mean	Std. Deviation	N
percent_email_fullsharing_count	.3527	.31865	263
percent_video_fullsharing_count	.4477	.35674	263
percent_chat_fullsharing_count	.5190	.38286	263

Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df	Sig.
media	Pillai's Trace	.203	33.250[b]	2.000	261.000	.000
	Wilks' Lambda	.797	33.250[b]	2.000	261.000	.000
	Hotelling's Trace	.255	33.250[b]	2.000	261.000	.000
	Roy's Largest Root	.255	33.250[b]	2.000	261.000	.000

a. Design: Intercept
Within Subjects Design: media

b. Exact statistic

Mauchly's Test of Sphericity[a]

Measure: MEASURE_1

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon[b] Greenhouse-Geisser
media	.929	19.082	2	.000	.934

Mauchly's Test of Sphericity[a]

Measure: MEASURE_1

Within Subjects Effect	Epsilon[b] Huynh-Feldt	Lower-bound
media	.941	.500

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. Design: Intercept
Within Subjects Design: media

b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square	F
media	Sphericity Assumed	3.664	2	1.832	29.722
	Greenhouse-Geisser	3.664	1.868	1.961	29.722
	Huynh-Feldt	3.664	1.881	1.948	29.722
	Lower-bound	3.664	1.000	3.664	29.722
Error(media)	Sphericity Assumed	32.295	524	.062	
	Greenhouse-Geisser	32.295	489.490	.066	
	Huynh-Feldt	32.295	492.873	.066	
	Lower-bound	32.295	262.000	.123	

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Sig.
media	Sphericity Assumed	.000
	Greenhouse-Geisser	.000
	Huynh-Feldt	.000
	Lower-bound	.000
Error(media)	Sphericity Assumed	
	Greenhouse-Geisser	
	Huynh-Feldt	
	Lower-bound	

Tests of Within-Subjects Contrasts

Measure: MEASURE_1

Source	media	Type III Sum of Squares	df	Mean Square	F	Sig.
media	Linear	3.639	1	3.639	59.062	.000
	Quadratic	.025	1	.025	.402	.527
Error(media)	Linear	16.142	262	.062		
	Quadratic	16.152	262	.062		

Tests of Between-Subjects Effects

Measure: MEASURE_1

Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	152.610	1	152.610	605.291	.000
Error	66.057	262	.252		

Estimated Marginal Means

media

Estimates

Measure: MEASURE_1

media	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
1	.353	.020	.314	.391
2	.448	.022	.404	.491
3	.519	.024	.473	.565

Pairwise Comparisons

Measure: MEASURE_1

(I) media	(J) media	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b]	
					Lower Bound	Upper Bound
1	2	-.095*	.019	.000	-.141	-.049
	3	-.166*	.022	.000	-.219	-.114
2	1	.095*	.019	.000	.049	.141
	3	-.071*	.024	.010	-.129	-.013
3	1	.166*	.022	.000	.114	.219
	2	.071*	.024	.010	.013	.129

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

b. Adjustment for multiple comparisons: Bonferroni.

Multivariate Tests

	Value	F	Hypothesis df	Error df	Sig.
Pillai's trace	.203	33.250[a]	2.000	261.000	.000
Wilks' lambda	.797	33.250[a]	2.000	261.000	.000
Hotelling's trace	.255	33.250[a]	2.000	261.000	.000
Roy's largest root	.255	33.250[a]	2.000	261.000	.000

Each F tests the multivariate effect of media. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.

a. Exact statistic

```
GLM percent_email_partialsharing_countpercent_video_partialsharing_countp
ercent_chat_partialsharing_count
  /WSFACTOR=media 3 Polynomial
```

```
/METHOD=SSTYPE(3)
/EMMEANS=TABLES(media) COMPARE ADJ(BONFERRONI)
/PRINT=DESCRIPTIVE
/CRITERIA=ALPHA(.05)
/WSDESIGN=media.
```

General Linear Model

Within-Subjects Factors

Measure: MEASURE_1

media	Dependent Variable
1	percent_email_partialsharing_count
2	percent_video_partialsharing_count
3	percent_chat_partialsharing_count

Descriptive Statistics

	Mean	Std. Deviation	N
percent_email_partialsharing_count	.4449	.29838	263
percent_video_partialsharing_count	.3375	.29216	263
percent_chat_partialsharing_count	.3479	.36506	263

Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df	Sig.
media	Pillai's Trace	.110	16.141[b]	2.000	261.000	.000
	Wilks' Lambda	.890	16.141[b]	2.000	261.000	.000
	Hotelling's Trace	.124	16.141[b]	2.000	261.000	.000
	Roy's Largest Root	.124	16.141[b]	2.000	261.000	.000

a. Design: Intercept
Within Subjects Design: media

b. Exact statistic

Mauchly's Test of Sphericity[a]

Measure: MEASURE_1

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon[b] Greenhouse-Geisser
media	.935	17.576	2	.000	.939

Mauchly's Test of Sphericity[a]

Measure: MEASURE_1

Within Subjects Effect	Epsilon[b] Huynh-Feldt	Lower-bound
media	.945	.500

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. Design: Intercept
Within Subjects Design: media

b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square	F
media	Sphericity Assumed	1.845	2	.923	13.785
	Greenhouse-Geisser	1.845	1.878	.983	13.785
	Huynh-Feldt	1.845	1.891	.976	13.785
	Lower-bound	1.845	1.000	1.845	13.785
Error(media)	Sphericity Assumed	35.071	524	.067	
	Greenhouse-Geisser	35.071	491.962	.071	
	Huynh-Feldt	35.071	495.390	.071	
	Lower-bound	35.071	262.000	.134	

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Sig.
media	Sphericity Assumed	.000
	Greenhouse-Geisser	.000
	Huynh-Feldt	.000
	Lower-bound	.000
Error(media)	Sphericity Assumed	
	Greenhouse-Geisser	
	Huynh-Feldt	
	Lower-bound	

Tests of Within-Subjects Contrasts

Measure: MEASURE_1

Source	media	Type III Sum of Squares	df	Mean Square	F	Sig.
media	Linear	1.236	1	1.236	15.552	.000
	Quadratic	.609	1	.609	11.201	.001
Error(media)	Linear	20.826	262	.079		
	Quadratic	14.245	262	.054		

Tests of Between-Subjects Effects

Measure: MEASURE_1

Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	111.987	1	111.987	644.365	.000
Error	45.534	262	.174		

Estimated Marginal Means

media

Estimates

Measure: MEASURE_1

media	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
1	.445	.018	.409	.481
2	.337	.018	.302	.373
3	.348	.023	.304	.392

Pairwise Comparisons

Measure: MEASURE_1

(I) media	(J) media	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b]	
					Lower Bound	Upper Bound
1	2	.107*	.020	.000	.060	.155
	3	.097*	.025	.000	.038	.156
2	1	-.107*	.020	.000	-.155	-.060
	3	-.010	.023	1.000	-.066	.045
3	1	-.097*	.025	.000	-.156	-.038
	2	.010	.023	1.000	-.045	.066

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

b. Adjustment for multiple comparisons: Bonferroni.

Multivariate Tests

	Value	F	Hypothesis df	Error df	Sig.
Pillai's trace	.110	16.141 [a]	2.000	261.000	.000
Wilks' lambda	.890	16.141 [a]	2.000	261.000	.000
Hotelling's trace	.124	16.141 [a]	2.000	261.000	.000
Roy's largest root	.124	16.141 [a]	2.000	261.000	.000

Each F tests the multivariate effect of media. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.

a. Exact statistic

```
/* repeated measures anova comparing media use evasivehidingdifference  "/

GLM percent_email_evasivehiding_countpercent_video_evasivehiding_countper
cent_chat_evasivehiding_count
  /WSFACTOR=media 3 Polynomial
  /METHOD=SSTYPE(3)
  /EMMEANS=TABLES(media) COMPARE ADJ(BONFERRONI)
  /PRINT=DESCRIPTIVE
  /CRITERIA=ALPHA(.05)
  /WSDESIGN=media.
```

General Linear Model

Within-Subjects Factors

Measure: MEASURE_1

media	Dependent Variable
1	percent_email_evasivehiding_count
2	percent_video_evasivehiding_count
3	percent_chat_evasivehiding_count

Descriptive Statistics

	Mean	Std. Deviation	N
percent_email_evasivehiding_count	.1036	.16186	263
percent_video_evasivehiding_count	.1483	.20806	263
percent_chat_evasivehiding_count	.0247	.10859	263

Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df	Sig.
media	Pillai's Trace	.252	43.854[b]	2.000	261.000	.000
	Wilks' Lambda	.748	43.854[b]	2.000	261.000	.000
	Hotelling's Trace	.336	43.854[b]	2.000	261.000	.000
	Roy's Largest Root	.336	43.854[b]	2.000	261.000	.000

a. Design: Intercept
Within Subjects Design: media

b. Exact statistic

Mauchly's Test of Sphericity[a]

Measure: MEASURE_1

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon[b] Greenhouse-Geisser
media	.944	14.948	2	.001	.947

Mauchly's Test of Sphericity[a]

Measure: MEASURE_1

Within Subjects Effect	Epsilon[b] Huynh-Feldt	Lower-bound
media	.954	.500

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. Design: Intercept
Within Subjects Design: media

b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square	F
media	Sphericity Assumed	2.059	2	1.030	45.827
	Greenhouse-Geisser	2.059	1.895	1.087	45.827
	Huynh-Feldt	2.059	1.908	1.079	45.827
	Lower-bound	2.059	1.000	2.059	45.827
Error(media)	Sphericity Assumed	11.774	524	.022	
	Greenhouse-Geisser	11.774	496.371	.024	
	Huynh-Feldt	11.774	499.880	.024	
	Lower-bound	11.774	262.000	.045	

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Sig.
media	Sphericity Assumed	.000
	Greenhouse-Geisser	.000
	Huynh-Feldt	.000
	Lower-bound	.000
Error(media)	Sphericity Assumed	
	Greenhouse-Geisser	
	Huynh-Feldt	
	Lower-bound	

Tests of Within-Subjects Contrasts

Measure: MEASURE_1

Source	media	Type III Sum of Squares	df	Mean Square	F	Sig.
media	Linear	.819	1	.819	47.393	.000
	Quadratic	1.241	1	1.241	44.850	.000
Error(media)	Linear	4.525	262	.017		
	Quadratic	7.249	262	.028		

Tests of Between-Subjects Effects

Measure: MEASURE_1

Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	6.708	1	6.708	184.585	.000
Error	9.521	262	.036		

Estimated Marginal Means

media

Estimates

Measure: MEASURE_1

media	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
1	.104	.010	.084	.123
2	.148	.013	.123	.174
3	.025	.007	.012	.038

Pairwise Comparisons

Measure: MEASURE_1

(I) media	(J) media	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b]	
					Lower Bound	Upper Bound
1	2	-.045*	.014	.003	-.077	-.012
	3	.079*	.011	.000	.051	.107
2	1	.045*	.014	.003	.012	.077
	3	.124*	.014	.000	.090	.157
3	1	-.079*	.011	.000	-.107	-.051
	2	-.124*	.014	.000	-.157	-.090

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

b. Adjustment for multiple comparisons: Bonferroni.

Multivariate Tests

	Value	F	Hypothesis df	Error df	Sig.
Pillai's trace	.252	43.854[a]	2.000	261.000	.000
Wilks' lambda	.748	43.854[a]	2.000	261.000	.000
Hotelling's trace	.336	43.854[a]	2.000	261.000	.000
Roy's largest root	.336	43.854[a]	2.000	261.000	.000

Each F tests the multivariate effect of media. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.

a. Exact statistic

```
/* repeated measures anova comparing media use playingdumb difference "/

GLM percent_email_playingdumb_countpercent_video_playingdumb_countpercent
```

```
_chat_playingdumb_count
  /WSFACTOR=media 3 Polynomial
  /METHOD=SSTYPE(3)
  /EMMEANS=TABLES(media) COMPARE ADJ(BONFERRONI)
  /PRINT=DESCRIPTIVE
  /CRITERIA=ALPHA(.05)
  /WSDESIGN=media.
```

General Linear Model

Within-Subjects Factors

Measure: MEASURE_1

media	Dependent Variable
1	percent_email_playingdumb_count
2	percent_video_playingdumb_count
3	percent_chat_playingdumb_count

Descriptive Statistics

	Mean	Std. Deviation	N
percent_email_playingdumb_count	.0989	.18461	263
percent_video_playingdumb_count	.0665	.14924	263
percent_chat_playingdumb_count	.1084	.22835	263

Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df	Sig.
media	Pillai's Trace	.041	5.619[b]	2.000	261.000	.004
	Wilks' Lambda	.959	5.619[b]	2.000	261.000	.004
	Hotelling's Trace	.043	5.619[b]	2.000	261.000	.004
	Roy's Largest Root	.043	5.619[b]	2.000	261.000	.004

a. Design: Intercept
Within Subjects Design: media

b. Exact statistic

Mauchly's Test of Sphericity[a]

Measure: MEASURE_1

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon[b] Greenhouse-Geisser
media	.911	24.304	2	.000	.918

Mauchly's Test of Sphericity[a]

Measure: MEASURE_1

Within Subjects Effect	Epsilon[b] Huynh-Feldt	Lower-bound
media	.925	.500

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. Design: Intercept
Within Subjects Design: media

b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square	F
media	Sphericity Assumed	.253	2	.126	5.197
	Greenhouse-Geisser	.253	1.837	.138	5.197
	Huynh-Feldt	.253	1.849	.137	5.197
	Lower-bound	.253	1.000	.253	5.197
Error(media)	Sphericity Assumed	12.747	524	.024	
	Greenhouse-Geisser	12.747	481.213	.026	
	Huynh-Feldt	12.747	484.446	.026	
	Lower-bound	12.747	262.000	.049	

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Sig.
media	Sphericity Assumed	.006
	Greenhouse-Geisser	.007
	Huynh-Feldt	.007
	Lower-bound	.023
Error(media)	Sphericity Assumed	
	Greenhouse-Geisser	
	Huynh-Feldt	
	Lower-bound	

Tests of Within-Subjects Contrasts

Measure: MEASURE_1

Source	media	Type III Sum of Squares	df	Mean Square	F	Sig.
media	Linear	.012	1	.012	.438	.509
	Quadratic	.241	1	.241	11.206	.001
Error(media)	Linear	7.113	262	.027		
	Quadratic	5.634	262	.022		

Tests of Between-Subjects Effects

Measure: MEASURE_1

Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	6.570	1	6.570	109.787	.000
Error	15.680	262	.060		

Estimated Marginal Means

media

Estimates

Measure: MEASURE_1

media	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
1	.099	.011	.076	.121
2	.067	.009	.048	.085
3	.108	.014	.081	.136

Pairwise Comparisons

Measure: MEASURE_1

(I) media	(J) media	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b]	
					Lower Bound	Upper Bound
1	2	.032*	.011	.015	.005	.060
	3	-.010	.014	1.000	-.044	.025
2	1	-.032*	.011	.015	-.060	-.005
	3	-.042*	.015	.015	-.077	-.006
3	1	.010	.014	1.000	-.025	.044
	2	.042*	.015	.015	.006	.077

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

b. Adjustment for multiple comparisons: Bonferroni.

Multivariate Tests

	Value	F	Hypothesis df	Error df	Sig.
Pillai's trace	.041	5.619[a]	2.000	261.000	.004
Wilks' lambda	.959	5.619[a]	2.000	261.000	.004
Hotelling's trace	.043	5.619[a]	2.000	261.000	.004
Roy's largest root	.043	5.619[a]	2.000	261.000	.004

Each F tests the multivariate effect of media. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.

a. Exact statistic

```
CROSSTABS
  /TABLES=scenario8_s_h BY scenario3_s_h
  /FORMAT=AVALUE TABLES
  /STATISTICS=CHISQ
  /CELLS=COUNT EXPECTED
  /COUNT ROUND CELL
  /METHOD=EXACT TIMER(5).
```

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
scenario8_s_h * scenario3_s_h	263	100.0%	0	0.0%	263	100.0%

scenario8_s_h * scenario3_s_h Crosstabulation

			scenario3_s_h		
			hiding	sharing	Total
scenario8_s_h	hiding	Count	9	35	44
		Expected Count	3.0	41.0	44.0
	sharing	Count	9	210	219
		Expected Count	15.0	204.0	219.0
Total		Count	18	245	263
		Expected Count	18.0	245.0	263.0

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	15.353[a]	1	.000	.001	.001
Continuity Correction[b]	12.896	1	.000		
Likelihood Ratio	11.621	1	.001	.001	.001
Fisher's Exact Test				.001	.001
Linear-by-Linear Association	15.294[c]	1	.000	.001	.001
N of Valid Cases	263				

Chi-Square Tests

	Point Probability
Pearson Chi-Square	
Continuity Correction[b]	
Likelihood Ratio	
Fisher's Exact Test	
Linear-by-Linear Association	.001
N of Valid Cases	

a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 3.01.

b. Computed only for a 2x2 table

c. The standardized statistic is 3.911.


```
CROSSTABS
  /TABLES=scenario8 BY scenario3
  /FORMAT=AVALUE TABLES
  /STATISTICS=CHISQ
  /CELLS=COUNT EXPECTED
  /COUNT ROUND CELL
  /METHOD=EXACT TIMER(5).
```

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
scenario8 * scenario3	263	100.0%	0	0.0%	263	100.0%

scenario8 * scenario3 Crosstabulation

			scenario3		
			playing dumb	evasive hiding	partial sharing
scenario8	playing dumb	Count	7	2	11
		Expected Count	2.0	.4	13.4
	evasive hiding	Count	0	0	4
		Expected Count	.5	.1	3.5
	partial sharing	Count	4	0	69
		Expected Count	7.4	1.5	49.5
	full sharing	Count	4	1	17
		Expected Count	5.1	1.0	34.6
Total		Count	15	3	101
		Expected Count	15.0	3.0	101.0

scenario8 * scenario3 Crosstabulation

			scenario3	
			full sharing	Total
scenario8	playing dumb	Count	15	35
		Expected Count	19.2	35.0
	evasive hiding	Count	5	9
		Expected Count	4.9	9.0
	partial sharing	Count	56	129
		Expected Count	70.6	129.0
	full sharing	Count	68	90
		Expected Count	49.3	90.0
Total		Count	144	263
		Expected Count	144.0	263.0

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	50.979[a]	9	.000	.000	
Likelihood Ratio	46.042	9	.000	.000	
Fisher's Exact Test	44.869			.000	
Linear-by-Linear Association	18.089[b]	1	.000	.000	.000
N of Valid Cases	263				

Chi-Square Tests

	Point Probability
Pearson Chi-Square	
Likelihood Ratio	
Fisher's Exact Test	
Linear-by-Linear Association	.000
N of Valid Cases	

a. 8 cells (50.0%) have expected count less than 5. The minimum expected count is .10.

b. The standardized statistic is 4.253.

```
GLM percent_experience_sharing_count percent_documents_sharing_count
   percent_relationships_sharing_count
 /WSFACTOR=knowledge_type 3 Polynomial
 /METHOD=SSTYPE(3)
 /EMMEANS=TABLES(knowledge_type) COMPARE ADJ(BONFERRONI)
 /PRINT=DESCRIPTIVE
 /CRITERIA=ALPHA(.05)
 /WSDESIGN=knowledge_type.
```

General Linear Model

Within-Subjects Factors

Measure: MEASURE_1

knowledge_type	Dependent Variable
1	percent_experience_sharing_count
2	percent_documents_sharing_count
3	percent_relationships_sharing_count

Descriptive Statistics

	Mean	Std. Deviation	N
percent_experience_sharing_count	.8013	.24948	263
percent_documents_sharing_count	.8089	.24391	263
percent_relationships_sharing_count	.8118	.31157	263

Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df
knowledge_type	Pillai's Trace	.002	.208[b]	2.000	261.000
	Wilks' Lambda	.998	.208[b]	2.000	261.000
	Hotelling's Trace	.002	.208[b]	2.000	261.000
	Roy's Largest Root	.002	.208[b]	2.000	261.000

Multivariate Tests[a]

Effect		Sig.
knowledge_type	Pillai's Trace	.812
	Wilks' Lambda	.812
	Hotelling's Trace	.812
	Roy's Largest Root	.812

a. Design: Intercept
Within Subjects Design: knowledge_type

b. Exact statistic

Mauchly's Test of Sphericity[a]

Measure: MEASURE_1

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon[b] Greenhouse-Geisser
knowledge_type	.915	23.102	2	.000	.922

Mauchly's Test of Sphericity[a]

Measure: MEASURE_1

	Epsilon[b]	
Within Subjects Effect	Huynh-Feldt	Lower-bound
knowledge_type	.928	.500

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. Design: Intercept
Within Subjects Design: knowledge_type

b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square
knowledge_type	Sphericity Assumed	.015	2	.008
	Greenhouse-Geisser	.015	1.844	.008
	Huynh-Feldt	.015	1.856	.008
	Lower-bound	.015	1.000	.015
Error(knowledge_type)	Sphericity Assumed	18.568	524	.035
	Greenhouse-Geisser	18.568	483.079	.038
	Huynh-Feldt	18.568	486.346	.038
	Lower-bound	18.568	262.000	.071

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		F	Sig.
knowledge_type	Sphericity Assumed	.217	.805
	Greenhouse-Geisser	.217	.787
	Huynh-Feldt	.217	.789
	Lower-bound	.217	.642
Error(knowledge_type)	Sphericity Assumed		
	Greenhouse-Geisser		
	Huynh-Feldt		
	Lower-bound		

Tests of Within-Subjects Contrasts

Measure: MEASURE_1

Source	knowledge_type	Type III Sum of Squares	df	Mean Square	F
knowledge_type	Linear	.014	1	.014	.329
	Quadratic	.001	1	.001	.036
Error(knowledge_type)	Linear	11.454	262	.044	
	Quadratic	7.114	262	.027	

Tests of Within-Subjects Contrasts

Measure: MEASURE_1

Source	knowledge_type	Sig.
knowledge_type	Linear	.567
	Quadratic	.849
Error(knowledge_type)	Linear	
	Quadratic	

Tests of Between-Subjects Effects

Measure: MEASURE_1
Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	514.283	1	514.283	3476.404	.000
Error	38.759	262	.148		

Estimated Marginal Means

knowledge_type

Estimates

Measure: MEASURE_1

knowledge_type	Mean	Std. Error	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
1	.801	.015	.771	.832
2	.809	.015	.779	.839
3	.812	.019	.774	.850

Pairwise Comparisons

Measure: MEASURE_1

(I) knowledge_type	(J) knowledge_type	Mean Difference (I-J)	Std. Error	Sig.[a]	95% Confidence ... Lower Bound
1	2	-.008	.014	1.000	-.041
	3	-.010	.018	1.000	-.054
2	1	.008	.014	1.000	-.026
	3	-.003	.017	1.000	-.043
3	1	.010	.018	1.000	-.033
	2	.003	.017	1.000	-.037

Pairwise Comparisons

Measure: MEASURE_1

(I) knowledge_type	(J) knowledge_type	95% Confidence Interval for [a]... Upper Bound
1	2	.026
	3	.033
2	1	.041
	3	.037
3	1	.054
	2	.043

Based on estimated marginal means

a. Adjustment for multiple comparisons: Bonferroni.

Multivariate Tests

	Value	F	Hypothesis df	Error df	Sig.
Pillai's trace	.002	.208[a]	2.000	261.000	.812
Wilks' lambda	.998	.208[a]	2.000	261.000	.812
Hotelling's trace	.002	.208[a]	2.000	261.000	.812
Roy's largest root	.002	.208[a]	2.000	261.000	.812

Each F tests the multivariate effect of knowledge_type. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.

a. Exact statistic


```
GLM percent_experience_hiding_count percent_documents_hiding_count
    percent_relationships_hiding_count
  /WSFACTOR=knowledge_type 3 Polynomial
  /METHOD=SSTYPE(3)
  /EMMEANS=TABLES(knowledge_type) COMPARE ADJ(BONFERRONI)
  /PRINT=DESCRIPTIVE
  /CRITERIA=ALPHA(.05)
  /WSDESIGN=knowledge_type.
```


General Linear Model

Within-Subjects Factors

Measure: MEASURE_1

knowledge_type	Dependent Variable
1	percent_experience_hiding_count
2	percent_documents_hiding_count
3	percent_relationships_hiding_count

Descriptive Statistics

	Mean	Std. Deviation	N
percent_experience_hiding_count	.1987	.24948	263
percent_documents_hiding_count	.1911	.24391	263
percent_relationships_hiding_count	.1882	.31157	263

Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df
knowledge_type	Pillai's Trace	.002	.208[b]	2.000	261.000
	Wilks' Lambda	.998	.208[b]	2.000	261.000
	Hotelling's Trace	.002	.208[b]	2.000	261.000
	Roy's Largest Root	.002	.208[b]	2.000	261.000

Multivariate Tests[a]

Effect		Sig.
knowledge_type	Pillai's Trace	.812
	Wilks' Lambda	.812
	Hotelling's Trace	.812
	Roy's Largest Root	.812

a. Design: Intercept
Within Subjects Design: knowledge_type

b. Exact statistic

Mauchly's Test of Sphericity[a]

Measure: MEASURE_1

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon[b] Greenhouse-Geisser
knowledge_type	.915	23.102	2	.000	.922

Mauchly's Test of Sphericity[a]

Measure: MEASURE_1

Within Subjects Effect	Epsilon[b] Huynh-Feldt	Lower-bound
knowledge_type	.928	.500

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. Design: Intercept
Within Subjects Design: knowledge_type

b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square
knowledge_type	Sphericity Assumed	.015	2	.008
	Greenhouse-Geisser	.015	1.844	.008
	Huynh-Feldt	.015	1.856	.008
	Lower-bound	.015	1.000	.015
Error(knowledge_type)	Sphericity Assumed	18.568	524	.035
	Greenhouse-Geisser	18.568	483.079	.038
	Huynh-Feldt	18.568	486.346	.038
	Lower-bound	18.568	262.000	.071

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		F	Sig.
knowledge_type	Sphericity Assumed	.217	.805
	Greenhouse-Geisser	.217	.787
	Huynh-Feldt	.217	.789
	Lower-bound	.217	.642
Error(knowledge_type)	Sphericity Assumed		
	Greenhouse-Geisser		
	Huynh-Feldt		
	Lower-bound		

Tests of Within-Subjects Contrasts

Measure: MEASURE_1

Source	knowledge_type	Type III Sum of Squares	df	Mean Square	F
knowledge_type	Linear	.014	1	.014	.329
	Quadratic	.001	1	.001	.036
Error(knowledge_type)	Linear	11.454	262	.044	
	Quadratic	7.114	262	.027	

Tests of Within-Subjects Contrasts

Measure: MEASURE_1

Source	knowledge_type	Sig.
knowledge_type	Linear	.567
	Quadratic	.849
Error(knowledge_type)	Linear	
	Quadratic	

Tests of Between-Subjects Effects

Measure: MEASURE_1
Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	29.283	1	29.283	197.942	.000
Error	38.759	262	.148		

Estimated Marginal Means

knowledge_type

Estimates

Measure: MEASURE_1

knowledge_type	Mean	Std. Error	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
1	.199	.015	.168	.229
2	.191	.015	.161	.221
3	.188	.019	.150	.226

Pairwise Comparisons

Measure: MEASURE_1

(I) knowledge_type	(J) knowledge_type	Mean Difference (I-J)	Std. Error	Sig.[a]	95% Confidence ... Lower Bound
1	2	.008	.014	1.000	-.026
	3	.010	.018	1.000	-.033
2	1	-.008	.014	1.000	-.041
	3	.003	.017	1.000	-.037
3	1	-.010	.018	1.000	-.054
	2	-.003	.017	1.000	-.043

Pairwise Comparisons

Measure: MEASURE_1

(I) knowledge_type	(J) knowledge_type	95% Confidence Interval for ... Upper Bound
1	2	.041
	3	.054
2	1	.026
	3	.043
3	1	.033
	2	.037

Based on estimated marginal means

a. Adjustment for multiple comparisons: Bonferroni.

Multivariate Tests

	Value	F	Hypothesis df	Error df	Sig.
Pillai's trace	.002	.208[a]	2.000	261.000	.812
Wilks' lambda	.998	.208[a]	2.000	261.000	.812
Hotelling's trace	.002	.208[a]	2.000	261.000	.812
Roy's largest root	.002	.208[a]	2.000	261.000	.812

Each F tests the multivariate effect of knowledge_type. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.

a. Exact statistic

```
/* repeated measures anova comparing knowledge type difference "/

GLM percent_experience_fullsharing_counpercent_documents_fullsharing_coun
```

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```
t
    percent_relationships_fullsharing_count
  /WSFACTOR=knowledge_type 3 Polynomial
  /METHOD=SSTYPE(3)
  /EMMEANS=TABLES(knowledge_type) COMPARE ADJ(BONFERRONI)
  /PRINT=DESCRIPTIVE
  /CRITERIA=ALPHA(.05)
  /WSDESIGN=knowledge_type.
```

General Linear Model

Within-Subjects Factors

Measure: MEASURE_1

knowledge_type	Dependent Variable
1	percent_experience_fullsharing_count
2	percent_documents_fullsharing_count
3	percent_relationships_fullsharing_count

Descriptive Statistics

	Mean	Std. Deviation	N
percent_experience_fullsharing_count	.3983	.33322	263
percent_documents_fullsharing_count	.4087	.30850	263
percent_relationships_fullsharing_count	.5057	.40860	263

Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df
knowledge_type	Pillai's Trace	.089	12.727[b]	2.000	261.000
	Wilks' Lambda	.911	12.727[b]	2.000	261.000
	Hotelling's Trace	.098	12.727[b]	2.000	261.000
	Roy's Largest Root	.098	12.727[b]	2.000	261.000

Multivariate Tests[a]

Effect		Sig.
knowledge_type	Pillai's Trace	.000
	Wilks' Lambda	.000
	Hotelling's Trace	.000
	Roy's Largest Root	.000

a. Design: Intercept
Within Subjects Design: knowledge_type

b. Exact statistic

Mauchly's Test of Sphericity[a]

Measure: MEASURE_1

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon[b] Greenhouse-Geisser
knowledge_type	.897	28.415	2	.000	.906

Mauchly's Test of Sphericity[a]

Measure: MEASURE_1

Within Subjects Effect	Epsilon[b] Huynh-Feldt	Lower-bound
knowledge_type	.912	.500

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. Design: Intercept
Within Subjects Design: knowledge_type

b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square
knowledge_type	Sphericity Assumed	1.845	2	.923
	Greenhouse-Geisser	1.845	1.813	1.018
	Huynh-Feldt	1.845	1.825	1.011
	Lower-bound	1.845	1.000	1.845
Error(knowledge_type)	Sphericity Assumed	28.655	524	.055
	Greenhouse-Geisser	28.655	475.002	.060
	Huynh-Feldt	28.655	478.123	.060
	Lower-bound	28.655	262.000	.109

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		F	Sig.
knowledge_type	Sphericity Assumed	16.871	.000
	Greenhouse-Geisser	16.871	.000
	Huynh-Feldt	16.871	.000
	Lower-bound	16.871	.000
Error(knowledge_type)	Sphericity Assumed		
	Greenhouse-Geisser		
	Huynh-Feldt		
	Lower-bound		

Tests of Within-Subjects Contrasts

Measure: MEASURE_1

Source	knowledge_type	Type III Sum of Squares	df	Mean Square	F
knowledge_type	Linear	1.517	1	1.517	23.194
	Quadratic	.328	1	.328	7.462
Error(knowledge_type)	Linear	17.139	262	.065	
	Quadratic	11.516	262	.044	

Tests of Within-Subjects Contrasts

Measure: MEASURE_1

Source	knowledge_type	Sig.
knowledge_type	Linear	.000
	Quadratic	.007
Error(knowledge_type)	Linear	
	Quadratic	

Tests of Between-Subjects Effects

Measure: MEASURE_1

Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	151.074	1	151.074	572.704	.000
Error	69.113	262	.264		

Estimated Marginal Means

knowledge_type

Estimates

Measure: MEASURE_1

knowledge_type	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
1	.398	.021	.358	.439
2	.409	.019	.371	.446
3	.506	.025	.456	.555

Pairwise Comparisons

Measure: MEASURE_1

(I) knowledge_type	(J) knowledge_type	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence [b]...
					Lower Bound
1	2	-.010	.017	1.000	-.051
	3	-.107*	.022	.000	-.161
2	1	.010	.017	1.000	-.030
	3	-.097*	.022	.000	-.149
3	1	.107*	.022	.000	.054
	2	.097*	.022	.000	.045

Pairwise Comparisons

Measure: MEASURE_1

(I) knowledge_type	(J) knowledge_type	95% Confidence Interval for [b]...
		Upper Bound
1	2	.030
	3	-.054
2	1	.051
	3	-.045
3	1	.161
	2	.149

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

b. Adjustment for multiple comparisons: Bonferroni.

Multivariate Tests

	Value	F	Hypothesis df	Error df	Sig.
Pillai's trace	.089	12.727 [a]	2.000	261.000	.000
Wilks' lambda	.911	12.727 [a]	2.000	261.000	.000
Hotelling's trace	.098	12.727 [a]	2.000	261.000	.000
Roy's largest root	.098	12.727 [a]	2.000	261.000	.000

Each F tests the multivariate effect of knowledge_type. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.

a. Exact statistic

```
GLM percent_experience_partialsharing_countpercent_documents_partialsharin
g_count
    percent_relationships_partialsharing_count
  /WSFACTOR=knowledge_type 3 Polynomial
  /METHOD=SSTYPE(3)
  /EMMEANS=TABLES(knowledge_type) COMPARE ADJ(BONFERRONI)
  /PRINT=DESCRIPTIVE
  /CRITERIA=ALPHA(.05)
  /WSDESIGN=knowledge_type.
```

General Linear Model

Within-Subjects Factors

Measure: MEASURE_1

knowledge_type	Dependent Variable
1	percent_experience_partialsharing_count
2	percent_documents_partialsharing_count
3	percent_relationships_partialsharing_count

Descriptive Statistics

	Mean	Std. Deviation	N
percent_experience_partialsharing_count	.4030	.29807	263
percent_documents_partialsharing_count	.4002	.27676	263
percent_relationships_partialsharing_count	.3061	.35008	263

Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df
knowledge_type	Pillai's Trace	.079	11.136[b]	2.000	261.000
	Wilks' Lambda	.921	11.136[b]	2.000	261.000
	Hotelling's Trace	.085	11.136[b]	2.000	261.000
	Roy's Largest Root	.085	11.136[b]	2.000	261.000

Multivariate Tests[a]

Effect		Sig.
knowledge_type	Pillai's Trace	.000
	Wilks' Lambda	.000
	Hotelling's Trace	.000
	Roy's Largest Root	.000

a. Design: Intercept
Within Subjects Design: knowledge_type

b. Exact statistic

Mauchly's Test of Sphericity[a]

Measure: MEASURE_1

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon[b] Greenhouse-Geisser
knowledge_type	.939	16.381	2	.000	.943

Mauchly's Test of Sphericity[a]

Measure: MEASURE_1

	Epsilon[b]	
Within Subjects Effect	Huynh-Feldt	Lower-bound
knowledge_type	.949	.500

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. Design: Intercept
Within Subjects Design: knowledge_type

b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square
knowledge_type	Sphericity Assumed	1.601	2	.801
	Greenhouse-Geisser	1.601	1.885	.849
	Huynh-Feldt	1.601	1.899	.843
	Lower-bound	1.601	1.000	1.601
Error(knowledge_type)	Sphericity Assumed	30.107	524	.057
	Greenhouse-Geisser	30.107	493.952	.061
	Huynh-Feldt	30.107	497.416	.061
	Lower-bound	30.107	262.000	.115

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		F	Sig.
knowledge_type	Sphericity Assumed	13.934	.000
	Greenhouse-Geisser	13.934	.000
	Huynh-Feldt	13.934	.000
	Lower-bound	13.934	.000
Error(knowledge_type)	Sphericity Assumed		
	Greenhouse-Geisser		
	Huynh-Feldt		
	Lower-bound		

Tests of Within-Subjects Contrasts

Measure: MEASURE_1

Source	knowledge_type	Type III Sum of Squares	df	Mean Square	F
knowledge_type	Linear	1.236	1	1.236	19.037
	Quadratic	.365	1	.365	7.304
Error(knowledge_type)	Linear	17.014	262	.065	
	Quadratic	13.093	262	.050	

Tests of Within-Subjects Contrasts

Measure: MEASURE_1

Source	knowledge_type	Sig.
knowledge_type	Linear	.000
	Quadratic	.007
Error(knowledge_type)	Linear	
	Quadratic	

Tests of Between-Subjects Effects

Measure: MEASURE_1
Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	107.881	1	107.881	623.284	.000
Error	45.348	262	.173		

Estimated Marginal Means

knowledge_type

Estimates

Measure: MEASURE_1

knowledge_type	Mean	Std. Error	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
1	.403	.018	.367	.439
2	.400	.017	.367	.434
3	.306	.022	.264	.349

Pairwise Comparisons

Measure: MEASURE_1

(I) knowledge_type	(J) knowledge_type	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence [b]... Lower Bound
1	2	.003	.018	1.000	-.041
	3	.097*	.022	.000	.043
2	1	-.003	.018	1.000	-.047
	3	.094*	.022	.000	.041
3	1	-.097*	.022	.000	-.151
	2	-.094*	.022	.000	-.147

Pairwise Comparisons

Measure: MEASURE_1

(I) knowledge_type	(J) knowledge_type	95% Confidence Interval for [b] ... Upper Bound
1	2	.047
	3	.151
2	1	.041
	3	.147
3	1	-.043
	2	-.041

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

b. Adjustment for multiple comparisons: Bonferroni.

Multivariate Tests

	Value	F	Hypothesis df	Error df	Sig.
Pillai's trace	.079	11.136[a]	2.000	261.000	.000
Wilks' lambda	.921	11.136[a]	2.000	261.000	.000
Hotelling's trace	.085	11.136[a]	2.000	261.000	.000
Roy's largest root	.085	11.136[a]	2.000	261.000	.000

Each F tests the multivariate effect of knowledge_type. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.

a. Exact statistic


```
GLM percent_experience_evasivehiding_countpercent_documents_evasivehiding_
count
    percent_relationships_evasivehiding_count
  /WSFACTOR=knowledge_type 3 Polynomial
  /METHOD=SSTYPE(3)
  /EMMEANS=TABLES(knowledge_type) COMPARE ADJ(BONFERRONI)
  /PRINT=DESCRIPTIVE
  /CRITERIA=ALPHA(.05)
  /WSDESIGN=knowledge_type.
```

General Linear Model

Within-Subjects Factors

Measure: MEASURE_1

knowledge_type	Dependent Variable
1	percent_experience_evasivehiding_count
2	percent_documents_evasivehiding_count
3	percent_relationships_evasivehiding_count

Descriptive Statistics

	Mean	Std. Deviation	N
percent_experience_evasivehiding_count	.1255	.18900	263
percent_documents_evasivehiding_count	.0817	.13976	263
percent_relationships_evasivehiding_count	.1141	.23989	263

Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df
knowledge_type	Pillai's Trace	.047	6.409[b]	2.000	261.000
	Wilks' Lambda	.953	6.409[b]	2.000	261.000
	Hotelling's Trace	.049	6.409[b]	2.000	261.000
	Roy's Largest Root	.049	6.409[b]	2.000	261.000

Multivariate Tests[a]

Effect		Sig.
knowledge_type	Pillai's Trace	.002
	Wilks' Lambda	.002
	Hotelling's Trace	.002
	Roy's Largest Root	.002

a. Design: Intercept
Within Subjects Design: knowledge_type

b. Exact statistic

Mauchly's Test of Sphericity[a]

Measure: MEASURE_1

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon[b] Greenhouse-Geisser
knowledge_type	.909	24.848	2	.000	.917

Mauchly's Test of Sphericity[a]

Measure: MEASURE_1

Within Subjects Effect	Epsilon[b] Huynh-Feldt	Lower-bound
knowledge_type	.923	.500

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. Design: Intercept
Within Subjects Design: knowledge_type

b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square
knowledge_type	Sphericity Assumed	.271	2	.135
	Greenhouse-Geisser	.271	1.833	.148
	Huynh-Feldt	.271	1.846	.147
	Lower-bound	.271	1.000	.271
Error(knowledge_type)	Sphericity Assumed	15.688	524	.030
	Greenhouse-Geisser	15.688	480.377	.033
	Huynh-Feldt	15.688	483.595	.032
	Lower-bound	15.688	262.000	.060

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		F	Sig.
knowledge_type	Sphericity Assumed	4.519	.011
	Greenhouse-Geisser	4.519	.014
	Huynh-Feldt	4.519	.013
	Lower-bound	4.519	.034
Error(knowledge_type)	Sphericity Assumed		
	Greenhouse-Geisser		
	Huynh-Feldt		
	Lower-bound		

Tests of Within-Subjects Contrasts

Measure: MEASURE_1

Source	knowledge_type	Type III Sum of Squares	df	Mean Square	F
knowledge_type	Linear	.017	1	.017	.444
	Quadratic	.253	1	.253	11.902
Error(knowledge_type)	Linear	10.108	262	.039	
	Quadratic	5.580	262	.021	

Tests of Within-Subjects Contrasts

Measure: MEASURE_1

Source	knowledge_type	Sig.
knowledge_type	Linear	.506
	Quadratic	.001
Error(knowledge_type)	Linear	
	Quadratic	

Tests of Between-Subjects Effects

Measure: MEASURE_1
Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	9.050	1	9.050	170.985	.000
Error	13.867	262	.053		

Estimated Marginal Means

knowledge_type

Estimates

Measure: MEASURE_1

knowledge_type	Mean	Std. Error	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
1	.125	.012	.103	.148
2	.082	.009	.065	.099
3	.114	.015	.085	.143

Pairwise Comparisons

Measure: MEASURE_1

(I) knowledge_type	(J) knowledge_type	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence ... Lower Bound
1	2	.044*	.013	.004	.012
	3	.011	.017	1.000	-.030
2	1	-.044*	.013	.004	-.076
	3	-.032	.015	.082	-.067
3	1	-.011	.017	1.000	-.053
	2	.032	.015	.082	-.003

Pairwise Comparisons

Measure: MEASURE_1

(I) knowledge_type	(J) knowledge_type	95% Confidence Interval for ... Upper Bound
1	2	.076
	3	.053
2	1	-.012
	3	.003
3	1	.030
	2	.067

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

b. Adjustment for multiple comparisons: Bonferroni.

Multivariate Tests

	Value	F	Hypothesis df	Error df	Sig.
Pillai's trace	.047	6.409[a]	2.000	261.000	.002
Wilks' lambda	.953	6.409[a]	2.000	261.000	.002
Hotelling's trace	.049	6.409[a]	2.000	261.000	.002
Roy's largest root	.049	6.409[a]	2.000	261.000	.002

Each F tests the multivariate effect of knowledge_type. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.

a. Exact statistic

```
GLM percent_experience_playingdumb_countpercent_documents_playingdumb_coun
t
    percent_relationships_playingdumb_count
  /WSFACTOR=knowledge_type 3 Polynomial
  /METHOD=SSTYPE(3)
  /EMMEANS=TABLES(knowledge_type) COMPARE ADJ(BONFERRONI)
  /PRINT=DESCRIPTIVE
  /CRITERIA=ALPHA(.05)
  /WSDESIGN=knowledge_type.
```

General Linear Model

Within-Subjects Factors

Measure: MEASURE_1

knowledge_type	Dependent Variable
1	percent_experience_playingdumb_count
2	percent_documents_playingdumb_count
3	percent_relationships_playingdumb_count

Descriptive Statistics

	Mean	Std. Deviation	N
percent_experience_playingdumb_count	.0732	.16232	263
percent_documents_playingdumb_count	.1093	.18708	263
percent_relationships_playingdumb_count	.0741	.19832	263

Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df
knowledge_type	Pillai's Trace	.043	5.908[b]	2.000	261.000
	Wilks' Lambda	.957	5.908[b]	2.000	261.000
	Hotelling's Trace	.045	5.908[b]	2.000	261.000
	Roy's Largest Root	.045	5.908[b]	2.000	261.000

Multivariate Tests[a]

Effect		Sig.
knowledge_type	Pillai's Trace	.003
	Wilks' Lambda	.003
	Hotelling's Trace	.003
	Roy's Largest Root	.003

a. Design: Intercept
Within Subjects Design: knowledge_type

b. Exact statistic

Mauchly's Test of Sphericity[a]

Measure: MEASURE_1

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon[b] Greenhouse-Geisser
knowledge_type	.941	15.864	2	.000	.944

Mauchly's Test of Sphericity[a]

Measure: MEASURE_1

Within Subjects Effect	Epsilon[b] Huynh-Feldt	Lower-bound
knowledge_type	.951	.500

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. Design: Intercept
Within Subjects Design: knowledge_type

b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square
knowledge_type	Sphericity Assumed	.223	2	.111
	Greenhouse-Geisser	.223	1.889	.118
	Huynh-Feldt	.223	1.902	.117
	Lower-bound	.223	1.000	.223
Error(knowledge_type)	Sphericity Assumed	12.069	524	.023
	Greenhouse-Geisser	12.069	494.820	.024
	Huynh-Feldt	12.069	498.300	.024
	Lower-bound	12.069	262.000	.046

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		F	Sig.
knowledge_type	Sphericity Assumed	4.839	.008
	Greenhouse-Geisser	4.839	.009
	Huynh-Feldt	4.839	.009
	Lower-bound	4.839	.029
Error(knowledge_type)	Sphericity Assumed		
	Greenhouse-Geisser		
	Huynh-Feldt		
	Lower-bound		

Tests of Within-Subjects Contrasts

Measure: MEASURE_1

Source	knowledge_type	Type III Sum of Squares	df	Mean Square	F
knowledge_type	Linear	.000	1	.000	.005
	Quadratic	.223	1	.223	11.306
Error(knowledge_type)	Linear	6.906	262	.026	
	Quadratic	5.163	262	.020	

Tests of Within-Subjects Contrasts

Measure: MEASURE_1

Source	knowledge_type	Sig.
knowledge_type	Linear	.947
	Quadratic	.001
Error(knowledge_type)	Linear	
	Quadratic	

Tests of Between-Subjects Effects

Measure: MEASURE_1

Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	5.775	1	5.775	105.739	.000
Error	14.309	262	.055		

Estimated Marginal Means

knowledge_type

Estimates

Measure: MEASURE_1

knowledge_type	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
1	.073	.010	.053	.093
2	.109	.012	.087	.132
3	.074	.012	.050	.098

Pairwise Comparisons

Measure: MEASURE_1

(I) knowledge_type	(J) knowledge_type	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence [b]...
					Lower Bound
1	2	-.036*	.012	.006	-.064
	3	-.001	.014	1.000	-.035
2	1	.036*	.012	.006	.008
	3	.035*	.014	.035	.002
3	1	.001	.014	1.000	-.033
	2	-.035*	.014	.035	-.069

Pairwise Comparisons

Measure: MEASURE_1

(I) knowledge_type	(J) knowledge_type	95% Confidence Interval for [b]...
		Upper Bound
1	2	-.008
	3	.033
2	1	.064
	3	.069
3	1	.035
	2	-.002

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

b. Adjustment for multiple comparisons: Bonferroni.

Multivariate Tests

	Value	F	Hypothesis df	Error df	Sig.
Pillai's trace	.043	5.908[a]	2.000	261.000	.003
Wilks' lambda	.957	5.908[a]	2.000	261.000	.003
Hotelling's trace	.045	5.908[a]	2.000	261.000	.003
Roy's largest root	.045	5.908[a]	2.000	261.000	.003

Each F tests the multivariate effect of knowledge_type. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.

a. Exact statistic

```
CROSSTABS
  /TABLES=scenario5_s_h BY scenario7_s_h
  /FORMAT=AVALUE TABLES
  /STATISTICS=CHISQ
  /CELLS=COUNT EXPECTED
  /COUNT ROUND CELL
  /METHOD=EXACT TIMER(5).
```

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
scenario5_s_h * scenario7_s_h	263	100.0%	0	0.0%	263	100.0%

scenario5_s_h * scenario7_s_h Crosstabulation

			scenario7_s_h		
			hiding	sharing	Total
scenario5_s_h	hiding	Count	25	19	44
		Expected Count	11.0	33.0	44.0
	sharing	Count	41	178	219
		Expected Count	55.0	164.0	219.0
Total		Count	66	197	263
		Expected Count	66.0	197.0	263.0

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	28.289[a]	1	.000	.000	.000
Continuity Correction[b]	26.299	1	.000		
Likelihood Ratio	24.975	1	.000	.000	.000
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	28.181[c]	1	.000	.000	.000
N of Valid Cases	263				

Chi-Square Tests

	Point Probability
Pearson Chi-Square	
Continuity Correction[b]	
Likelihood Ratio	
Fisher's Exact Test	
Linear-by-Linear Association	.000
N of Valid Cases	

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 11.04.

b. Computed only for a 2x2 table

c. The standardized statistic is 5.309.


```
CROSSTABS
  /TABLES=scenario5 BY scenario7
  /FORMAT=AVALUE TABLES
  /STATISTICS=CHISQ
  /CELLS=COUNT EXPECTED
  /COUNT ROUND CELL
  /METHOD=EXACT TIMER(5).
```

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
scenario5 * scenario7	263	100.0%	0	0.0%	263	100.0%

scenario5 * scenario7 Crosstabulation

			scenario7		
			playing dumb	evasive hiding	partial sharing
scenario5	playing dumb	Count	5	11	11
		Expected Count	2.2	4.8	14.3
	evasive hiding	Count	6	3	6
		Expected Count	1.3	2.7	8.2
	partial sharing	Count	4	28	92
		Expected Count	12.0	25.7	76.4
	full sharing	Count	6	3	25
		Expected Count	5.5	11.8	35.2
Total		Count	21	45	134
		Expected Count	21.0	45.0	134.0

scenario5 * scenario7 Crosstabulation

			scenario7	
			full sharing	Total
scenario5	playing dumb	Count	1	28
		Expected Count	6.7	28.0
	evasive hiding	Count	1	16
		Expected Count	3.8	16.0
	partial sharing	Count	26	150
		Expected Count	35.9	150.0
	full sharing	Count	35	69
		Expected Count	16.5	69.0
Total		Count	63	263
		Expected Count	63.0	263.0

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	78.845[a]	9	.000	.[b]	
Likelihood Ratio	71.234	9	.000	.[b]	
Fisher's Exact Test	.[b]			.[b]	
Linear-by-Linear Association	38.092	1	.000	.[b]	.[b]
N of Valid Cases	263				

a. 5 cells (31.3%) have expected count less than 5. The minimum expected count is 1.28.

b. Cannot be computed because there is insufficient memory.

```
 /* remove evasive hiding cases for scenario 5"/
USE ALL.
COMPUTE filter_$=(scenario5 < 2 or scenario5 > 2).
VARIABLE LABELS filter_$ 'scenario5 < 2 or scenario5 > 2 (FILTER)'.
VALUE LABELS filter_$ 0 'Not Selected' 1 'Selected'.
FORMATS filter_$ (f1.0).
FILTER BY filter_$.
EXECUTE.
CROSSTABS
  /TABLES=scenario5 BY scenario7
  /FORMAT=AVALUE TABLES
  /STATISTICS=CHISQ
  /CELLS=COUNT EXPECTED
  /COUNT ROUND CELL
```

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
scenario5 * scenario7	247	100.0%	0	0.0%	247	100.0%

scenario5 * scenario7 Crosstabulation

			scenario7		
			playing dumb	evasive hiding	partial sharing
scenario5	playing dumb	Count	5	11	11
		Expected Count	1.7	4.8	14.5
	partial sharing	Count	4	28	92
		Expected Count	9.1	25.5	77.7
	full sharing	Count	6	3	25
		Expected Count	4.2	11.7	35.8
Total		Count	15	42	128
		Expected Count	15.0	42.0	128.0

scenario5 * scenario7 Crosstabulation

			scenario7 full sharing	Total
scenario5	playing dumb	Count	1	28
		Expected Count	7.0	28.0
	partial sharing	Count	26	150
		Expected Count	37.7	150.0
	full sharing	Count	35	69
		Expected Count	17.3	69.0
Total		Count	62	247
		Expected Count	62.0	247.0

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	58.497[a]	6	.000	.000	
Likelihood Ratio	57.084	6	.000	.000	
Fisher's Exact Test	55.530			.000	
Linear-by-Linear Association	30.551[b]	1	.000	.000	.000
N of Valid Cases	247				

Chi-Square Tests

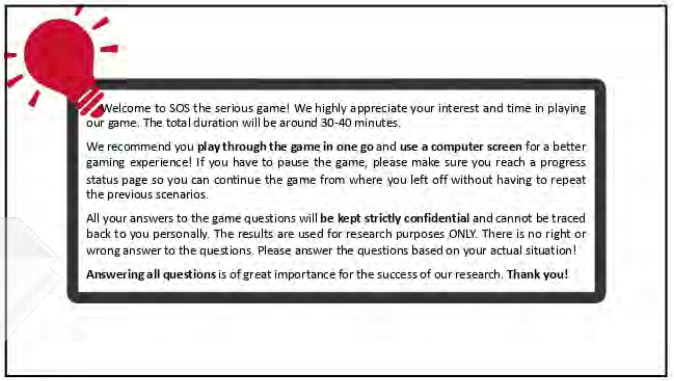
	Point Probability
Pearson Chi-Square	
Likelihood Ratio	
Fisher's Exact Test	
Linear-by-Linear Association	.000
N of Valid Cases	

a. 3 cells (25.0%) have expected count less than 5. The minimum expected count is 1.70.

b. The standardized statistic is 5.527.

Appendix 3: SOS the Serious Game Images Used on GenaGame® Platform

1



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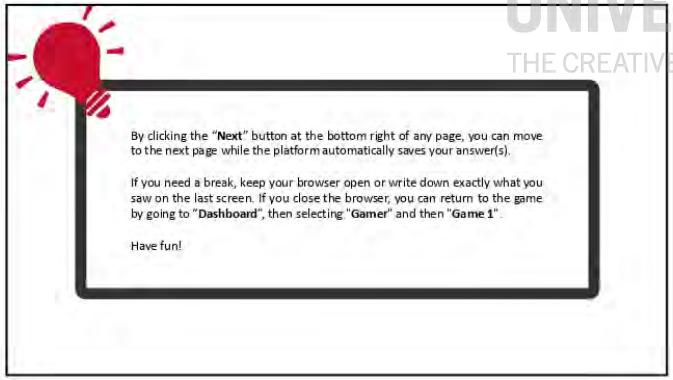

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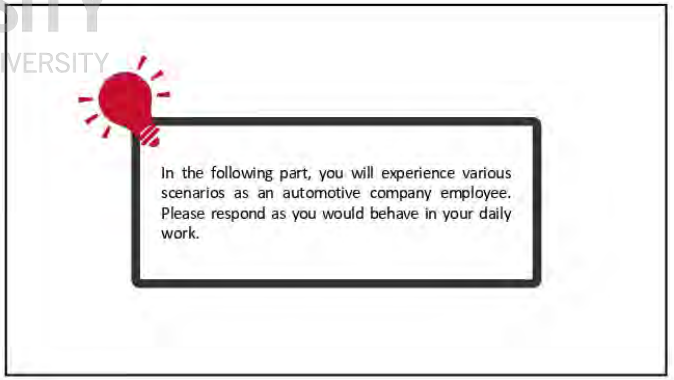

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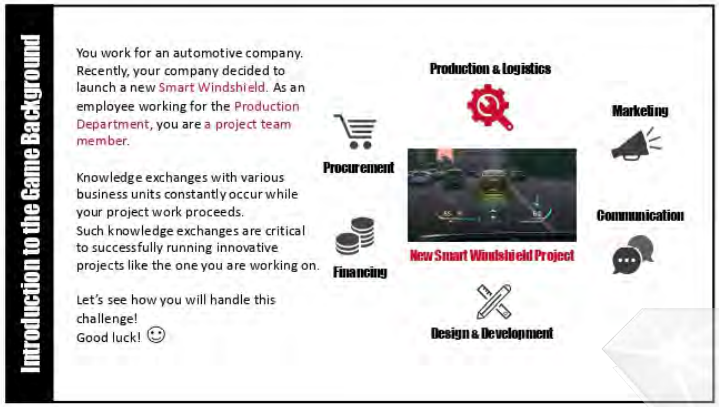

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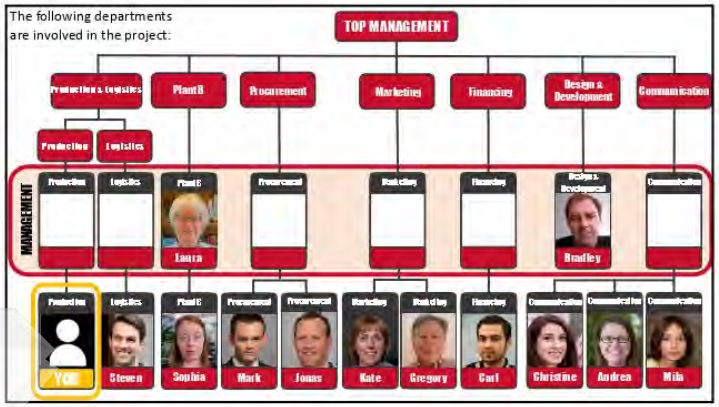

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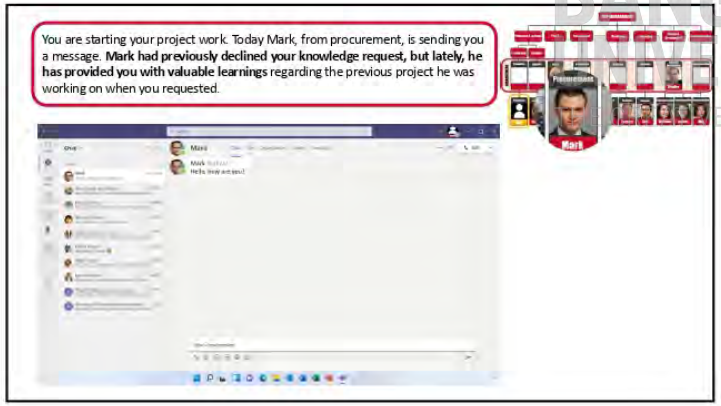
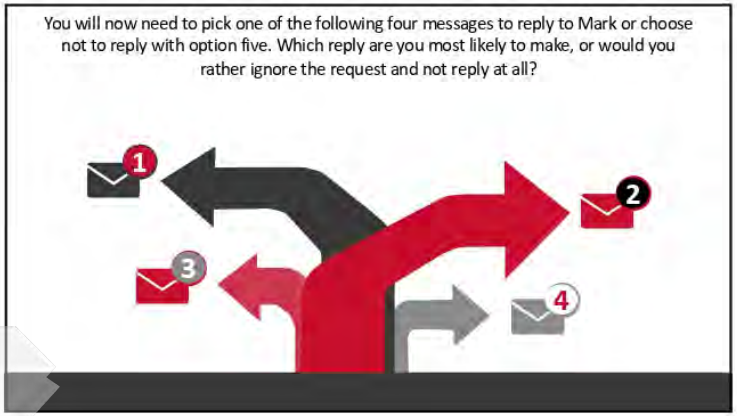


7

8

9



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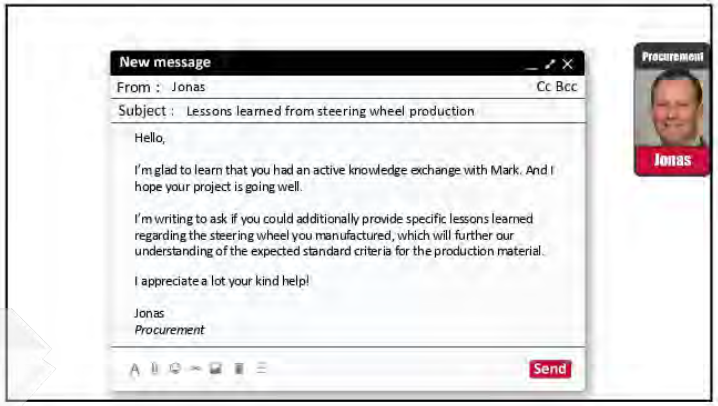
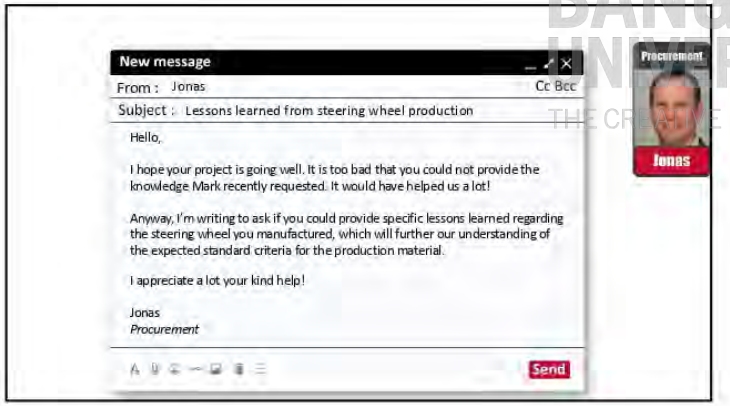
11

12

13



14



15

16

You will now need to pick one of the following four emails to reply to Jonas or choose not to reply with option five. Which reply are you most likely to make, or would you rather ignore the request and not reply at all?

17

You share all the lessons learned with Jonas.

New message
To : Jonas
Subject : **Lessons learned from steering wheel project**

Hello Jonas,
I'm attaching a document to this email detailing **ALL** lessons learned concerning the project to your request. Hope it will help.
Best regards,

1

You tell Jonas that you need time to ask around, since you are not the right person to talk to about the subject.

New message
To : Jonas
Subject : **Not sure if I can help**

Hello Jonas,
I wish I could help you, but I'm **not sure if I can** since I was not involved in the production process. Therefore, I need to ask around. Maybe we can try to connect by the end of this month when things at my side slow down a bit.
Best regards,

2

You tell Jonas that no lessons learned were documented.

New message
To : Jonas
Subject : **No lessons learned summarized**

Hello Jonas,
Nice to hear from you! Since the team did not make any particular effort to summarize and document any lessons learned, there is **nothing I can provide** in this regard.
Best regards,

3

You share some of the lessons learned that Jonas asked about.

New message
To : Jonas
Subject : **Lessons learned concerning production**

Hello Jonas,
I'm attaching a document to this email that presents **SOME** lessons learned concerning the production aspect of the previous product. Hope it will help.
Best regards,

4

5 **You ignore Jonas' email and do not reply to him.**

18

KNOWLEDGE MANAGEMENT
Learning Nuggets

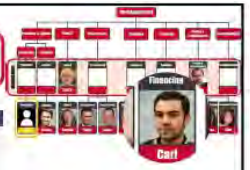
Before starting a new project, we recommend you always try to learn from peers who have worked on similar past projects. This is called

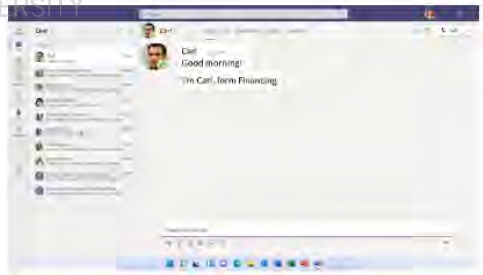
PEER ASSIST

It is a meeting where a project team invites a number of people with relevant knowledge and experience, which they bring to bear on the issues of the project. This will save you and your team from repeating previous mistakes and speed up the development of your project.

19

You get a new message! It's Carl from Financing...





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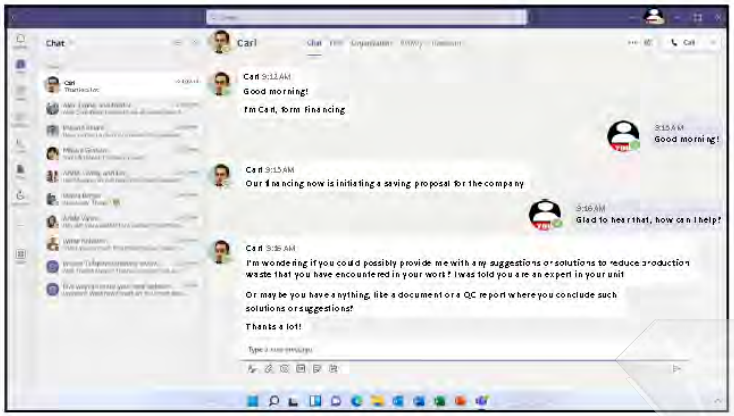

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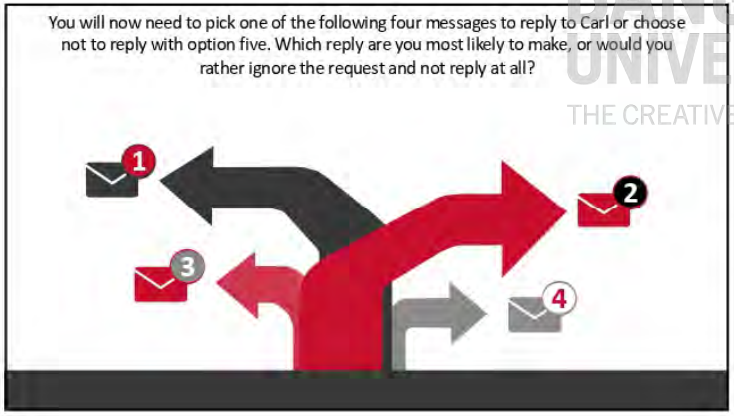
22



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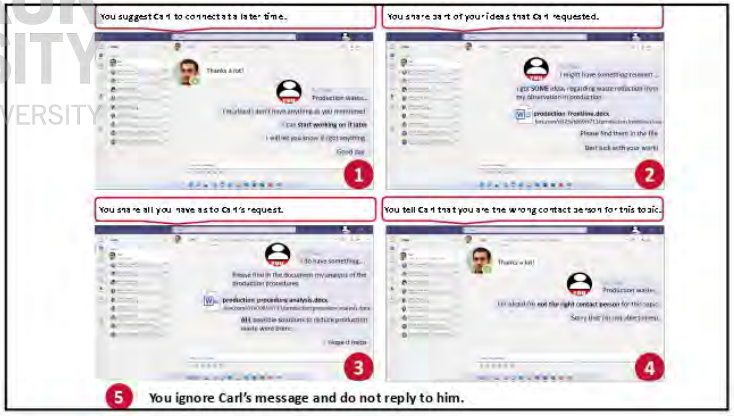
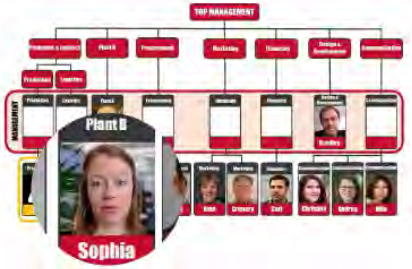


24

Great! You have already completed
20% of your project's tasks!

25

A video call jumps in. It's Sophia, who works at Plant B.
Not long ago, you asked Sophia for the best practices from her previous head-up project to get well prepared for your current project. However, **Sophia declined your request**!



26

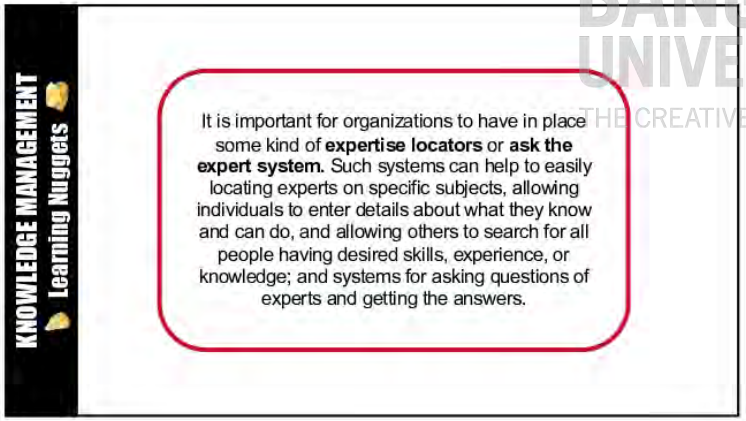
27

You do have in your possession the detailed list of experts with their competencies requested by Sophia, **who has declined your previous request**! How will you reply to her?

28

29

30



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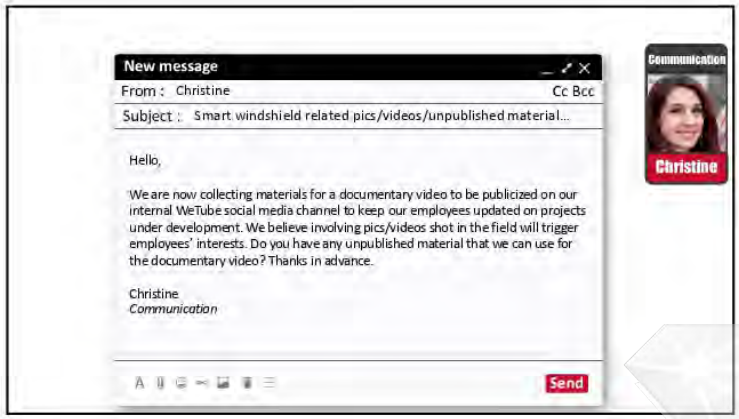
32



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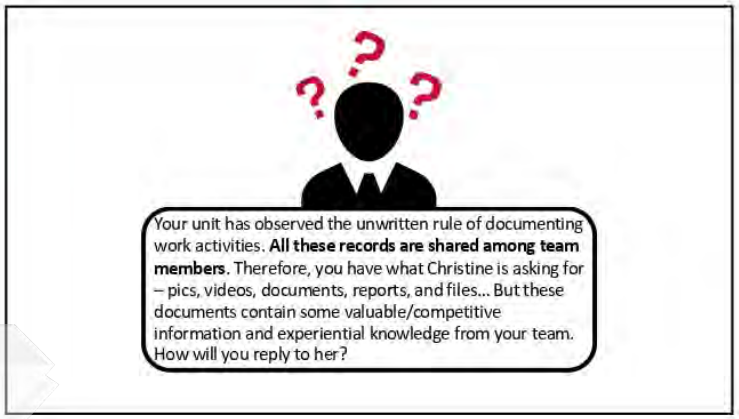

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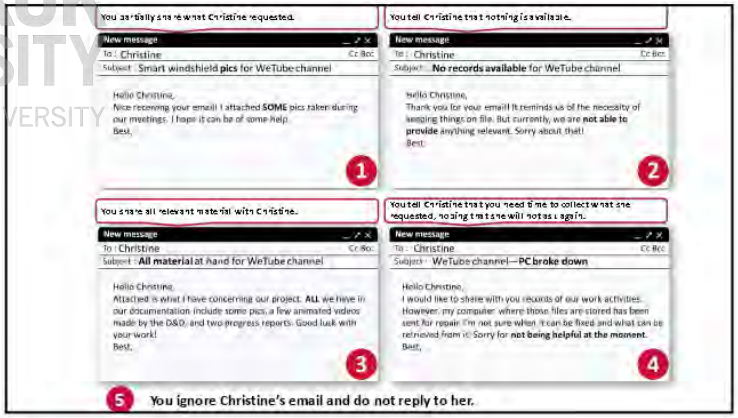
35



36

Another video call jumps in when you fill out the questionnaire. It's Gregory from Marketing...

37

38

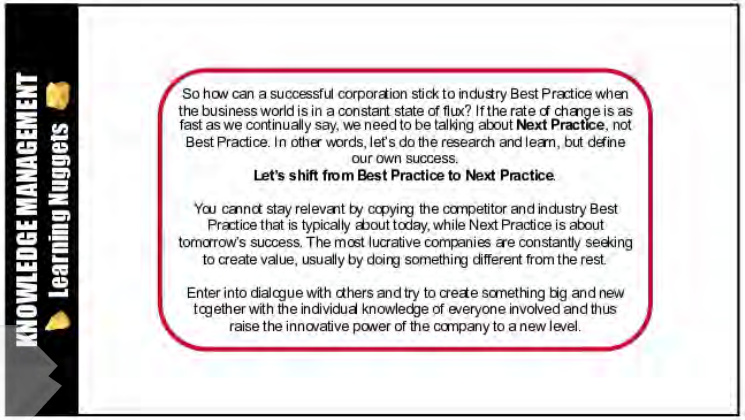
The "next practice" Gregory asked for is **a piece of hard-earned knowledge** you have developed along with the project progress. You did draw up a full proposal, kept track of the progress, and documented every adjustment made throughout the whole process. How will you reply to him?

39

You will now need to pick one of the following four messages to reply to Gregory or choose not to reply with option five. Which reply are you most likely to make, or would you rather ignore the request and not reply at all?

40

41



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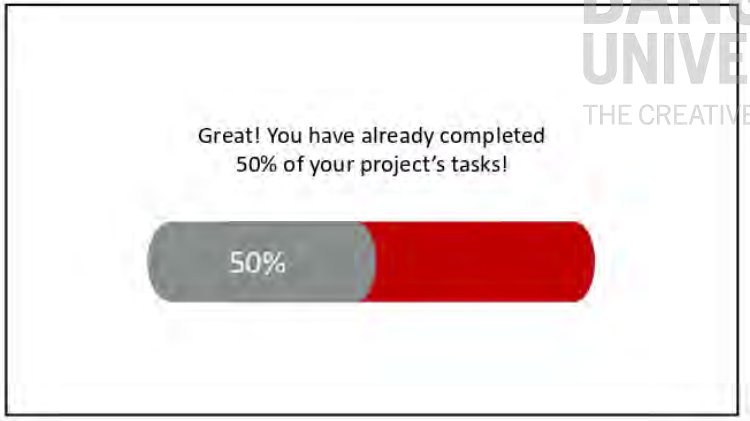
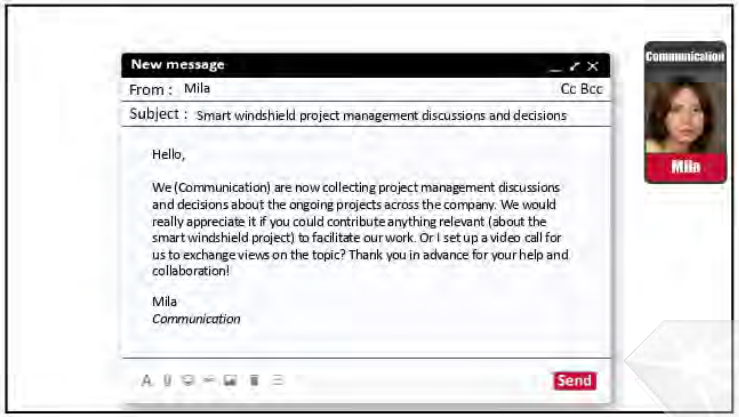
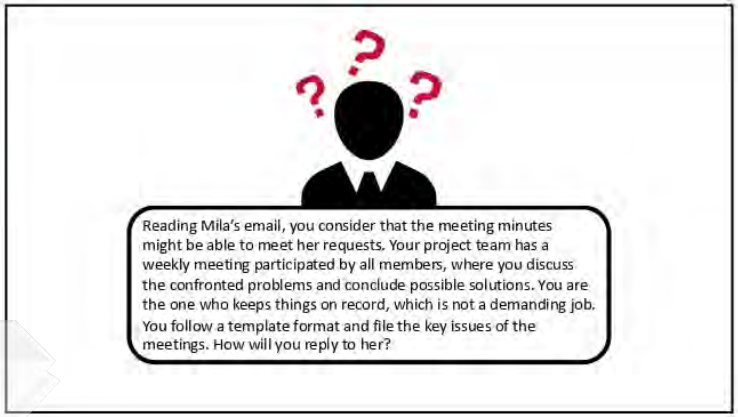


43

44

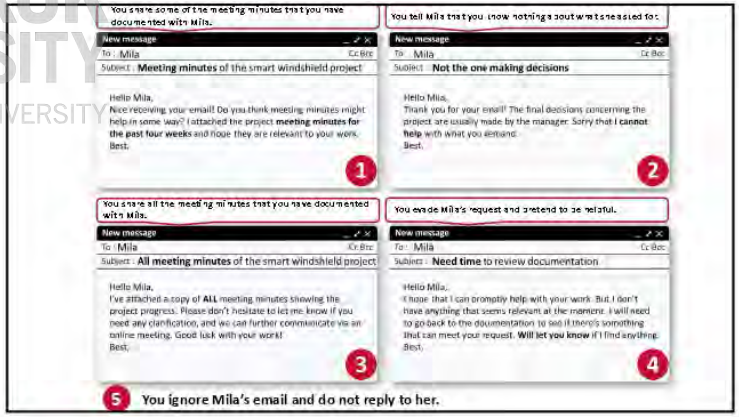


45



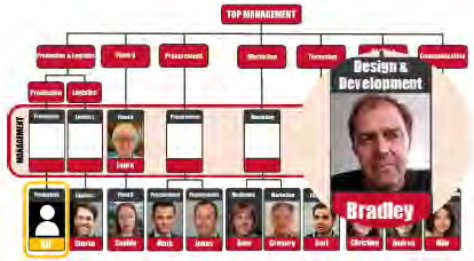
46

47



48

A video call jumps in. It's Bradley, **the Design & Development manager...**



49

50

You once had an enjoyable interaction with Mr. Muller at work and obtained his business card and a warm welcome to contact further. Over the years, you have established with Mr. Muller (a global expert in his field) a close and trusted relationship that he only maintains with very few associates / partners. He usually doesn't share his contact information since he is very busy, and he prefers collaborating with people he has already worked with in the past. Consequently, introducing a new connection to him will be a great favor you will be doing to **Bradley, the manager of the Design & Development department ...** How will you reply to him?

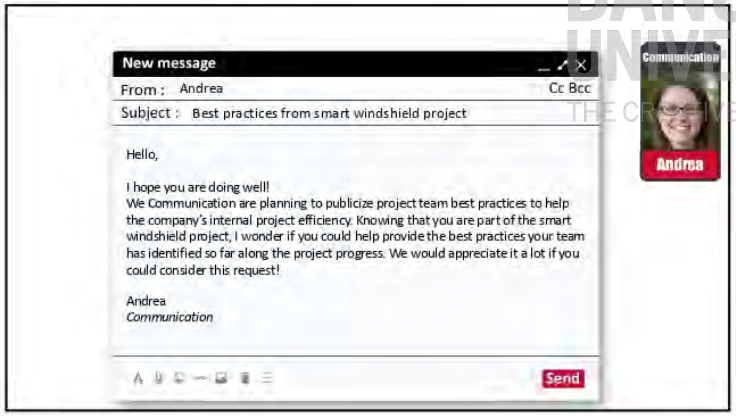
51

You will now need to pick one of the following four messages to reply to Bradley or choose not to reply with option five. Which reply are you most likely to make, or would you rather ignore the request and not reply at all?

52

53

54



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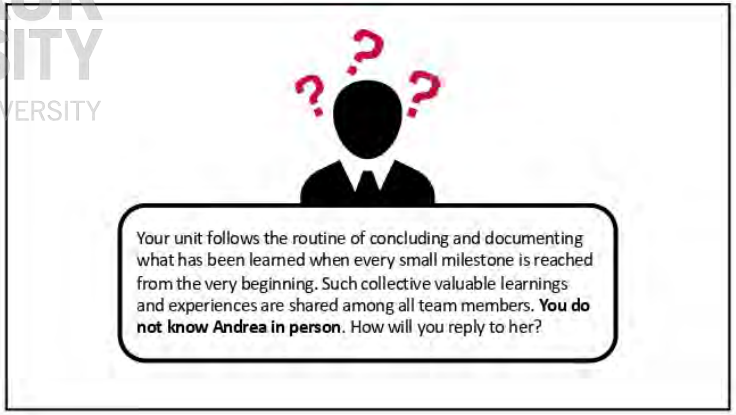
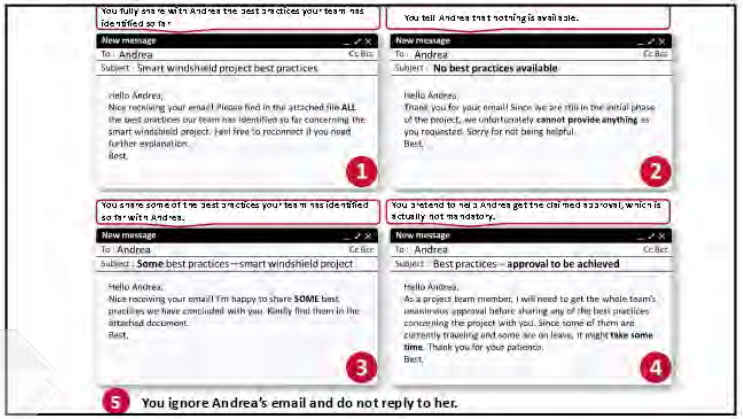
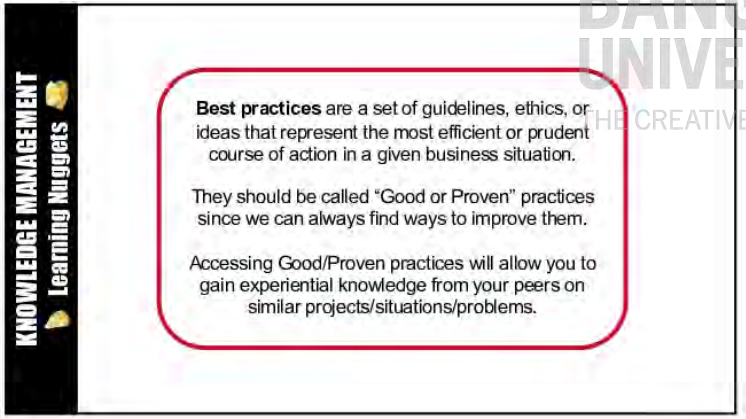


56

57



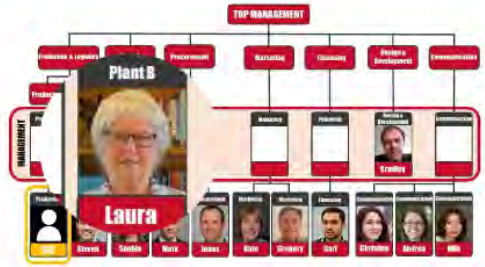
58



59

60

You receive a video call...
It's Laura, **the production manager** at B plant. You recall that when you emailed her the other time she **chose not to share** production best practices with you.



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You have the list of experts with their competencies requested by Laura, **the Manager of the B Production team, who did not provide** your demanded production best practices. How will you reply to her?

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You will now need to pick one of the following four messages to reply to Laura or choose not to reply with option five. Which reply are you most likely to make, or would you rather ignore the request and not reply at all?

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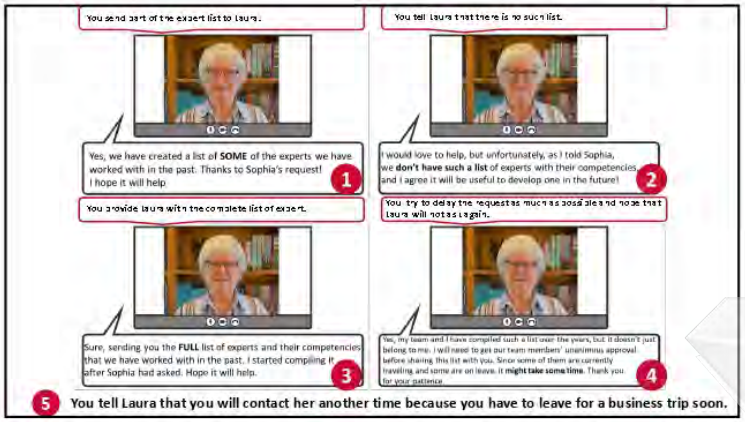

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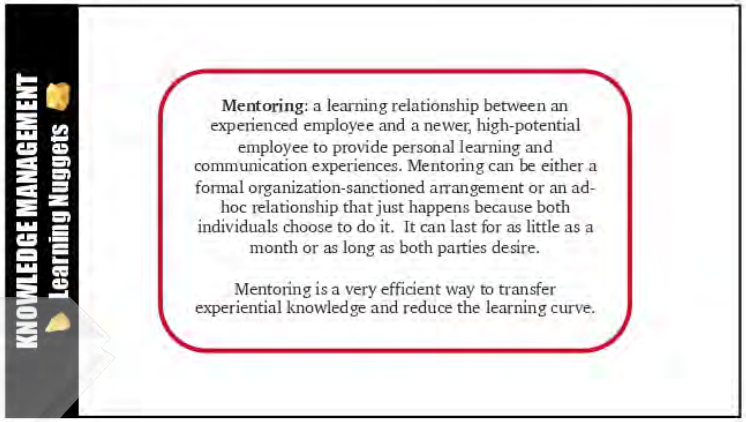

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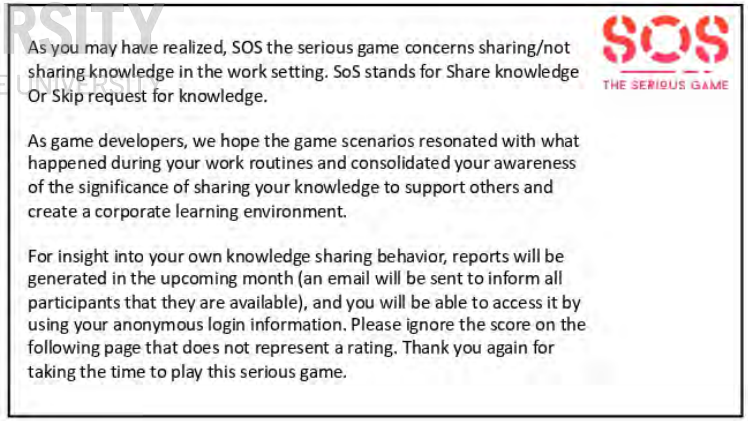

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PUBLICATIONS

Journal Articles

1. Yang, K., Ribiere, V., & Bartel-Radic, A. (2022). Exploring Antecedents of Knowledge Hiding and Sharing Among Knowledge Workers through a Serious Game. *Journal of Knowledge Management*, (accepted for publication).
2. Yang, K., Ribiere, V., & Bennet, A. (2022). What do we actually hide: conceptual and measurement challenges of knowledge hiding research. *International Journal of Knowledge Management Studies*, (accepted for publication).
3. Yang, K., Ribiere, V., & Bartel-Radic, A. (2022). Understanding knowledge hiding behaviors in the workplace using a serious game data collection approach. *Online Journal of Applied Knowledge Management (OJAKM)*, *10*(3), 27-45.
4. Yang, K., & Ribiere, V. (2020). Drivers of knowledge hiding in the university context. *Online Journal of Applied Knowledge Management (OJAKM)*, *8*(1), 99-116.

Conference Proceedings

1. Yang, K., Ribiere, V., & Bartel-Radic, A. (2025, January). To Which Extent Can Personality Traits Predict Knowledge Workers' Sharing and Hiding Responses to Colleagues' Requests?. In *9th International Conference on Management Engineering, Software Engineering and Service Sciences (ICMSS)*.
2. Ribiere, V., Kaiyu, Y., & Bartel-Radic, A. (2024, July). *Assessing the impact of knowledge value on knowledge hiding behavior: A comparative study of Chinese*

and German knowledge workers in the automotive industry. 8th Theory and Applications in the Knowledge Economy (TAKE) Conference, Lisbon, Portugal.