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Applying Game Theory to interactions between individuals with asymmetrical roles: The case of online sex offender investigative interviews

Appliquer la théorie des jeux aux interactions entre individus ayant des rôles asymétriques: Le cas des entrevues d'enquête des cyberdélinquants sexuels

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Summary

The literature on police investigative interviewing has highlighted the factors associated with confession. Research has shown that confession is associated with younger suspects (Deslauriers-Varin & St-Yves, 2010; Viljoen, et al., 2005); individuals of Caucasian origin (St-Yves, 2002; Viljoen, et al., 2005); single individuals (St-Yves, 2002); and individuals who have committed less serious crime (Moston et al., 1992; Phillips & Brown, 1998). Research also examines the role of evidence strength (e.g., Brimbal & Luke, 2019; Deslauriers-Varin, et al., 2011, 2020; Moston & Engelberg, 2011), the way in which evidence is presented (e.g., strategic use of evidence; Clemens et al., 2020; Granhag et al., 2013), and the role of police investigators and investigative techniques (e.g., May, et al., 2017; Snook et al., 2015; Wachi, et al., 2014). However, the literature on investigative interviewing has emphasized measures of correlation between confession and the variables that may influence it as if they were stable over time. Yet, there is evidence that confession could be an unstable process influenced by contextual elements. For example, researchers have raised the change in decision (towards confession or even towards denial) that operates with suspects in the context of an interrogation (Bull & Soukara, 2010, Deslauriers-Varin, et al., 2011a; Walsh & Bull, 2012; Verhoeven, 2018). More recently in the literature, researchers engaged in a clear shift toward a more dynamic analysis of investigative interview (e.g., Kelly, et al., 2016; Yang, et al., 2017).

To contribute to the research in this field, we propose a new conceptualization of the investigative interview through a new theoretical perspective: Game Theory. A discussion on the theory and its concept leads to two empirical articles that aim to study interviews more effectively. The first one explores the dynamic influence of both participants, the interviewer and the suspect, on suspect's disclosure. Videotaped interviews related to online child sexual exploitation (n=130) were analyzed and the different behaviors of suspects and interviewers were analyzed to determine if they involved (1) rapport building/active denial, (2) collaboration, (3) confrontation, (4) emotion/response, and (5) elicitation of information related to the case. Results showed that information relevant to the investigation is often provided shortly after a suspect has offered additional information or given responses that meet emotional needs (e.g., justifications). The interviewer's use of available evidence increases the likelihood that additional information will be

provided, while the ability to build a rapport with the suspect is effective in the longer term, even if a positive effect is not immediately observed. The second study explores the heterogeneity of strategies and behaviors of suspects during an interview as well as the stability of those profiles as suspects behaviors is a subject that have been overlooked in the literature contrarily to interviewers behaviors. The analysis helped identify the presence of five different profiles: 1) Positive; 2) Justifying; 3) Accepting; 4) Controlling; 5) Irritated. The temporal analysis also shows that the probability that a suspect will continue to exhibit the same profile over the course of the interview is high.

This thesis allows to set a theoretical and methodological basis to the study of asymmetrical interaction through the use of the Game Theory perspective. More particularly, the context of investigative interviewing of online sex offenders has been observed and the results point toward the fact that both the suspect and the interviewer influence the course of the social interaction that takes place in the interrogation room. Moreover, the decisions of the suspects have been explored and seems to be taken according to their preferences. The thesis also gives particular attention to the complex notion of time and its influence on behavior and proposes, in the fourth chapter, a continuous timeline evaluation of the interaction instead of a segmented analysis. The findings help develop a new line of research with innovative methods in order to eventually provide practical tools to police investigators on the matter of the type of strategies to use according to the amount of time they have and on the type of suspect they are working with. The findings also contribute to setting methodologies for other types of asymmetrical interaction which are common in the field of criminology. Seeing the interviews as being an interaction process provides a starting point for the creation of practical guidelines to help practitioners increase suspect collaboration during investigative interviews.

Keywords: Investigative interview; interrogation; confession; information gathering; Game Theory; cybersexual crime; police

Résumé

La littérature sur les entrevues d'enquête du milieu policier a mis en évidence les facteurs associés à la confession. Des recherches ont montré que la confession est associée à des suspects plus jeunes (Deslauriers-Varin & St-Yves, 2010; Viljoen, et al., 2005); des personnes d'origine caucasienne (St-Yves, 2002; Viljoen, et al., 2005); des célibataires (St-Yves, 2002); et le type de crime (Moston et coll., 1992; Phillips et Brown, 1998). La recherche a également examiné le rôle de la quantité et la nature de la preuve (p.ex., Brimbal & Luke, 2019 ; Deslauriers-Varin, et al., 2011, 2020 ; Moston & Engelberg, 2011), la manière dont les preuves sont présentées (p.ex., l'utilisation stratégique des preuves; Clemens et al., 2020 ; Granhag et al., 2013), et le rôle des enquêteurs et des techniques d'enquête (p.ex., May, et al., 2017; Snook et al., 2015; Wachi, et al., 2014). Cependant, la littérature sur l'entrevue d'enquête a mis l'accent sur les mesures de corrélation entre la confession et les variables qui peuvent l'influencer comme si elle était stable dans le temps. Pourtant, il existe des preuves que la confession pourrait être un processus instable influencé par des éléments contextuels. Par exemple, des chercheurs ont évoqué le changement de décision (vers l'aveu ou vers le déni) qui s'opère avec les suspects dans le cadre d'un interrogatoire (Bull & Soukara, 2010; Deslauriers-Varin, et al., 2011a ; Walsh et Bull, 2012). Plus récemment, dans la littérature, les chercheurs se sont engagés dans un virage clair vers une analyse de l'entrevue d'enquête qui prenait en compte des différents aspects dynamiques de la situation tel que l'ordre des comportements dans le temps (p.ex., Kelly, et al., 2016 ; Yang, et al., 2017).

Pour participer à ce virage et contribuer à la recherche dans le domaine, nous proposons une nouvelle conceptualisation de l'entrevue d'enquête à travers une nouvelle perspective théorique : la Théorie des Jeux. Une discussion sur la théorie et ses concepts est suivie de deux articles empiriques qui visent à mieux étudier les entrevues. Le premier article explore l'influence mutuelle des deux participants sur l'obtention d'information pertinente à l'enquête. Des entretiens enregistrés sur vidéo liés à l'exploitation sexuelle d'enfants sur internet (n = 130) ont été utilisés et les différents comportements des suspects et des enquêteurs ont été analysés pour déterminer s'ils impliquaient (1) l'établissement d'un rapport/le déni actif, (2) la collaboration, (3) la confrontation, (4) l'émotion/réponse, et (5) l'obtention d'informations liées à l'enquête. Les résultats ont montré que les informations pertinentes à l'enquête sont souvent fournies peu de temps après qu'un suspect

a offert des informations supplémentaires ou s'est montré émotif (par exemple, pleure). Lorsque l'enquêteur présente des preuves, la probabilité que des informations supplémentaires soient fournies par le suspect augmente immédiatement. Cependant, établir un rapport avec le suspect est efficace à plus long terme alors qu'un effet positif n'est pas immédiatement observé. En utilisant le même échantillon, la deuxième étude explore l'hétérogénéité des stratégies et des comportements des suspects lors d'une entrevue d'enquête ainsi que la stabilité de ces profils dans le temps puisque les comportements des suspects est un sujet rarement abordé dans la littérature contrairement aux comportements de l'interviewer. L'analyse a permis d'identifier la présence de cinq profils différents : 1) Positif ; 2) Justifiant ; 3) Accepter ; 4) Contrôler ; 5) Irrité. L'analyse temporelle montre également que la majorité des suspects restent dans le même profil au cours de l'entretien.

Cette thèse a permis d'instaurer une base théorique et méthodologique pour l'étude des interactions sociales asymétriques à travers l'utilisation de la perspective de la Théorie des Jeux. Plus particulièrement, le contexte de l'entrevue d'enquête des délinquants sexuels en ligne a été observé et les résultats pointent vers le fait que l'interaction sociale qui a lieu dans la salle d'interrogatoire est influencée par les stratégies de l'interviewer et du suspect. De plus, les décisions prises par le suspect aux cours de l'entrevue sont explorées et semblent être associés à leurs préférences. La thèse accorde également une attention particulière à la notion complexe de temps ainsi que son impact sur les comportements et propose une évaluation temporelle continue de l'interaction plutôt que de segmenter l'entrevue tel que vu dans la littérature. Les résultats visent à développer une nouvelle façon d'étudier l'entrevue d'enquête afin d'éventuellement fournir des outils pratiques aux policiers sur le type de stratégies à utiliser selon le temps dont ils disposent et sur le type de suspect avec lequel ils travaillent. Les résultats contribuent également à établir des méthodologies pour l'analyse de d'autres types d'interactions asymétriques qui sont courantes dans le domaine de la criminologie. Considérer l'entrevue d'enquête comme étant une interaction sociale représentant un processus qui évolue dans le temps fournit un point de départ pour la création de directives pratiques pour aider les praticiens à accroître la collaboration des suspects.

Mots-clés : Entrevue d'enquête; interrogatoire; confession; la collecte d'informations; Théorie des Jeux; délinquance sexuelle en ligne; police

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Introduction[1]

[1] DISCLAIMER: The opinions and conclusions presented in this thesis do not necessarily constitute those of the Sûreté du Québec.

In a police investigation process, the terms "*interview*" and "*interrogation*" imply some form of questioning oriented towards the gathering of information (Gudjonsson, 2003). The term *interrogation* is more commonly used in the literature and in police practice to refer to the questioning of criminal suspects. *Interview* is a more general term that is used to discuss the questioning of witnesses, victims and plaintiffs. *Investigating* is the process of inquiring for relevant information to solve a case and represents a more dynamic activity than *interrogating* (Wrightsman & Kassin, 1993). It is also a term that represents the intention of collecting information and that has a more objective connotation (Williamson, 1993). That is why the term "investigative interviewing" has been proposed to cover both the interviewing of witnesses and suspects (Gudjonsson, 2003). This term has now been incorporated into police training and its evaluation (Clarke & Milne, 2001; Williamson, 1993). In order to adopt a dynamic vocabulary to talk about the process of police interviewing and to contribute to a neutral and constant use of vocabulary throughout the studies, this term will be used in this thesis.

The investigative interview is a central and significant aspect of the criminal justice procedure, but to be useful, the information collected throughout this process must be accurate and relevant to the investigation (Walsh & Oxburgh, 2008). The type of information sought is related to what happened, who was involved and to what extent, as well as where and when the crime happened (Milne & Bull, 2006). A myriad of studies has focused on detecting what is true and what is false in suspect discourse (e.g., Blair et al., 2018; Masip et al., 2018; McDougall & Bull, 2015; Vredeveldt et al., 2014), which demonstrates the interest in understanding and comprehend hesitation to confess. The existence of these studies presupposed the obvious: some guilty suspects will lie or avoid telling the truth in order to prevent disclosing incriminating information (but see Cleary and Bull (2021) and Kebbell and colleagues(2006) who found that only a minority entered

the interview with the intention of denying/saying 'no comment'). On one hand, it means that the investigator's objective is to obtain the truth even if suspects are resistant. On the other hand, it also means that information needs to be given freely in order to be valid. This illustrates the complexity of this interaction and the need for scientifically-based and ethical guidelines for investigators (such as the 2021 'Mendez Principles of Effective Interviewing').

Research on investigative interviews has shared useful knowledge on measures of correlation between confession and the factors that may influence it. However, this literature has important limitations that need to be addressed. The limitations are presented in this work as originating from the researchers' emphasis on confession. Some of the literature on investigative interviews emphasized on confession, which is one of the many goals of an investigative interview, but would now beneficiate from focusing on the process of information gathering. Confession has largely been seen as being a static event as most researchers explain the efficacy of a strategy using the presence or the absence of confession. As it will be argued in this thesis, the confession should not be considered dichotomous (present versus absent) but rather as a continuum since the suspect may give information on several occasions throughout the interview. A dynamic conceptualization of interviews is needed in order to move this field forward. To participate in the shift toward a conception of interviews that is more dynamic (as seen in Kelly and colleagues(2016) for example), this paper aims to propose a new theoretical frame for the study of investigative interviews using the Game Theory perspective and videotaped police interviews.

In this study, Game Theory is used to enable a detailed analysis of interactions, relying on videotaped interviews that facilitate coding of each behavior. Police interviews matches Game Theory requirements for naturally occurring events (*in situ* as opposed to produced for the purposes for research). Although Game Theory is rooted in applied mathematics, this thesis uses

the theory to understand behaviors and more precisely what people do in strategic situations while considering the choices individuals make depending on what their interlocutor does and what individuals obtain in return (Gintis, 2014). Using this method also provides an innovative way of exploring aspects of police interviews that have neither been seen as areas to research, nor been analyzed in this particular way. This thesis presents an empirical insight into the police interview in action, and aims to broaden academic, institutional and general viewing in practice. Situating this thesis in a Game Theory perspective is part of its contribution to the field of police psychology and provides a multidisciplinary perspective which has the potential to inform areas of police interview policy, training and practice.

The general objective of this thesis is to develop a better understanding of investigative interviewing and its different aspects through the lens of the Game Theory perspective. To meet this objective, three sub-objectives are formulated. The first sub-objective is to propose a new conceptualization of the object under study by adopting a clear theoretical perspective. The second sub-objective is to observe the impact of different strategies of both participants and on the suspect's disclosure. The third sub-objective is to explore suspects' strategies in an investigative interview.

Chapter 1 aims to detail the current state of knowledge of suspect investigative interviews that have been developed over the past decades. Studies that described the context, the interviewer and the suspect are explored. The theoretical framework used in the previous literature is explored and limitations are overviewed. Chapter 2 is a theoretical article named "Toward a new theoretical and methodological understanding of investigative interviews" and goes more deeply into the problems of some of the literature on investigative interviews by explaining the consequences of having an emphasis on confession rather than information gathering. It also fulfills the first

objective of the thesis by proposing a new theoretical conceptualization of investigative interviews. The Game Theory perspective is adopted, and the notion of time is integrated in the basic assumptions of the theory to add an important aspect of social interaction. A discussion of the elements needed to be put in place in a new methodology to study this subject follows. Chapter 3 details the general methodology used to proceed with the empirical analysis of the different concepts of the Game Theory that follow in the next two chapters. Chapter 4 presents the second article of this thesis, an empirical study called "It's all about time: the influence of behavior and timelines on suspect disclosure during investigative interviews". In this article, a quantitative analysis aims to test the impact of the behaviors of both the suspect and the interviewer on suspect's disclosure as well as the impact of time on the effect. Chapter 5 presents the third article of the thesis and is called "Players' preferences: identifying suspects' profiles during investigative interviews through their use of strategies". This article aims to test another aspect of Game Theory: players' preferences. The article focuses on the suspect's preferences to explore the heterogeneity of strategies and behaviors during an interview. The article also aims to test the stability of those profiles through the interview. Chapter 6 presents a general discussion of the findings of this doctoral research. Specifically, the first section of the discussion presents the implications of the thesis through the different concepts of the Game Theory. Then, the important notion of time that was integrated in the thesis is discussed. The contribution for the literature and then the practical contribution of the thesis on investigative interviews as well as on social science is presented.

This thesis aims to participate in the shift toward a dynamic view of investigative interviewing by setting the theoretical and methodological basis for conducting empirical research. It aims to deepen the knowledge of investigative interviews and ultimately increase the interest of law enforcement agencies to work further to develop best practices. This thesis also aims to

contribute to criminology and the social sciences by proposing new ways to study social interaction in which the roles of the participants are asymmetrical.

Chapter 1. Literature on investigative interviewing

This review of the literature aims to introduce the knowledge about the different aspects of investigative interviews with a focus on the effect of those aspect on suspect's disclosure. The scientific information on investigative interviews can be divided in three aspects. The first aspect is the context in which the interview happens. The impact of variables such as the presence of a lawyer, the strength of police evidence and the comfort of the room on suspect's disclosure are revealed under this aspect. Second, the knowledge about the interviewer, which includes the technique used and the overall attitude, is another important aspect that could impact suspect disclosure. Third, the knowledge about the suspect is exposed including the variables associated with confession. A discussion of the theoretical frame used in the literature follows the empirical exploration. The limitations of the literature will be discussed, and the chapter will conclude by exposing the context of the thesis.

1.1 The context

The context in which the investigative interview takes place is important as it might influence the process. As such, according to the literature, the decision of the suspect to confess or not in the context of interrogation is in part influenced by the presence of a lawyer. Researchers agree that suspects who use a lawyer before the interview have a lower confession rate than those who do not (e.g., Deslauriers-Varin et al., 2011; Snook et al., 2015; Verhoeven & Stevens, 2013). Moston and colleagues(1992) indicate that in the absence of a lawyer, 50% of the suspects interviewed confessed to the alleged crime, whereas only 30% did so when a lawyer was present. In the study of Pearse and colleagues(1998), the suspects who contacted a lawyer confessed four times less often than suspects who did not contact a lawyer. However, more recent studies seem to have contradictory results compared to the last two mentioned studies, which points towards the evolution of practices. Researchers indicate that the absence of a lawyer is quite rare but that in

this context, the suspects tend to answer relevantly to the questions rather than refusing to answer (Leahy-Harland & Bull, 2020). Moreover, Verhoeven (2018) states that the presence of a lawyer has very little effect on the interview outcome.

During the interview, the interviewer usually presents the sets of evidence to the suspect. Acknowledging the amount of evidence against him/her can lead the suspect to confess. The quantity and the nature of evidence held against the suspect at the time of the interview plays an important role in the confession process (Brimbal et Luke, 2019; Cleary & Bull, 2021; Deslauriers-Varin et al., 2011; Moston et Engelberg, 2011). The findings of several empirical studies show that individuals who consider the evidence held by the police against them to be important and solid are more cooperative (e.g., Cleary & Bull, 2021; Vrij, 2005). In the study by Moston and colleagues(1992), when the evidence against the questioned suspect is weak, less than 10% confess their crime. On the opposite, in cases where the evidence gathered is solid and important, 67% of the suspects confess to the alleged crime. The hypothesis raised by Gudjonsson (2003) to explain this finding stems from the fact that when the evidence seems important, the suspect realizes that there is no point in denying the alleged crime and that they will have more to gain by collaborating with authorities.

Empirical studies show a relationship between the room setting and how the suspect acts and feels. Police interrogation training manuals such as the Reid technique (Inbau et al.,2013) consider the physical space in which an interview takes place as an important aspect to consider; it recommends isolating the suspect and questioning him/her in small spaces that are stark and sparsely furnished. Dawson and colleagues(2017) found that the room setting influenced people's behavior. Participants' disclosure of information about the event was influenced by the room setting. When considering the amount of detail in an interviewee statement, a small, bare and

custodial setting was associated with a lower disclosure tendency while spacious, comfortable, and inviting settings tended to be associated with participants that were more forthcoming. Results of other studies are in line with Dawson and colleagues(2017) by showing that a decorated, inviting environment in which the individual feels comfortable promotes disclosure, cooperation and the gathering of reliable information (Goodman-Delahunty & Martschuk, 2020; Hoogesteyn & al., 2018, 2020). On the opposite, Hoogesteyn and colleagues (2019) concluded that room size had no effect on disclosure. Nevertheless, they state that participants in small rooms reported wanting to leave the interview at significantly higher rates than those in larger rooms. Kelly and colleagues (2021) tried to recreate a police interview more accurately by collaborating with a large American police department. Interviews with witnesses of serious violent crimes were randomly assigned to an experimental or control context. The experimental room was altered to create a space that was intended to be more comfortable than the control context of a standard interrogation room. Despite making major alterations to one of two interview rooms, witnesses did not significantly perceive the experimental context as more comfortable than those in the control context. Although not significantly different, witnesses in the experimental room reported it as being a more comfortable setting, and there is evidence that interpersonal dynamics were better in the control context (Kelly & al, 2021).

1.2 The Investigators' Strategies

Empirical studies have shown that the external pressure exerted by the police, including elements such as interrogation techniques and the attitude of the police officer, seem to influence the confession rate. Some older studies on the subject suggest that if the suspect does not confess at the beginning of the interrogation, the interrogation techniques would have no impact later (Moston et al., 1992; Pearse et al., 1998). These studies therefore suggest that interrogation

techniques did not contribute to increasing the confession rate. However, other studies seem to show the opposite. Indeed, in recent years, the influence and effectiveness of several interrogation techniques have been analyzed. The techniques that come up most often throughout the studies are the type of questions used, the minimization, the development of an empathetic relationship and the gradual presentation of evidence.

1.2.1 Open-ended questioning

A number of studies have found that interviews characterized by the predominant use of open questions have yielded longer, more detailed and more accurate responses than those containing closed questions (Oxburgh et al.,2010; Poole & Lamb, 1998; Powell & Snow, 2007). Many interviews contain mainly closed, direct, leading and suggestible utterances, with infrequent use of open questions (Oxburgh et al.,2010). This phenomenon has been observed internationally, including in Australia, England and Wales, Estonia, Israel, Norway, Sweden, Finland and in the USA (Cederborg et al., 2000; Clarke & Milne, 2001; Kask, 2008; Korkman et al., 2008; Mildren, 1997; Moston et al., 1993; Myklebust & Bjørklund, 2006). However, other studies found that the use of open-ended questions in investigative interviews have been increasing (Clarke & Milne, 2001; Soukara et al., 2009). This increase is also seen in other parts of the world. For example, in their analysis of ten investigative interviews obtained from a Chinese police department, Zeng and colleagues (2020) found a large proportion of open questions which indicates that the use of regulation around interview techniques is relevant. Other studies also found that the use of open-ended question is predominantly used in investigative interview (Bull & Soukara, 2010; Leahy-Harland and Bull, 2017).

1.2.2 Minimization

Minimization is discussed by Inbau and colleagues(2001) and is repeated in a few other studies (e.g., Klaver et al., 2008; Madon et al., 2013). Minimization consists of offering the suspect a false sense of security by showing sympathy and tolerance (Kassin & McNall, 1991). In some cases, the interrogator offers excuses for the actions taken and moral justifications, even going as far as blaming the victim. The circumstances of the crime and its consequences are mitigated. As this technique appears to be non-coercive, judges at the trial of the accused seem to be more likely to convict a suspect who confesses in these circumstances (Kassin & McNall, 1991). This approach has been substantially studied (e.g., Davis and Leo, 2010; Horgan et al., 2012; Kelly, Russano, Miller and Redlich, 2019) but remains controversial and is often presented as a manipulative technique that can lead to false confessions (Kassin, 2015; Narchet, & al., 2011). Even if courts claim that this technique do not lead to leniency, findings of several studies suggest the contrary. This is done through the fact that minimization influence how people judge the severity of the crime (Luke & Alceste, 2020). The effects of minimization may be difficult to rectify because of their indirect nature (Luke & Alceste, 2020).

1.2.3 Relationship building

The second strategy that is often discussed in the literature of investigative interviews is the development of an empathetic relationship. Contrary to popular image, Williamson (1993) asserted almost 30 years ago that police practices had changed over the past decade and reflect more of a sympathetic and cooperative relationship between police officer and suspect. When the suspect feels respected and understood, they seem to gain confidence, which would allow them to confess more easily (Kebbell et al., 2010; Leahy-Harland & Bull, 2017; Snook et al., 2015; St-Yves & Kebbell, 2018; Wachi et al., 2014). Holmberg and Christianson (2002) report that police

interrogations marked by dominance are mostly associated with denial of accusations by the suspect, while interrogations marked by humanity are more often associated with confession. Indeed, the development of a good relationship between the police officer and the suspect would make it possible to obtain a higher confession rate (Alison et al., 2013; 2014; Baker-Eck & Bull, 2022; Baker-Eck et al., 2021; Cleary & Bull, 2019; 2021; Wachi & al., 2014; Goodman-Delahunty et al., 2014). Several researchers also talk about the benefits of a more human and warm relationship (e.g., Holmberg & Christianson, 2002; Kebbell et al., 2010). The technique used by the police therefore has an impact on the decision-making process of the suspect in the context of interrogation. The Reid model also specifies that it is important to be attentive to the person and to observe their behavior. Research shows that matching the level and style of language of the police officer to that of the suspect increases the chances of obtaining a confession (Richardson, & al., 2014). Recent comprehensive review of empathetic strategies and rapport development in investigative interviews have been written by Bull and Baker (2020) and by Gabbert and colleagues(2020).

1.2.4 Presentation of evidence

The third strategy that is often discussed in the literature of investigative interviews is the gradual presentation of evidence. More recently, other non-coercive techniques are gaining popularity with police forces, such as the SUE (Strategic Use of Evidence) technique. This technique aims to influence the perception of the suspect by confronting him/her with the inconsistencies of their speech using the evidence in the file, instead of exposing all the evidence at the start of the interview. At the theoretical level, the aspect of disclosure of evidence had been addressed by Inbau and colleagues (2001) and is also part of the elements related to confession in Gudjonsson's model (2003). At the empirical level, this technique has proven effective in several

studies based on non-criminalized samples such as university students (e.g., Tekin et al., 2015; Tekin et al., 2016), in simulated terrorist studies (Dando & Bull, 2011; Sandham et al., 2021), and in real-life suspect interviews (Clemens et al., 2020; Granhag et al., 2013; Walsh & Bull, 2015). When confronted with the SUE technique, participants disclosed significantly more incriminating facts than individuals confronted with more conventional techniques and perceived that the interviewer had more information (Tekin et al., 2015).

1.3 Suspects' characteristics and strategies

The literature on investigative interviewing shows great importance to suspects' collaboration and/or confession, since it is at the heart of investigators' objectives. Many different aspects have been observed in relation to confession: (1) individual characteristics of the suspect; (2) elements related to the crime; (3) suspects' strategies or attitude. The previous section shows that while a substantial amount of work has been done regarding interviewers' strategies, the same is not true for suspects' strategies. The information comes from a fragmented and underdeveloped literature. The findings of the literature on these aspects are presented in this section.

1.3.1 Individual characteristics

The individual factors that are studied are generally age, ethnicity and marital status. Confession has, among other things, been associated with younger suspects (Beauregard et al., 2010; Viljoen, et al., 2005). However, by taking into account the effects of variable interaction, Moston and colleagues(1992) came to a somewhat contradictory conclusion when compared to other studies. They observed that younger suspects tended to deny committing acts more frequently than older suspects when the evidence held against them was of good quality. When the evidence is of moderate quality, the youngest deny the accusations less strongly than the adults.

The hypothesis proposed by the researchers to explain these findings is that adults are more aware of the futility of denying accusations when the evidence is overwhelming, while young people have an inappropriate escape strategy in the context. Finally, some researchers came to the conclusion that age is not an element influencing the confession process since it observes no significant relationship with the latter (e.g., Cleary & Bull, 2021; Deslauriers-Varin et al., 2011; St-Yves, 2002).

Some studies show that ethnicity significantly influences the confession process. Indeed, individuals of Caucasian origin could be a factor associated with confession compared to individuals from other ethnic origins (Cleary & Bull, 2021; St-Yves, 2002; Viljoen et al., 2005). Some researchers argue that since the majority of interrogations are conducted by investigators of Caucasian origin, individuals belonging to minority groups may feel less confident and less connected to the investigator (Leo, 1996b; St-Yves, 2004). Another explanation could be that different techniques have different effect according to an individual ethnicity and the background and experience that goes with it. For example, Cleary and Bull (2019) found that Black respondents were more likely to endorse Sympathy/Perspective-Taking as a desirable interview strategy than White respondents. The perception of a suspect during the interview might than influence their decision to confess (Deslauriers-Varin, et al., 2011a; Walsh & Bull, 2012). Other researchers have found no relationship between ethnicity and confession (e.g., Pearse et al., 1998).

Regarding marital status, the study by St-Yves (2002) on incarcerated sex offenders self-reports about their investigative interview indicates that single individuals have a higher rate of confession (38%) than individuals in a relationship (24%). St-Yves (2002) mentions that single individuals do not have to undergo the pressure created by the possible rejection of those around them, which would facilitate confession. Similar results are shown in a study with a sample

including all type of crimes. The study by Deslauriers-Varin and colleagues(2011), which uses a similar methodology of self-reports of a sample of incarcerated adult men, show that single individuals are more likely to confess their actions. Contradictory results are found in more recent studies in which the authors state that married offenders were 3.6 times more likely to confess than unmarried offenders (Wachi et al.,2016).

Internal pressures such as feelings of guilt are another element associated with a higher confession rate (Deslauriers-Varin et al., 2011; Lowe & Haws, 2019; Normile & Scherr, 2018; St-Yves, 2002). This feeling creates a weight on the shoulders of the suspect which leads him/her to confess the alleged acts (Gudjonsson & Petursson, 1991). The study by Beauregard and Mieczkowski (2012), based on a sample of 624 convicted sex offenders at the federal level, shows that individuals living with guilt are more likely to admit a full confession than a partial disclosure. Gudjonsson and Bownes (1992) observe a strong association between the feeling of guilt and the urgent need to confess. On the other hand, they also observe, paradoxically, that the same feeling of guilt is associated with a strong inhibition to confession. This suggests that the factors that can facilitate the passage to confession are also sometimes obstacles to it and demonstrates the importance of the interactions between certain explanatory factors of confession.

Information related to physical and physiological aspects has also been observed empirically. The mental state of the suspect can be influenced by various factors. Intoxication from drugs or alcohol has indeed been shown to be an important factor in the confession process in the context of interrogation (Gudjonsson & Sigurdsson, 1999; Pearse et al., 1998; Sigurdsson & Gudjonsson, 1994). Pearse and colleagues (1998) state that only the fact of having consumed an illicit substance in the 24 hours preceding the interrogation is significantly associated with confession. On the other hand, other studies show that there is no link between substance use and

confession (Gudjonsson & Sigurdsson, 1999; Mindthoff et al., 2019). It has been shown that a mental health problem, such as a psychotic state, can also increase the likelihood of a confession (Gudjonsson & Sigurdsson, 1999).

1.3.2 Crime characteristics

Characteristics of the crime committed by the suspect have also been the object of study in the literature. The criminal factors analyzed in the studies are the influence of the criminal history of the suspect and the type of crime. The decision to confess to a crime would be more likely for individuals with no criminal history (Deslauriers-Varin et al., 2011a; Moston et al., 1992; Snook et al., 2015). In their study of 160 suspects detained at the police station, Pearse and colleagues(1998) indicate that individuals are less inclined to confess when they have experience of incarceration or pre-trial detention. However, some researchers come to the opposite conclusion: an individual with a criminal history will be more predisposed to confess (Baldwin & McConville, 1980; Mitchell, 1983), while more recent studies indicate that there is no significant association between criminal history and confession (Phillips & Brown, 1998; St-Yves, 2002). In a study from the UK, suspects of serious crimes who had a criminal history were more likely to respond "relevantly" (i.e., meaningfully) than to refuse to answer (Leahy-Harland & Bull, 2021).

The type of crime, which is related to its seriousness, is also to take into consideration as confession is associated with less serious types of crime (Moston & al., 1992; Phillips & Brown, 1998). The findings of empirical studies suggest that an individual who has committed a more serious act will try to avoid the serious consequences of his act by denying the accusations (Gudjonsson, 2003; St-Yves, 2004). Researchers have proposed that sex offenders, because of the inherent seriousness and nature of sex crimes, may engage in different decision-making calculus (Beauregard & Mieczkowski, 2012; Holmberg & Christianson, 2002; Kebbell et al., 2008). The

expected long prison sentence and other confession outcomes might disincentive them from confessing (Yang et al., 2016). Contrary to these results, other researchers have however found that individuals who have committed sexual crimes, which is considered as a highly serious act, would instead be associated with individuals who confess the most (Mitchell, 1983; Gudjonsson & Sigurdsson, 1999). This difference observed in the findings of the different studies could be due to external factors or interaction effects as reported by Lippert and colleagues(2010). In their observations of 282 child abuse files, the authors mention that a greater proportion of suspects confess to the crimes charged when the abuse is more frequent than when it is less so. Other studies report no association between crime seriousness and confession in data with incarcerated persons (Snook et al., 2015).

1.3.3 Suspect Strategies

Researchers have extensively studied investigators' strategies and these have been presented above (e.g., Kebbell et al., 2010; Madon et al., 2013; Oxburgh et al.,2010; Tekin et al., 2016; Wachi et al., 2014). Suspect strategies have not received as much attention. However, researchers raise the fact that offenders do not only have strategies, but also report that they often extensively plan their strategies before the interrogation (Alison et al., 2013; Hartwig et al., 2007). In the literature on police interrogation, suspects' strategies are often compared between a group of truth tellers and a group of liars assigned to participants in an experimental setting. The level of information given is observed. For example, being honest and more forthcoming has been associated with the group of truth tellers while being restrictive and consistent was associated with the group of liars (Granhag et al., 2013). When asking suspects about their strategies, they express concern for the level of detail, consistency, and coherence of their statement, and for keeping track of the information they provide (Hines et al., 2010). In this line of consideration, studies have

pointed out several ways of telling a story used by the suspect in a context of experimental design. For example, the suspects might give a smaller amount of self-incriminating information in an initial free recall phase and when asked crime-specific questions (Granhag et al., 2009), try to avoid giving a testimony that is too detailed (Granhag & Strömwall, 2002), keep the story "simple" (Strömwall et al., 2006), tell a detailed story, avoid lying and make sure their story is consistent (Hartwig, et al., 2007). In line with this, when some suspects are under increased suspicion, they become more forthcoming in order to avert that suspicion (Granhag et al., 2009).

Besides the way of speaking in this context, most studies focused on the ultimate outcome of the interrogation indicating whether the suspect admitted guilt (either partially or fully), denied or refused to speak. The reaction of the suspect during the interview is seen as a kind of continuum on which silence stands on one end and total confession stands on the other. Feld (2013), for example, analyzed the suspect's resistance to the interviewer among juvenile delinquents. Of the 285 participants who waived their rights to silence, 11.6% did not provide an incriminating statement. The researcher determined that their strategies boiled down to behaviors of, non-collaboration (e.g., trying to leave the premises), denial about guilt ("I didn't do it") or about knowing the facts ("I don't know what you're talking about"), lying (reporting inaccurate facts), evasive answers, remaining silent, and blaming someone else. Moston and Stephenson (2009) developed a typology of resistance based on the observation of empirical data on interrogations. The authors propose two types of denial, passive denial and active denial. In the first type, the suspects simply deny without providing information that would exonerate them. In the second type of denial, i.e., active denial, the suspects deny their involvement but provide exculpatory details. Those two studies represent typologies of suspects' actions during an interview but do not describe

strategies more precisely. They illustrate the emphasis on the continuum of denial versus confession.

Literature on the actual observable strategies of suspects is scarce. Nevertheless, a recent study used investigative interviews to observe the techniques used by the suspect in such contexts (Watson et al., 2018). Their results show that suspects used four different forms of influence during an interview: (1) rational arguments to convince of their innocence; (2) justifications to minimize perception of harm or deflect blame; (3) relational arguments to bias police perceptions in the suspect's favor; (4) reputational arguments to impose dominance in the interview. There are also researchers who observe that minimization has been one of the strategies used by suspects. Maletzky (1991) reported that 87% of his sample of sex offenders denied all or part of their crimes. In the same line, Marshall (1994) found that 32% of a similar sample significantly minimized aspects of their offending.

To delve deeper in the types of strategies suspects use, the literature in other domains must be explored. Suspect strategies have been observed in the context of terrorist interrogation setting, where five clusters of suspect strategies were identified: passive (refusing to look at interviewers, remaining silent), passive verbal (monosyllabic response, claiming lack of memory), verbal (discussing an unrelated topic, providing well-known information, providing a scripted response), retraction of previous statements, and no-comment (Alison et al., 2014). Moreover, a very interesting parallel can be made with the literature on counselling with non-cooperative clients, a context that is highly present in criminology. Client resistance was defined in this context as "any behavior that indicates overt or covert opposition to the therapist, the counselling process or the therapist's agenda" (Bischoff & Tracey, 1995, p.488). Hill and colleagues(2001) studied clients' resistance and noticed complaining or blaming others inappropriately, defenses (e.g., projection,

denial, intellectualization, avoidance, dissociation, etc.), sidetracking (changing the topic) and inappropriate requests (reflecting excessive helplessness or dependency). The resistant clients' tone of voice is often defensive, whiny, defeated, abusive, or hostile. Watson and McMullen (2005) identified similar categories.

1.4 The theories on investigating interviewing

The previous sections presented the empirical knowledge of the three major aspects of investigative interviewing and their relationship with confession: the context, the interviewer and the suspect. To understand from what theoretical perspective prior studies have been built on, a step back into previous work on investigative interviews has to be made. Researchers concerned with the theoretical framework mainly focused on explaining why someone would confess or admit to a crime they have committed by proposing explanatory models. Falling within the psychoanalytic theories of personality, some authors proposed that confessions are the result of internal conflicts (e.g., guilt; Berggren, 1975; Horowitz, 1956; Reik, 1959; Yang et al., 2017). Other authors resorted to the principles of rational choice (Hilgendorf & Irving, 1981; Jayne, 1986), suggesting that a confession results from a cost-benefit analysis. Some researchers stressed the importance of considering emotional, criminogenic, crime-related and situational factors in a suspect's decision to confess (Gudjonsson, 1992; 2003). These factors can help explain how guilt and shame, the relationship between the interrogator and the suspect and the interviewing techniques used can persuade suspects to confess. Finally, a model of the inter-related factors has been proposed by Moston, Stephenson and Williamson (1992) to render the influence of many variables acting together.

1.4.1 The psychoanalytic approach

Reik's model (1973), inspired by Freud's psychoanalytical theories, addresses the internal conflict experienced by the suspect in the context of the interview. This model explains that confession is a way to free oneself from internal conflict and find balance. Reik, however, emphasizes the fact that the confession stems from the desire for self-punishment. The suspect is considered as wishing to reintegrate into society by admitting that they deserve punishment. Even if guilt is a difficult concept to measure, researchers have documented this internal feeling (Beauregard & Mieczkowski, 2012; Deslauriers-Varin et al., 2011; Gudjonsson & Petursson, 1991; Sigurdsson & Gudjonsson, 1994; St-Yves, 2002). Gudjonsson and Bownes (1992) observe a strong association between the feeling of guilt and the urgent need to confess. Nevertheless, they also observe, paradoxically, that the same feeling of guilt is associated with a strong inhibition to confession. The emphasis of Reik's model on guilt makes it incomplete for explaining suspect disclosure.

1.4.2 The rational choice approach

In 1986, Cornish and Clarke adapted the utilitarian view of criminology from rational choice theory. This theory presupposes that people are individualistic beings, that is, focused on maximizing their personal gain. The central points of the theory stipulate that the human being is a rational actor, and that rationality involves cost-benefit calculations of gains as well as of the means to obtain them. People make choices based on these calculations and are oriented towards pleasure and against pain.

The model of Irving and Hilgendorf (1980), specifically presented for investigative interviews, is similar to what was later proposed in the theory of rational choice (Cornish & Clarke, 1986) in the sense that the actions of an individual always pursue a goal whose benefits are

perceived as being more important than the costs. The theory also includes the notion of punishment. A choice can be controlled by the perception and understanding of the pain (potential punishment) that will follow an act that goes against the law. However, the cost-benefit calculation is not objective since it is based on the evaluation of the individual according to the perceived and available information, but also according to his experience and knowledge. It would be practically impossible to test this theory empirically based on observational behaviors, so this approach is not ideal for the practical implication of research in this field.

1.4.3 The cognitive approach

The model developed by Jayne (1986) highlights the suspect's perception of the situation, including cognitive, emotional and social events. The important aspect leading to confession is considered to be the reduction of the perceived consequences by the suspect and of the anxiety associated with a confession (Jayne, 1986). It is recommended that the interviewer make sure to increase the anxiety related to lying and make the confession appear as the solution to reduce the internal conflict. Jayne suggests reducing anxiety about confessing, not just increasing anxiety about lying. In the development of the cognitive approach, Gudjonsson (1992) proposed an explanatory model of confession in which he considers that it is strongly influenced by the relationship between the individual and his environment. Gudjonsson also deepens the relationships between interacting factors. For example, he mentions that the relationship between the individual and his environment is shaped by the events that precede the interrogation, but also by the consequences that flow from the confession based on five types of elements: (1) social elements from the context like the consequences related to confession, (2) emotional elements like the feeling of guilt, (3) cognitive elements like suspect’s perception of evidence quantity, (4) physical and physiological elements like intoxication, and (5) situational elements like the

investigator's attitude. The events include sleep or food deprivation, illness, fatigue, isolation and feelings of guilt and bereavement. The consequences of confession can be short-term or long-term. Gudjonsson's model was built through a questionnaire that has been used in some studies (e.g., Deslauriers-Varin, 2006; Gudjonsson & Sigurdsson, 1999; Sigurdsson& Gudjonsson, 1994). The branches of the model have been the subject of empirical findings, but the theoretical proposition is not built in order to be applied and observed in a global way. Only the presence or the absence of the items are studied. There is however no precision with regard to the causal chain, the conditions, the logic or the explanation of the finality: the approach mostly enumerates of the concepts likely to influence confession.

1.4.4 The applied model of Moston, Stephenson and Williamson (1992)

Without necessary stating any obvious theoretical orientation, the most detailed model applicable to investigative interviews is the model presented by Moston, Stephenson and Williamson (1992). This model is derived from an empirical study of 1067 police interrogation recordings and includes the characteristics of the suspect and his crime as well as the effects of variables' interactions. These authors consider individual factors such as age and ethnic group, delictual factors such as the nature and severity of the crime, and contextual factors such as the quality of evidence and the presence of a lawyer. Interviewing techniques are also considered in this model. Their model suggests that perceptions of the quality of the evidence could play multiple roles: when the evidence is overwhelming, younger suspects tend to deny the charges in opposition to older suspects. When the evidence is of good quality, most individuals with no criminal record would also be more likely to confess.

The importance of the characteristics of the suspect, of his crime and of the context of the interrogation have been greatly evaluated in empirical studies on confession (Deslauriers-Varin et al., 2011; Kassin & Gudjonsson, 2004; Walsh & Bull, 2012). The different aspects of Moston, Stephenson and Williamson's (1992) model have been tested empirically, but their model has rarely been reproduced in its entirety. The authors see the interrogation and its purpose as a fixed event in time, they do not consider the interactions that take place during the interrogation. It is therefore an analysis of the factors related to the confession rather than an explanatory analysis of the confession. The interaction is found in statistical analyses rather than in the design of the study.

In summary, the literature on the theoretical approaches around the concept of confession first introduced the notion of internal pressures from a desire for self-punishment (Reik, 1973). Then, the rational choice approach was developed in order to study confession as a decision resulting from a cost-benefit calculation (Irving & Hilgendorf, 1980). A more cognitive approach was then introduced by Jayne (1986) and by Gudjonsson (1992). This approach includes several elements which are sometimes difficult to consider simultaneously. Eventually, a model considering the interaction between variables was introduced (Moston et al., 1992). Each of the approaches present a collection of factors put in relation with confession but their shortcomings prevent the models to be fully tested by empirical studies.

1.5 Important points raised by empirical findings and theories

The literature review allowed to raise three major limitations held by research on investigative interview. The first one is the lack of consideration for dynamic elements present in interviews. While the purpose of developing effective interview practices is to increase the amount of information provided by the suspect, the literature often does not discuss this information as a whole but instead focuses on confession, with researchers evaluating the effectiveness of a strategy

based on its presence or absence. This dichotomous approach constituted the first step to understand the phenomena by oversimplifying the interview process. Researchers have looked at the association between confession and individual or criminological factors as if this relationship was stable over time, with confession seen as the result of a fixed relationship between various factors (e.g., Tekin et al., 2015; Madon et al., 2013), making it harder to assess the dynamic aspects of human interactions (Roe, 2008). However, there is increasing evidence that confession is a dynamic process, and this might be observed by the influence of contextual elements on the outcome of interviews (see Cleary & Bull, 2021 for example). One evidence that the actions taken during an interview is evolving, researchers have found that the decision to confess or to deny responsibility may change during investigative interviews (Bull & Soukara, 2010; Deslauriers-Varin, Beauregard et al., 2011; Verhoeven, 2018; Walsh & Bull, 2012) and that this change may be linked to contextual factors, such as the rapport developed between interviewer and suspect, interviewer skill, or the choice of interview strategy (Cleary & Bull, 2021). The most recent studies have discussed the amount of information provided by the suspect instead of the presence or absence of confession (Baker-Eck et al., 2021; Baker-Eck & Bull, 2022; Oxburgh et al., 2010; Walsh & Bull, 2010; 2012). Also, as part of this shift toward a dynamic analysis of investigative interviews, some researchers have looked at the effect of a gradual presentation of evidence on disclosure (Granhag et al., 2013; Hartwig et al., 2014; Luke & Granhag, 2020; Vrij & Granhag, 2012). Kelly and colleagues(2016) looked at the dynamics of cooperation and the use of strategies over the course of the interview, coding for suspect cooperation and interviewer strategies in relation to several temporal intervals and found that cooperation varied over the three intervals considered. Richardson and colleagues (2014) also looked at the language matching of interviewers on a linear time frame.

The second limitation is the emphasis on interviewer strategies. In the literature, important attention has been given to the strategies and behaviors of the interviewer. Amongst these, general strategies that the interviewer should deploy throughout an interview like the development of a good relationship between the interviewer and the suspect (Holmberg & Christianson, 2002; Kebbell et al., 2010; Wachi et al., 2014), matching the level and style of language of the suspect (Richardson et al., 2014) and gradually presenting the evidence throughout the interview (Tekin et al., 2015; Tekin et al., 2016) have been associated with an increase in the suspect's confession probabilities. While research has focused on how interviewers can improve their strategies and techniques to favor confession, very few studies have highlighted how the suspect is responding, sometimes using strategies and techniques of their own. This element is relevant and contributes to the understanding of the complex interactions of an investigative interview. Also, the investigative interview might be seen as an institutional and interactional manifestation of social control depicted by a 'battle' between police and suspects (Holdaway & Rock, 1998). This means that each aspect of this social interaction is shadowed by a power imbalance (Ainsworth, 2008; Garfinkel, 1963). This asymmetry creates a situation in which the participants have different strategies depending on their roles. The strategies observed by the researchers are therefore different according to the participant who is analyzed. Different tools must be used in order to observe the behaviors of the suspect compared to those of the interviewer.

The third limitation raised by this literature review is the difficulty to identify a clear theoretical frame in which to develop the knowledge. Each of the theories presented in the previous section have shortcomings and none have been fully tested by empirical studies. There is a need to establish a theoretical frame to further develop the knowledge of investigative interviews in empirical studies (Snook et al.,2021). In this thesis, we propose introducing the concepts used in

Game Theory to make it possible to analyze strategies in a more efficient manner. Participants can be seen as players who make rational decisions about actions that lead to outcomes with different payoffs according to their preferences. Such a perspective makes it possible to go beyond the study of individual and criminological factors associated with confession and consider the dynamic elements involved in interactions between a suspect and a police officer. The next chapter provides a conceptual and methodological introduction to the study of investigative interviews from the perspective of Game Theory. Introducing this temporally oriented perspective makes it possible to determine the probability that certain strategies will be effective in leading a suspect to provide information and whether these strategies can be expected to be effective immediately or only after some time has elapsed, which will be explored in Chapter 4. Such information will not only increase scientific knowledge about the dynamic process that takes place in an investigative interview but will also help develop tools for investigators in the context of interviewing suspects.

1.6 Context of the thesis

The propositions as well as the findings of the empirical studies presented in this thesis are influenced by two major aspects: (1) The Canadian context of the data; (2) The type of crime included in the sample. The Canadian context will impact the interviewers' training and the different individuals present in the interrogation room. The study is also impacted by the type of crime, which is an aspect influencing the generalization of results and the length of the interview.

1.6.1 Interviewer training and the Canadian context

Several internationally recognized models have emerged aiming to propose an interview protocol to be followed and one of them is relevant in Canadian police training: the Reid technique. The Reid technique was presented in 1962 in Inbau and Reid's book *Criminal Interrogation and*

Confession. This technique quickly became one of the most widespread in North America and training is widely based on it (Gudjonsson, 2003; St-Yves & Landry, 2004). The proposed technique is based on the elimination of the barriers of resistance of the suspect by minimizing the negative consequences related to confession. In addition to the minimization technique and contrarily to its objective, confrontation is used to develop a sense of guilt. The interviewer aims to confront the suspect with the contradictory aspects of his speech or present information or evidence that are in opposition with his claims. This confrontation forces the suspect to reconsider his strategy because of this internal conflict created through the contradiction. Collaboration is therefore considered by the suspect as being the most interesting option in that context. To do this, the first part of the interview is used to confirm or invalidate certain information or certain doubts regarding the suspect. In the second part of the interview, the police officer tries to develop a relationship with the suspect and then get him to tell his version of the facts. The authors mention the importance of taking note of verbal information and non-verbal behavior. The questions that are asked of the suspect are open, general and non-accusatory. After asking these personalized questions, the investigator leaves the room for a period of time in order to generate a feeling of anxiety in the suspect in order to facilitate his subsequent collaboration.

The Reid model is controversial despite its adjustments over time. Critics decry the aspect of psychological manipulation used throughout the stages (Gudjonsson, 2003; Kassin & Neumann, 1997; Leo, 1996b; Pearse et al.,1998; Sigurdsson & Gudjonsson, 2001; St-Yves & Meissner, 2014). In particular, they note the risks created by the suggestibility of the technique when it is used with vulnerable suspects such as individuals with intellectual disabilities, as it might lead to a false confession (Gudjonsson, 2003). Critics point toward the lack of consideration concerning false confessions in their work, but Reid and colleaguesdefend themselves by saying that it is

against nature to incriminate oneself and that it would be difficult for the police to carry out their work without using subterfuges which are not coercive. Critics also address the lack of evidence on the technique's effectiveness. Few studies have been devoted to empirically and objectively testing the effectiveness of the technique in the context of police interrogation (Gudjonsson, 2003). Finally, Reid and colleagues are subject to criticism regarding the verbal and non-verbal aspects of the interrogation. Indeed, according to them, there are differences in verbal and non-verbal behavior between guilty and non-guilty suspects (Inbau et al., 2001). Some studies show findings contrary to those proposed by Inbau and colleagues(e.g., Kassin & Fong, 1999; Kassin & Gudjonsson, 2004; Kassin et al., 2005; Meissner & Kassin, 2002; Vrij, 2005), but it is worth mentioning that some studies still note various differences between liars and innocent individuals but not in a consistent way.

Researchers have reported that in Canada, the training given to police officers on the interrogation of suspects is limited to the teachings of the Reid model and to an approach which is essentially based on obtaining a confession (Snook, et al., 2010; St-Yves & Meissner, 2014). In Quebec, however, the École Nationale de Police offers standardized training on interrogation for all investigators, which is based on the most recent research on the subject and the best practices identified (St-Yves, 2014). Non-coercive techniques focused on developing a relationship of trust and respect between the police officer and the suspect are prioritized (see St-Yves, 2014, regarding the basic rules advocated). Few studies have made it possible to evaluate the effectiveness of the Reid model or Quebec's hybrid approaches. The sample of the thesis includes videotaped interviews conducted by the Internet Child Exploitation (ICE) unit of Québec's provincial police department, the Sûreté du Québec (SQ). The specific training of the members of the unit may have an impact on the data.

Besides the training of police officers, the interviews in the sample should be understood in a Canadian context with regard to the number of participants in the room. As explained earlier, the presence of a lawyer might have an incidence on disclosure. Moston and colleagues(1992) indicate that in the absence of a lawyer, 50% of the suspects interviewed confessed to the alleged crime, whereas only 30% did so when a lawyer is present. In Canada, the suspect is allowed to contact a lawyer before the start of the interview, but the lawyer is not allowed inside the interview room. It means that interviews usually involve only two participants – the interviewer and the suspect. The setting thus generally limits the interaction to two participants.

The length of interviews tends to vary according to the characteristics of the crime involved (e.g., type of crime, number of charges, number of victims, amount of evidence available). Studies in the United States suggest interviews are approximately 1.5 hours long (see Cleary & Bull, 2021; Kassin et al., 2007; Kelly et al., 2016). Similar findings were found in Canadian settings (King & Snook, 2009). The interviews of the sample in this thesis are considerably longer: the mean length was 198.23 minutes. This might also have an influence on the techniques used, the development of the relation with the suspect and the overall sequence of behaviors.

1.6.2 Type of crime of the sample

The thesis is based on a sample of investigative interviews with online sex offenders in Canada. Whether sex offenders differ from other offenders is often discussed in the literature. For example, sex offenders are likely to have a higher level of education (Babchishin et al., 2011; Faust et al., 2015) and a higher rate of employment (Clevenger et al., 2016; Faust et al.,2015). Cybersexual offenders tend to have been convicted less often than those who commit other types of sexual crimes (Aebi et al., 2014; Faust et al.,2015; Smid et al., 2015) and show fewer antisocial traits than other offender groups (Babchishin, et al., 2015; Magaletta et al., 2014). Some studies

suggest that an individual who has committed a serious criminal act will try to avoid the consequences of the act by denying the accusations (Gudjonsson, 2003; Moston et al., 1992; Phillips & Brown, 1998; St-Yves, 2004) while other researchers have found the confession rate of sex offenders to be higher than that of other kinds of offenders (Mitchell, 1983; Gudjonsson & Sigurdsson, 1999), particularly when the offense has been committed more frequently (Lippert et al., 2010). The particularity of this crime might influence the generalization of the results.

The investigation of online sex offenses has the advantage of leaving digital traces as evidence. The amount of evidence against suspects is large and this is an important aspect to consider as the quality of the evidence against the suspect has been shown to have an influence on confession (e.g., Brimbal et Luke, 2019; Cleary & Bull, 2021; Deslauriers-Varin et al., 2011; Moston et Engelberg, 2011). The amount and the strength of the evidence is very similar across the different interviews of the sample which creates an interesting homogeneity for the analysis. This thesis presents the first articles published with this particular sample.

1.7 Conclusion

This chapter presented the literature on investigative interviewing from an empirical and theoretical perspective. The different aspects of interviews are explored through empirical work: The context, the interviewer and the suspect. The psychoanalytic, the rational choice, and the cognitive approaches were presented as well as the applied model proposed in the literature. This review allowed to highlight the limitations of the literature, such as the lack of dynamic consideration of behaviors, the emphasis on the interviewers' strategies to the detriment of suspects' strategies and the lack of adapted theoretical frame of empirical studies. We propose that these limitations can be addressed using Game Theory as a perspective to study investigative

interviews. The next chapter will explain in detail the limitations and the proposed theoretical frame.

Chapter 2. (Article) Toward a new theoretical and methodological understanding of investigative interviews[2]

[2] Bergeron, A., Fortin F., Deslauriers-Varin, N. (2022). Toward a new theoretical and methodological understanding of investigative interviews, manuscript ready to submit for publication.

Student's statement regarding the contribution to the article: I declare that I am the main instigator of this article. I took on the task of literature review, data analysis, and writing. Francis Fortin and Nadine Deslauriers-Varin provided intellectual input into the development of the project and assisted in writing and revising the manuscript.

Abstract

Research on investigative interviews has provided useful knowledge about confession and the factors that influence it. However, a more dynamic understanding of such interviews is required if the field is to move forward. To help achieve this shift, we argue that the concepts used in Game Theory provide a useful way to analyze the strategies used in investigative interviews and that this theoretical framework's temporally oriented perspective can help determine the relation of particular strategies to the probability of disclosure. After looking at how previous literature has dealt with the conceptual basis of investigative interviews, we propose a new conceptual and methodological basis for their study. This new framework could help increase scientific knowledge about the dynamic process of investigative interviews as well as having practical implications for the development of efficient strategies for information gathering by police investigators.

2.1 Introduction

Previous research on investigative interviews has provided a great deal of useful knowledge for interviewers. Researchers have identified both different suspect characteristics (e.g., Beauregard et al., 2010; Cleary & Bull, 2021; Deslauriers-Varin, Lussier et al., 2011) and different interviewer strategies (e.g., Leahy-Harland and Bull, 2017; Zeng et al., 2020; Vallano et al., 2015; Wachi et al., 2014) associated with confession. They have also used an evidence-based perspective to look at which police practices are the most effective and ethical during suspect interviews (e.g., Cleary & Bull, 2019; Meissner et al., 2014; Shepherd, 2007; Walsh & Milne, 2008). Researchers' work has even led to changes in legislation, such as the PEACE model, a five-step protocol based on research findings that sets out the lawful and ethical standards to be followed in interviewing suspects and is now widely used in the United Kingdom (Bull & Soukara, 2010).

However, the empirical literature on investigative interviews suffers from limitations that prevent researchers from fully understanding the interviewing process. For example, while the purpose of developing effective interview practices is to increase the amount of information provided by the suspect (Dando & Bull, 2011; Sandham et al., 2021), in the past, the literature often did not discuss the information given by the suspect and instead focuses only on confession[3]. Researchers evaluate the effectiveness of a strategy based on the presence or the absence of confession in an interview in which the strategy was used. This dichotomous approach tends to oversimplify the interview process as the suspect may provide information during the interview that, while not a confession, can be used as evidence of participation in a crime. For example, computers seized in cases of online child sexual luring usually contain digital traces of

[3] Kassin and Gudjonsson (2004) define confession as "a statement admitting or acknowledging all facts necessary for conviction of a crime". Confession is thus not a simple statement of culpability or an acknowledgment of connection with some of the aspects of a crime but instead provision of information about all aspects of the crime that are necessary to establish culpability.

conversations between the offender and the child. Confirmation that the offender is the only person who has access to the relevant computer can be seen as important evidence of guilt in Court even without formal confession. That is one of the reasons that information gathering has become central in research over the past few years.

The focus on confession findings is a lack of consideration for the dynamic nature of investigative interviews. Researchers have looked at the association between confession and individual or criminological factors as if this relationship was stable over time, with confession seen as the result of a fixed relationship between various factors (e.g., Tekin et al., 2015; Madon et al., 2013), making it harder to assess the dynamic aspects of human interactions (Roe, 2008). There is increasing evidence that confession is not a dichotomous event but rather a dynamic process that is influenced by contextual elements. For example, researchers have found from self-reported data that the decision to confess or to deny responsibility may change during investigative interviews (Deslauriers-Varin, Beauregard et al., 2011; Verhoeven, 2018; Walsh & Bull, 2012) and that this change may be linked to contextual factors, such as the rapport developed between interviewer and suspect, interviewer skill, or the choice of interview strategy (Cleary & Bull, 2021). As part of this shift toward a dynamic analysis of investigative interviews, some researchers have looked at the effect of gradual presentation of evidence on disclosure (Granhag et al., 2013; Hartwig et al., 2014; Luke & Granhag, 20220; Vrij & Granhag, 2012). Kelly and colleagues (2016) looked at the dynamics of cooperation and the use of strategies over the course of the interview, coding for suspect cooperation and interviewer strategies in relation to several temporal intervals, and found that cooperation varied over the three intervals considered. Cooperation was determined by the presence of cooperative utterances as opposed to resistant utterances from the suspect and was shown as varying over time.

The focus on confession may sometimes have repercussions for the ethics of interviewing. Confession has been shown to play a primary role in corroborating incriminating evidence (Inbau et al., 2001) and establishing guilt in court proceedings (Fisher & Rosen-Zvi, 2008). It is also important in resolving police investigations, leading to convictions in from 13% to 33% of cases that would normally not have been solved (Leo, 1996a; McConville, 1993). However, an emphasis on obtaining a confession can lead to interviews in which presumption of guilt is believed to justify the use of promises, threats, or lying about the existence of evidence (Leo & Drizin, 2010), greatly increasing the risk of false confessions[4].

One of the solutions to the problem of emphasis on confession is to find new ways to measure the success of investigative interviews, shifting the emphasis from confession to information gathering (Oxburgh et al., 2010) as well as on the best ways to obtain investigation relevant information (IRI). Oxburgh and Ost (2011) participate to this shift of emphasis with a methodological strategy that coded the number of IRIs provided by the suspect during an interview. The authors define an IRI as an item of information obtained during an interview that may be of relevance to the ongoing investigation, arguing that the success of an interview should be determined by the number of IRIs obtained rather than whether a suspect confesses (Oxburgh & Ost, 2011). The primary function of investigative interviews would then be seen as gathering new information as well as confirming information related to what happened, how it happened, and who did what, when, and where (Milne & Bull, 2006), contributing to an important change in understanding by shifting the focus from confession to collection of IRIs.

[4] The situational and individual factors associated with false confessions have been extensively studied (see Kassin et al., 2010 for a review). For example, a person who is mentally unstable is at higher risk of providing a false confession.

A shift toward dynamic methodologies requires not only that the phenomenon under study be reframed but also that measures of IRI be accompanied by a sequential analysis of events as they evolve through time. To encourage this shift, we propose introducing a theoretical perspective based on Game Theory to the study of investigative interviews. In Game Theory, decision-making is studied by looking at the interactions between two or more participants (Bicchieri, 2004). Applying this approach to the interview process makes it possible to consider not only the influence of an individual behavior on IRI but also the effect of a combination of behaviors. We then argue that time and its influence on behaviors must be part of research in this area. Finally, we discuss methodological aspects of this new approach, such as the type of data and the data collection methods needed in a more dynamic understanding of investigative interviews.

2.2 Game Theory applied to investigative interviews

Game Theory is a mathematical model based on rational choice theory (Morrow, 1997), which presupposes that each actor is focused on maximizing personal gain (Cornish & Clarke, 1986). The theory's origins in the field of mathematics make it a fundamental tool for understanding how resources are shared between individuals with divergent interests (Eber, 2013). A game is defined as an interaction between two or more individuals in which the gains of each participant are affected by the decisions made by the other players (Kelly, 2003). The theory is thus nested in the rational choice approach (Morrow, 1997) but also includes the idea of strategic interaction.

To illustrate the different theoretical concepts, the example of a typical investigative interview of a suspect of online sexual offending in Canada will be used throughout this paper. Investigation of online sex offenses has the advantage that digital traces on a suspect's computer can be used as evidence and investigative interviews are therefore very similar in the kind of

evidence available. The amount of evidence available for presentation throughout the interview not only increases the possibility that IRIs will be provided but allows a sequential analysis of information. We consider these interviews from a two-party perspective – an interviewer tasked with obtaining valid information and a suspect whose task is to manage communication to serve their best interests.

2.2.1 Basic concepts

Most of the literature on Game Theory uses similar concepts to explain the context of a game (see, for example, Gintis (2014), Guerrien (2010), Kelly (2003), Peters (2008), or Rasmusen (1989)). First, social interaction requires individuals who interact (Gintis, 2014; Kelly, 2003) – players who are participants or actors in the game. Applying this concept to a typical investigation of child exploitation in Canada, the case begins with a team of investigators collecting information about an individual who is presumed to have consumed online material dealing with child exploitation. If the suspect is arrested, an investigator, designated here as the interviewer, will meet him/her at the police station. The interaction analyzed in this paper begins at the start of the interview, with the first player the interviewer, the second the suspect. In Canada, only these two individuals take part in the interview, although in a different context, other players might be involved[5]. In some countries, such as the United States, a lawyer or another police officer may be present during the interrogation.

Second, a game contains actions (Gintis, 2014; Peters, 2008). Players must make decisions that are translated into observable behaviors. In our example, verbal communication is considered

[5] Police officers in Canada give a suspect the opportunity to contact an attorney before the interview begins but the attorney cannot be present during the interview. If the suspect is a minor, they may be accompanied by a guardian or a lawyer.

to be a social action: people speak, and their words have consequences (Garfinkel & Sacks, 2005; Wittgenstein, 1976). It is important to analyze not just the words used but also their meaning since it influences the way they are interpreted by other players (Fabbrichesi, 2016). For instance, if the interviewer (player 1) asks the suspect (player 2) a direct question about their use of child sexual exploitation material, player 2 must respond and may decide to deny the accusation, accept it, or remain silent. In this context, silence is considered to be an action. In Game Theory these actions are seen as strategic interactions: what takes place during the game is not a simple communication between two individuals but an exchange in which each player's decision (observed through behaviors) alters the objectives of the other players, whether or not they are aware of this effect (Goffman, 1966).

Third, the game includes a set of outcomes (Kelly, 2008; Rasmussen, 1989), each of which is the consequence of the players' actions. In most research, the outcome is considered to be the dependent variable and in the literature on investigative interviews this dependent variable is often a confession. However, a suspect may provide IRIs that are sufficient to validate their arrest and can lead to a conviction even in the absence of an explicit confession. IRIs could then be considered to be outcomes (dependent variables) with the other pertinent aspects of the interview seen as independent variables.

An outcome in this sense can be the result of a conscious decision by the suspect or may occur inadvertently. For example, the interviewer might tell the suspect that a computer, linked to him/her through its IP address, has clearly been shown to have been used to download child exploitation material. The suspect might then choose to confess that they had downloaded those files. The suspect's response, an outcome, is the result of the interviewer's previous action. Or, during the course of a more general discussion, the suspect might confirm that they are the only

one living at a particular address and using the relevant computer. The suspect has then provided an IRI that meets the criteria for an outcome, even if they are not conscious of having done so.

Fourth, there are payoffs associated with each outcome. In Game Theory these are the benefits players receive after the action has been played (Rasmussen, 1989). They are profits that a player expects to receive based on their strategies and those of the other players (Gintis, 2014). In investigative interviews, these payoffs make it possible to determine the probability that a behavior will lead to a desired outcome. For example, displaying empathy toward the suspect may have a more positive effect on the provision of IRIs than emphasizing the gravity of the actions of which the suspect has been accused (Baker-Eck & Bull, 2022; Baker-Eck et al., 2021).

Fifth, the players have preferences regarding strategies. The strategies used by both participants during an investigative interview, observable through their behaviors – the actions taken – have an impact on the conduct of the interview (Rasmussen, 1989). Static variables, such as personality traits, age, gender, or physical appearance, also influence the interaction (Baker et al., 1990; Haines & Leonard, 2007) and are reflected in players' preferences (Gintis, 2014; Goffman, 1969): players will tend to choose a certain set of strategies and tend to use the same strategies again. Certain interviewer strategies will then be more effective with particular suspects and can be chosen and changed in response to the strategies used by suspects. This leads to an important aspect of the theory – that decision-making is rational.

2.2.2 Rationality

Game Theory is an extension of rational choice theory, and the rationality of actors is therefore central (Gintis, 2014). Rationality is often defined as acting to achieve objectives (e.g., Gintis, 2014; Harrington, 2009). In a game, the objectives are to maximize payoffs. Maximization of gains is not necessarily egoistically self-oriented: there is nothing necessarily irrational about

being altruistic. The only element rationality presupposes is that a decision is made as a way to achieve a particular objective rather than randomly.

In a game, each decision is made among a defined set of choices, known by the players. In investigative interviews, participants make choices as rational beings in accordance with their preferences (Boudon & Bourricaud, 2002). Goffman points out that "we can say that anyone who hides something away and then keeps his lips sealed, or reveals something through communication that he had theretofore hidden, does so because he feels his interests can be furthered in this way" (Goffman, 1969; p. 36). An individual's choices may sometimes appear irrational because they are different from the choices we would have made in the same situation. For instance, from a purely mathematical perspective, a suspect who knows he or she is guilty should logically remain silent during an investigative interview because there is nothing they could say that could change the situation. In reality, however, such interviews are part of a very different game in which the suspect may not always remain silent or try to deny the accusations. It might be a rational decision for a player to confess in the first minutes of an interview, without knowing the amount of evidence against him/her, if they believe that this decision will help assuage strong feelings of guilt. Rationality involves making decisions that meet individual interests given the knowledge, interests, and experiences involved in a given situation.

2.2.3 Inherent elements of the Game Theory

There are several implied notions of Game Theory that should be intertwined in our work. First, Game Theory suggests observing how players proceed when placed in a real-time social situation (Schmidt, 2001). The timeframe used in the empirical work should consider a continuous timeline that renders adequately the line of actions.

This notion points toward an emphasis on what is happening during the interview rather than on the influence of external factors. Schmidt (2001) reports that in individual decision theory, a decision maker faces an external world that affects the consequences of his actions. This outside world is somehow considered unimportant in Game Theory. The knowledge of the game by the players is considered much more central to the analysis of social interaction since it is never independent of the knowledge of the other players (Schmidt, 2001). This justifies the suggested shift from the emphasis of the literature on external factors associated with confession towards the observable behaviors of the interview.

Intertwined with the first two implied notions, the observability of behaviors is another important aspect. Binmore (1990) indicates that a player learns from what another player thinks, by observing how he has played, and this observation will be useful in predicting how he will play next. This will influence players' choices in their decision-making. The observation of behavior must be at the center of the analyzes.

2.2.4 The game elements of investigative interviews

The literature on Game Theory discusses several modes of play or situations involving two participants, two of which are particularly relevant to the analysis of the investigative interview: non-cooperation and asymmetrical levels of information. Work on Game Theory often discusses cooperative situations versus non-cooperative (or competitive) situations (e.g., Rasmussen, 1989). In cooperative situations, each player agrees to work with the other players to achieve a common goal while also trying to prevent other participants from losing, for example, by making sure that everyone wins the maximum amount of money possible. In a cooperative situation, a player who deviates from the agreement and chooses a strategy that benefits only him/herself will often be severely punished by other players, who will then choose strategies to make him/her lose: "In fact,

cooperation is rather a balance of terror: it only takes place if the two players choose this very uncomfortable strategy" (Guerrien, 2002, p. 73). Risks and uncertainty are part of both cooperative and non-cooperative game situations, the difference being that non-cooperative situations do not involve a prior agreement between players but are part of a competitive social interaction in which there will be winners and losers (Guerrien, 2002). With this element in mind, an investigative interview is therefore always an uncooperative situation. On the one hand, there is most likely no prior agreement to cooperate as suspects might want to protect their legal freedom. On the other hand, even if the suspect would be totally cooperative and would agree to tell everything the investigator needs to know, the non-cooperative game situation apply as one of the players can choose, at any time, to stop collaborating or be well-meaning and honest with their interlocutor. The cooperative game exists only if it is identified following an analysis of an interaction which took place in the past. Otherwise, for the players in the interaction, the situation can change at any time and become a non-cooperative game.

The second game mode relevant to investigative interviewing concerns the level of information held by the participants. A game involves important information, such as the strategies that can be used or have already been used. In a situation where all participants have the same information about the game (perfect or complete information), the players are aware not only of their own strategies and the associated payoffs but also of the strategies and payoffs of the other players (Kelly, 2003). Having this information does not mean that a player knows what actions an opponent may make – they can only try to anticipate them. In a game with asymmetrical information, players are aware that they can choose strategies but do not know the payoffs associated with these strategies and may not know the strategies available to the other players (Kelly, 2003). For example, a suspect knows they are under arrest and that the interview is being

conducted by police. If the suspect is not knowledgeable about police investigative strategies, they might fail to see the importance of a conversation about the last hockey game watched, seeing it as harmless. However, while talking about hockey, the suspect might confirm that they watched the game alone, at home, on a particular night. As digital traces on the suspect's computer tell the interviewer when child sexual exploitation material was downloaded and at which address, this can suggest that the suspect was alone that night, and that therefore no one else could have downloaded the material. The suspect's information did not involve knowledge about this strategy or the evidence and was therefore asymmetrical in comparison with the informer's knowledge. An investigative interview is a game in which the relevant information is not equally available to all players. The interviewer is not only aware of all the information the police have about the case, including available evidence but, based on professional experience, is knowledgeable about the strategies a suspect may use to defend him/herself. The suspect is both unaware of the evidence found by the police and unlikely to know the strategies used by their interlocutor. The asymmetry of information between the suspect and the interviewer have been recognized in the literature (Cleary & Bull, 2019; Sivasubramaniam & Heuer, 2012).

Some research on police/civilian interactions has made implicit use of Game Theory. While researchers do not discuss the theory directly, the vocabulary they use, such as describing the interaction as a "game" or speaking of "equilibrium of outputs", is very similar to that used in Game Theory (e.g., Brent & Sykes, 1979; Sacks, 1972). The same pattern can be found in research on investigative interviews (e.g., David, et al., 2017; Gordon & Fleisher, 2011; Leo, 1996a; Leo 2009; May et al., 2017; Shuy, 1998; Simon, 1991). Kelly and colleagues (2016) go even further and adopt the vocabulary of Game Theory by suggesting that some types of strategies lead to a zero-sum game, in which the interviewer wins, and the suspect loses. Other researchers have used

Game Theory more explicitly. For instance, Guo and Chen (2014) used the concepts in the Prisoner's Dilemma, the Chicken Game, and Path-Dependence, models derived from Game Theory, to analyze transcripts of taped recordings of police interrogations in China and conclude that the Chicken Game, in which the first person to back down in a confrontation loses, is a useful model for analyzing the interaction between the interviewer and the suspect. Finally, Schiemann (2016), while not explicitly referencing police interviewing, uses Game Theory to explain the relationship between confession and the use of torture, arguing that the theory makes it possible to show that torture is ineffective even if it often leads to confession: for him, while confession is often defined as the payoff, Game Theory shows that the payoff should instead be defined as obtaining truthful information, a payoff not achieved through torture.

To summarize the different concepts, in a game the participants take actions that lead to outcomes that have different payoffs. The actions are chosen according to players' preferences and are considered to be rational. Game Theory offers a useful perspective for understanding investigative interviews by analyzing the interaction between the two individuals as if they were players. The game is non-cooperative, and the information known by participants is asymmetrical. Using the concepts of Game Theory demonstrates the need to consider the interaction between the two players involved in an investigative interview as dynamic and to understand the effects of the actions of each player on outcomes. However, while a few studies have used the vocabulary of Game Theory, only one study, known to the authors, in the field of torture has used these concepts to understand a phenomenon (Schiemann, 2016). No study to our knowledge has applied the concepts proposed by the theory to look at investigative interviews.

2.3 Dynamic analysis of investigative interviews

Some of the previous research on investigative interviews has tended to emphasize the association between confession and individual, criminological, or contextual factors, suggesting that these relationships are stable over time, and to focus on the presence or absence of confession, a static approach that does not take into account behaviors and events that are transitory and dynamic (Roe, 2008). More recently, however, some researchers have shifted toward a more dynamic analysis of investigative interviews, the first step in developing different strategies of analysis that will lead to a more sophisticated understanding of suspect disclosure and confession.

Some researchers have looked at participant strategies and how these change during the course of an interview (Håkansson, 2019; Luke & Granhag, 2020). Others have analyzed the effect of the same variable, such as presentation of evidence, at different times during an interview (Clemens et al., 2020; Granhag et al., 2013; Hartwig et al., 2014; Vrij & Granhag, 2012; Walsh & Bull, 2015), looking at both the strategic use of evidence (SUE) and Shift-Of-Strategy (SoS) approaches. These approaches are based on the idea that how the interviewer presents information about the evidence available will influence suspect's strategies (i.e., their behavior and communication in the interview setting), with suspects found to adapt their statements in relation to their perception of the interviewer's knowledge (Hartwig et al., 2014; Luke et al., 2014; Sorochinski et al., 2014).

Interviews have also been analyzed in terms of actions within temporal segments, which makes it possible to identify changes in behavior and strategy over the course of an interview. Pearse and Gudjonsson (1999) analyzed 18 police interviews in the United Kingdom by dividing the interviews into 5-minute segments and charting the appearance and timing of 39 interview strategies. Their findings showed that strategies can change over the course of an interview, pointing toward the need to understand interviews as a dynamic interaction. Bull and Soukara

(2010) adopted the idea of 5-minute segments in their study of which strategies were most likely to lead to confession. Both these studies, however, analyzed only interviews that ended with a confession. In contrast, Kelly and colleagues (2016) and Leahy-Harland and Bull (2017) used the idea of five-minute segments to analyze interviews that involved either confession or continued denial. These studies showed that rapport and relationship building are positively associated with disclosure, while strategies aimed at increasing the suspect's level of anxiety – such as those that use negative questioning (e.g., suggestive questions), describe victim trauma, or involve confrontational strategies (e.g., asserting authority) – are associated with the absence of disclosure. Kelly and colleagues (2016) were able to show that the negative effect of certain strategies on disclosure can last for up to 15 minutes.

A third strategy is to use a model that highlights the dynamic aspects of the decision-making process and the effect of time on these decisions. Yang and colleagues (2017) argue that including temporal effects in the model makes it possible to account for situations in which suspect decisions change during the course of an interview in relation to previous behaviors. Their findings show that participants were more likely to change from denial to confession when they believed that the proximal outcome (limiting the length of the interview, decreasing the amount of anxiety felt) outweighed the negative aspects of the distal outcome (conviction and punishment). Cabell and colleagues (2020) also considered the impact of time on guilty and innocent individuals on their decision to confess.

Looking at sequences of behaviors and timelines should be an important part of research in this area. However, theory-building and research that take temporal aspects into account require overcoming the conceptual hurdle of static thinking inherent in the concept of the variable (Roe, 2008). Researchers must start thinking of human behavior as something that happens rather than

as something that is (Roe, 2008). Game Theory does not explicitly include the idea of time in strategic interactions, but the dynamic aspect of a game is underlined by introducing the idea of time. Time is a fundamental element in strategies used in interactions between two parties (Lee & Liebenau, 1999). A dynamic analysis of interactions such as investigative interviews must therefore consider not only the influence of participants on each other but the timeline on which this interaction occurs, both in observing and interpreting 'what happens', as well as in generating new concepts and hypotheses.

2.4 Adding time to methodology

Since time plays a prominent role in everyday life, the tendency to ignore it when developing research methodologies is somewhat paradoxical and can lead to an unintentional distortion of the subject being studied (Jones, 2000). Many factors might explain why temporal aspects are not integrated into methodology: research conventions (such as an emphasis on short-term experiments), the complexity of the phenomena, and the lack of relevant theories and related methodologies (Ancona et al., 2001). The failure to recognize the importance of time when developing methodologies has been mentioned by scholars in fields such as organizational research (Ployhart et al., 2002), education (Barbera et al., 2015), and psychology (Roe, 2008) and scholars from different fields have begun to advocate for an enhanced consideration of time and a dynamic understanding of the phenomenon being studied. Roe (2008) notes that the term dynamic refers to the overall shape of the phenomenon as it unfolds over time and Lee and Liebenau (1999) discuss how interaction strategies involve time as a fundamental dimension. Eaton (2004), discussing the duration of emotional responses, calls for more time-based research that will make it possible to create a fully dynamic theory of human emotion. Mathieu and Schulze (2006) propose a time-based theory of team behaviors in which team attributes are recognized as influencing

episodic transitions, interpersonal processes, and performance. Avolio (2007), in an article on leadership theory, argues that understanding the dynamic interplay between leaders and followers necessitates taking contextual changes into account. The dynamic methodologies discussed in the previous section on research in investigative interviews also acknowledge a dynamic, and therefore temporal, perspective.

Some researchers have approached the problem directly – Ekman and colleagues (2012) describe social interaction as a fluid and changing process whose analysis must include all participants and take place in real time, without interruption. While some researchers have begun to use nonlinear regressions and regressions with interaction terms as well as multiple indicator models, structural equation modeling, time series analysis, and hierarchical linear models (Stolzenberg, 2003), the models in most studies consider the subject at discrete times, even if the subject is a process that is continuously evolving. This not only ignores an important characteristic but can make it difficult to compare research results (van Montfort et al., 2018): research tends to focus on estimated parameters for the intervals being studied and not only can these parameters differ, but the lack of a continuous timeline can lead researchers to miss important material – humans do not cease to exist between parameters (Bergstrom & Nowman, 2007). The idea of temporality is central to the analysis of data focused on interactions and has to be taken into account in both data collection and statistical analysis. Observing the effect of time on behavior requires that it be considered as an independent variable, like other variables in a study. Understanding temporal relationships requires going beyond simple ideas of simultaneity, sequence, or causality.

Discussions of Game Theory often implicitly recognize the importance of time in their presentation of interactions as evolving but the idea of time is seldom discussed directly. That is

why we present the concept of time as being an important element to discuss and which should be central in the shift of methodologies on investigative interviewing.

2.5 Changes in methods

The second major objective of this paper is to move beyond analysis of concepts involved in investigative interviews and look at methodological changes that can lead to research based on a more dynamic understanding of investigative interviews.

2.5.1 Data collection

When researchers and practitioners in the field of police interviews were asked for their ideas on urgent issues and prospects for reforming interrogation practices in Canada and the United States, Leo argued (Snook et al., 2021) that the most important reform would involve ensuring that a full electronic recording of every interview exists to provide a factual (i.e., objective, comprehensive, and reviewable) record of what occurred. Such recordings would not only be important in the judicial process but could provide valuable data for research. However, even when they exist, they are often difficult to access and some researchers have therefore used questionnaires or interviews as a way to access investigators' perceptions of the interview process and the techniques used (e.g., Wachi, et al., 2014; Mueller et al., 2015), while others have interviewed inmates (e.g., Deslauriers-Varin, Beauregard, et al., 2011; Snook et al., 2015) or conducted studies using samples drawn from participants outside the judicial system, such as university students (e.g., Tekin et al., 2015; Tekin et al., 2016; Yang et al., 2015). It is, however, difficult to create a face-to-face interaction that adequately captures the elements in investigative interviews and impossible to be certain that the behavior described or recreated by these participants captures the actual experience during an interrogation. The observation of real

investigative interviews is therefore the best source of data (Granhag, 2021; Kleinman, 2021). Conditions such as the objective of the interview, the context, the environment, and the roles of the two different stakeholders can be kept constant and research observations do not change the behavior of the subjects or introduce observational bias as the interviews are recorded for reasons other than research. Actions linked to various decisions can be analyzed through a sample of individuals who are in a very similar context.

Researchers analyzing investigative interviews have done substantial work in outlining the different strategies used by police interviewers in investigative interviews[6]. However, the interviewer is not the only player and the behaviors of both players must be taken into account (Haworth, 2006). As there is very little research on strategies used by the suspect in such interviews (e.g., Feld, 2013; Hines et al., 2010; Moston et al., 2009), it is helpful to look at the literature on interviewer strategies in other fields, such as job interviews, communications in psychology or psychosocial meetings, or interpersonal communications.

To assess the strategic interaction of both participants, all behaviors must be noted, which requires developing an extensive coding grid to include all behaviors related to strategic interaction. Using the dynamic perspective proposed in this paper requires adapting the research tools presently available. One possibility is to use Observer XT©. This software, which has been developed through the last 25 years, makes it possible to program a codification grid directly into the software and then code and analyze behaviors as they relate to a video timeline. When a behavior is identified by the coder, a click records it and the exact moment it occurred. This data is automatically transferred to a database, making it possible to collect a large amount of behavioral, verbal, and physiological data that is temporally linked.

[6] Kelly and colleagues (2013) present an in-depth analysis of the different techniques and propose an interesting taxonomy to group them.

2.5.2 Aspects of data analysis

Four aspects of behavior are interesting to analyze from a temporal perspective. The first is being able to identify given behaviors and their temporal relation to other behaviors. This makes it possible to identify behaviors that are more likely to be followed by IRI as well as their durational effect. For instance, a behavior such as confronting the suspect may decrease the probability of disclosure, but this effect might be temporally limited: the impact may be seen for a few minutes and then decrease. Kelly and colleagues (2016) found that the negative effect of certain strategies, such as confrontational behaviors, can last for up to 15 minutes.

The second is recognizing that the effect of behaviors on the dependent variable, in this case provision of IRI, may be delayed. For example, giving food to suspects at the beginning of the interview contributes to ensuring their well-being. Such behavior may not be immediately followed by disclosure of an IRI but may increase the chance of disclosure later in the interview.

The third is considering behavior that lasts for a period of time: instead of happening at one point in time, such behavior has a starting point and an ending point. For example, a suspect might begin to cry. This behavior might last for a few seconds or longer. The duration of a behavior can have an effect on other players. A study by Cleary (2014), looked at the "flow" of people present in an investigative interviewing room during interviews with juveniles. The author recorded the duration of everyone's presence and found that youth spent on average 13 minutes alone in the interrogation room and that in only 26.3% of cases were all individuals present at the start of the interrogation present throughout the entire event. However, the author did not observe the effect of duration on suspect collaboration.

The fourth aspect is the cumulative effect of behaviors. The fundamental assumption of Game Theory is that interaction is a process in which the actions of each participant at each point in time

are, at least in part, contingent upon actions that have occurred in the past. Therefore, not only the immediately preceding behavior but the cumulative weight of preceding behaviors is important. If investigative interviews are looked at as a game in which players take many turns, Game Theory suggests that this repeated interaction provides an opportunity for cumulative experiences. For example, players can collect experiences of trustworthy behavior and establish norms of cooperation and reciprocity (Ostrom, 2003; Tarrant et al., 2010).

Adding a temporal perspective to Game Theory offers a myriad of possibilities for analysis of the different aspects of investigative interviews. The presence of behavior on a timeline, delayed effects, the effect of durational behavior, and the cumulative effects of behavior are examples of areas that could be analyzed in future research in the field. Integrating the idea of time into the study of investigative interviews will not only help increase our understanding of them but help develop effective interviewing practices.

2.6 Conclusion

Research on investigative interviews has increased substantially over the past three decades (see Deslauriers-Varin, 2022 for a review) and has provided information about the ethical, science-based practices that could be integrated into these interviews (e.g., Clarke et al., 2011; Meissner et al., 2014; Milne & Bull, 2003; Shepherd, 2007; Walsh & Milne, 2008), leading to meaningful reforms in the practice of investigative interviewing. Researchers have, however, focused on correlations between confession and the factors that may influence it as if these factors were stable over time (e.g., Tekin et al., 2015; Madon et al., 2013), making it difficult to acknowledge that suspect interviews are not linear (e.g., Kelly et al., 2016) but should be considered in terms of the dynamic use of strategies that involve collaboration and resistance and can change during different phases of an interview (Snook et al., 2021). Introducing the concepts used in Game Theory makes it possible to analyze these strategies more effectively. Participants

can be understood as players who make rational decisions about actions that lead to outcomes with different payoffs according to their preferences. Such a perspective makes it possible to go beyond the study of individual and criminological factors associated with confession and consider the dynamic elements involved in interactions between a suspect and a police officer.

This paper provides a conceptual and methodological introduction to the study of investigative interviews from the perspective of Game Theory which attempt to go deeper into the dynamic concepts of the phenomenon. Most recent studies have proposed to use a specific coding frame in which interviews are broken down into time segments (e.g., 5-min) in order to account for the passage of time and it impact on behavior. The researchers proceed by dichotomizing the presence or absence of confession among the segments. We propose to go further in this direction by considering a continuous timeline (analysis by second instead of segments of few minutes) and to considerer IRI rather than the presence or absence of confession. Introducing this temporally oriented perspective makes it possible to determine the probability that certain strategies will be effective in leading a suspect to provide IRI and whether these strategies can be expected to be effective immediately or only after some time has elapsed. Such information will not only increase scientific knowledge about the dynamic process that takes place in an investigative interview but might help investigators develop the most efficient strategies for interviewing suspects.

The theory presents a new conceptualization of investigative interviews that allows to perform studies which were not possible to consider until now. By representing social situations under the form of a game, it allows recognizing that choices have consequences and that these have different impact levels on players' actions. It allows recognizing the asymmetry of the roles and of the information present in the interview in order to properly account for the strategies specific to each of the roles. It allows recognizing the preferences of the players and offer the

possibly to study how it is possible to adapt behaviors in relation to the preferences of our interlocutor. The analysis of the game thus aims to facilitate the understanding of the problems and realities encountered by the players and possibly to provide them with avenues for solving them.

We should not expect an explanatory theory of collaboration in the context of an investigative interview but rather a methodological theory that allows us to understand and study, through its conceptual framework, the interaction between two individuals. Instead of trying to extract a problem in order to find its solution, it is a question of extracting a protocol of rules whose concrete application will create a solution that will then have to be analyzed.

Chapter 3. Research Design

This thesis carried out two empirical analyses to test the different concepts of Game Theory. The findings are presented in the two scientific articles presented in chapter 4 and 5. The two articles have different analytical approaches and include a detailed description of the methodologies employed. This chapter therefore reports more briefly on the general methodology used in the context of this thesis.

The data for this thesis were collected during the PRESEL project which is a French acronym for Research Project on the Online Sexual Exploitation of Children (Fortin, Paquette, Deslauriers-Varin, Proulx, and Cortoni). This initiative, which started in 2016, is the result of a collaboration between Université de Montreal, Université Laval and Sûreté du Québec (SQ). The objective of the project is to deepen the knowledge about online sexual offenders in order to better prioritize police cases, better prevent to such crimes. The project includes three areas of research:1) Risk factors for online and contact sexual offending against children; 2) Factors related to disclosure during police interrogation and; 3) Police intervention and development of a police

cases prioritization tool. This thesis is based on the second area of research. The empirical findings of the thesis are presented under two scientific articles in chapters 4 and 5. This chapter reports the general method used in the two articles as well as an overview of the analysis.

3.1 Sample

The sample consisted of 130 videotaped investigative interviews by the Internet Child Exploitation (ICE) special unit of Québec's provincial police department, the SQ. Everyone in the sample had been convicted of one or more offenses related to online child sexual exploitation – including child luring (44.5%) or accessing and possessing, distribution of, or production of child pornographic material (76%). All suspects were male and 96.5% were Caucasian[7]. The average age was 37.68 years (SD=14.06) and 59.5% of individuals in the sample were employed during the crime period. The suspects were single in 57.7% of cases. Also, 41.9% of suspects had a criminal history and among those, 7% had history of online sexual offenses.

All interviewers in the sample were Caucasian, and in 74% of interviewer were male as the remaining 26% were female. No other information about the interviewers was available (e.g., years of experience, specialization). The mean length of the interviews was 198.23 minutes (SD= 71.15; range = 46.5-493.5; median = 193.69). In total, 25,770 minutes of interview time were analyzed.

3.1.1 Sample specification

The type of crime committed by the individuals in the sample is a very important aspect of the project. First, cybersexual offenders represent a specific type of delinquency compared to individuals who have committed other types of crime. The general information highlighted in the studies is that the profile of an online sex offender differs greatly from non-criminalized

[7] The remaining ethnic origins were noted as unknown.

individuals and other types of offenders with respect to personal and socio-demographic factors. Indeed, cybercriminals are more likely to have a higher level of education (Babchishin, Hanson, and Hermann, 2011; Faust et al., 2015) and a higher employment rate (Clevenger, Navarro, and Jasinski, 2016; Faust, et al.,2015). Cybersexual offenders also tend to have less criminal history than offenders of other types of sex crimes (Aebi et al., 2014; Faust, et al.,2015; Smid et al., 2015). Indeed, only 12% of them would have a criminal history (Babchishin et al.,2011) whereas among contact offenders, this would be the case for 59% of them (Greenfield, 1996). Cybersexual offenders are predominantly Caucasian (Babchishin et al., 2011) and tend to use fewer illicit substances (Faust et al.,2015). They show fewer antisocial traits than other offender groups (Babchishin, et al., 2015; Magaletta et al., 2014). Cybersex offenders appear to be more sensation-seeking than non-offenders (Ray, Kimonis, & Seto, 2014; Seigfried-Spellar, 2014) and exhibit interpersonal deficits and depression significantly more than the other groups (Magaletta, et al., 2014). A higher level of extraversion would explain their ability to create a social network on the Internet in order to have access (exchange/share) to child pornography (Seigfried-Spellar, 2014). Online offenders are less vulnerable to recidivism compared to the offline sex offender group (Faust, et al., 2015).

The second reason that this sample is of particular interest is that online sex offenses are leaving more computer digital traces as evidence. The capacity of the computer to record all events creates a large amount of information which is compelling and indisputable to prove an offense. This feature of the crime represents an important benefit as evidence against the suspect has been shown to have an influence on confession (e.g., Gudjonsson & Petursson, 1991; Moston, et al., 1992; Phillips & Brown, 1998). According to the visual inspection of the content of police files and because of the nature of the offense, the nature and the strength of evidence is very similar

across the different interviews of the sample which create an interesting homogeneity for the analysis. This important variable is equivalent to all the suspects and rules out the uncontrollable effects that this aspect could have on the results.

Another specification of the sample is that the interviews are done in a Canadian setting. It is important to consider this aspect of the data as it may influence the findings. In a Canadian context of police interviewing, there is most likely only two participants in the room: the interviewer and the suspect. In Canada, the suspect is offered to call a lawyer before the start of the interview, but the lawyer is not authorized inside the interview room. This setting simplifies the interaction to two players and allows to apply the Game Theory concepts in an efficient manner. Also, the finding might be influenced by the interview protocol of the Child Sexual Exploitation special unit of the SQ which might be different from other law enforcement team. For example, the length of the interviews is longer than what has been observed in previous studies (see Kelly, et al., 2016; King & Snook, 2009) which potentially influences the strategies used as well as the suspect's reaction. Suspects perception of police and experience during interviews might be very different for another culture (Braga, 2015; Phillips et Brown, 1998; St-Yves, 2002). The strategies used and the overall interviewers' training might have an impact on the suspect reaction during the interview (Brimbal et al., 2021). All those factors might impact the suspect experience and interpretations of the investigative interview. The study must be replicated with different samples in order to understand the impact of this context.

3.2 Material

In accordance with organizational procedure, all interviews were conducted by investigators who received a standardized training on investigative interviewing. The interviews

were conducted under the usual interview protocol and not for the purposes of this research. The interviews are all closed cases managed by the SQ between 2011 and 2019.

The coding grid was developed by the author and her co-adviser. The grid was then submitted to two co-researchers from the project in order to clarify and improve the variables, their definitions and their codification. Subsequently, the coding grid was subjected to an evaluation phase to test the effectiveness and the conceptualization of the variables. Essentially, this phase consisted of coding a small number of interviews to determine whether the coding of variables could be carried out in an optimal manner according to the definitions and the established procedure.

3.3 Procedure

The coding grid was programmed in *Observer* XT version 14. Resulting from 25 years of development, this software allows to encode and analyze behaviors directly on the video timeline. The grid contains the 77 behaviors used in this study (31 for the suspect and 26 for the interviewer). The software allowed a simplified data collection: Whenever a behavior was identified by the coder, it only took a keystroke or click to flag it in the database along with the exact time it occurred. The data was automatically transferred to a database allowing efficient analysis. It was therefore possible to indicate, while viewing the video, our observations of behavioral, verbal and physiological data, thus amassing a huge amount of information in a timely and precise manner. The coding grid integrated into the software makes it possible to account for the different elements interacting in the process of confession and non-confession. It makes it possible to analyze the content of the recording continuously over time and therefore to know which behavior precedes and succeeds other behaviors. This is the first study on investigative interview that is done on a continuous timeline basis rather than divided in periods of time. The collection tool made it

possible to timestamp preidentified behaviors that took place during an interview, creating a continuous timeline of interview events.

All videotapes were viewed and analyzed at the law enforcement office to ensure the confidentiality of the data. Data reliability was ensured by a coder training protocol. First, the coder, a master student studying in the field of police interrogation practices, was trained by the author of this thesis, under the supervision of the investigators of the larger research project this thesis is part of. The coder was assigned five interviews which was then compared with the author's codification. Throughout the codification of these five interviews, the research assistant met the author regularly to ensure the proper coding. After this training phase, since the level of error was low, the research assistant proceeds to code by herself most of the interviews included in the research project (85%). Because they were only two coders and because they were working very closely, the interrater reliability was therefore not calculated. To facilitate the use of the coding grid, a guide has been developed. This guide presents general instructions for effective use as well as clarifications on certain variables to improve understanding.

3.4 Ethics

In 2017, the SQ granted its agreement to the use of video interrogations of cyber-sex suspects for the purposes of PRESEL research project. An agreement was signed to manage the use of data, considering the protection and security of SQ data. This project was also approved in 2017 by the Ethics Committee of Research in arts and sciences (CERAS) of the University of Montreal (Number of certificate: CERAS-2017-18-039-D(3)) and this approval has been annually renewed ever since.

3.5 Measures and analysis

In this thesis, two methodological strategies were used to test Game Theory's concepts in investigative interviews. The sample, material and procedure previously described were identical for both empirical tests. This section aims to broadly introduce measures and analysis used in the next two chapters. Deeper explanation of measures is presented in each chapter.

3.5.1 Measures and analyses of Chapter 4

In chapter 4, the quantitative analysis aims to test the impact of the behaviors of both the suspect and the interviewer on suspect's disclosure as well as the impact of time. The many behaviors were grouped in order to do the analyses. The taxonomy of investigative interviews developed by Kelly, Miller, Redlich, and Kleinman (2013) was used to classify the different behavior into domains. Six classification categories were identified for the interviewer: (a) Rapport and relationship building; (b) Context manipulation; (c) Emotion provocation; (d) Confrontation and competition; (e) Collaboration; and (f) Presentation of evidence. No taxonomy of suspect behaviors was available, so the categories of interviewer behaviors proposed by Kelly and colleagues (2013) were adapted to suspects' behavior using the same categories. The dependent variable observed in relation to the different domains was all investigation-relevant information (IRI) - defined as information obtained during the interview that may be of relevance to the ongoing investigation (Oxburgh and Ost, 2011). The IRI allows to draw the process of suspect's disclosure in the interview.

According to the theory, an investigative interview is a process in which the act of a player at a point in time is, at least in part, contingent upon past acts. The simplest mathematical model of a process involving discrete and continuous times is a Markov model (Brent & Sykes, 1979), a sequence of events in which each event, or state, depends on one or more previous states

(Manderscheid, et al., 1982). An important aspect of Markov models is their recognition of indeterminacy: individual behaviors may vary widely while the overall pattern is maintained, creating a statistical approach that is more reflective of human behavior than models that use estimates of parameters based on means (Hewes, 1975; Leik & Meeker, 1975). The approach was used to test whether a given behavior at time 1 influences subject disclosure at time 2. Each behavior was paired with the one that followed it and then paired with the one after that; that behavior was then paired with the one following, and so on.

Then, when the data were arranged, generalized linear mixed models (GLMM) were used to predict whether behavior at time 2 is influenced by behavior at time 1 as well as the force of this influence. This type of statistical analysis makes it possible to assume that observations are independent by adding a random effect for each interview. The software R version 4.1.2 was used to run the analysis with the lme4 package.

3.5.2 Measures and analyses of chapter 5

Chapter 5 aims to test another aspect of Game Theory: players' preferences, by determining the differences between suspects' strategies and behaviors during the interview. To observe the profiles, the list of suspects' behavior were first grouped as some of them were conceptually similar. For example, showing frustration (e.g., swearing aggressively) is very similar to speaking back to the interviewer in the sense that both express irritation with the situation. Similar behaviors were aggregated into the following broader categories: (a) Irritation; (b) Controlling; (c) Justifying; and (d) Agreeable. Once the conceptually similar behaviors were grouped, Latent Transition Analysis (LTA; Collins & Wugalter, 1992; Graham, et al., 1991) help identify different profiles of behavior.

LTA was also used to determine whether these profiles remained stable throughout the interview. LTA is an extension of Latent Class Analysis (LCA) and measures dynamic latent variables. Parameters are estimated to account for the prevalence of memberships at the time of first measurement, the incidence of transitions from one stage to another, and the probability of response to specific items (Collins & Flaherty, 2002). The probability that behavior patterns will change is estimated for each time point. The analysis also estimates the probability that there will be a transition from one class to another during the time considered. LTA thus makes it possible to identify mutually exclusive suspect profiles within a sample as well as estimate movement among profile categories during the interview. Analyzes were performed using PROC LTA in SAS 9.4 statistical software.

Chapter 4. (Article) It's all about time: The influence of behavior and timelines on suspect disclosure during investigative interviews[8]

[8] Bergeron, A., Fortin F., Charrette, Y., Deslauriers-Varin, N., & Paquette, S. (2022). It's all about time: The influence of behavior and timelines on suspect disclosure during investigative interviews, manuscript ready to submit for publication.

Student's statement regarding the contribution to the article: I declare that I am the main instigator of this article. I took on the task of the literature review, data analysis, and writing. Francis Fortin, Nadine Deslauriers-Varin, and Sarah Paquette provided intellectual input into the development of the project and assisted in writing and revising the manuscript. Yanick Charette provided help with the analysis.

Abstract

Research on confession has usually focused on showing that it is significantly associated with individual, crime-related, and situational/contextual variables and is both a static event and a dichotomous indicator of interview success. Recent work, however, suggests that investigative interviews are a dynamic process in which interrogation strategies change over time (e.g., Kelly et al., 2016). Using a Game Theory perspective, this study looks at the impact of behaviors of both players (interviewer and suspect) on the production of investigation-relevant information (IRI). The sub-objective is to demonstrate the usefulness of applying Game Theory to the study of investigative interviews by considering time and interaction between players as an integrative part of the analysis. Videotaped interviews related to online child sexual exploitation (n=130) were analyzed and the different behaviors of suspects and interviewers were analyzed to determine if they involved (1) rapport building/active denial, (2) collaboration, (3) confrontation, (4) emotion/response, and (5) elicitation of information related to the case. Results showed that information relevant to the investigation is often provided shortly after a suspect has offered additional information or given responses that meet emotional needs (e.g., justifications). The interviewer's use of available evidence increases the likelihood that additional information will be provided, while the ability to build a rapport with the suspect is effective in the longer term, even if a positive effect is not immediately observed. Using a dynamic process approach in analyzing

investigative interviews provides a starting point for the creation of practical guidelines to help practitioners increase suspect collaboration during investigative interviews.

4.1 Introduction

Interest in investigative interviews has increased over the past decades and research in this area has been important in the development of ethical, legal, and effective interrogation practices (Meissner et al., 2017). For example, the High-Value Detainee Interrogation Group (HIG) research program, begun in 2010, has made it possible to identify approaches that are effective in developing cooperation and rapport, eliciting information, challenging inconsistencies through the strategic presentation of evidence or information, and assessing credibility using cognitive cues and strategic questioning based on evidence-based scientific studies. Researchers have also helped develop meaningful reforms in police practices, such as the decision in Canada and some states in the US to legislate mandatory recording of all police interviews and the creation in the UK of the PEACE model of investigative interviewing, now used internationally (Snook et al., 2020). However, work is still needed to better understand different aspects of investigative interviews, including suspect disclosure. The increased sophistication of the latest methodologies and the development of more efficient tools for data collection offer promising possibilities for the study of investigative interviews according to evidence-based practices (e.g., Clarke, et al., 2011; Cleary & Bull, 2021; Kelly et al., 2019; Leahy-Harland & Bull, 2017).

Deslauriers-Varin and Bergeron (2021) reviewed the scientific literature on police interrogation and identified three major waves of research. In the first wave, which was more

theoretical in nature, researchers focused largely on explaining why someone confessed or admitted to having committed a crime. Various explanatory models were proposed and the importance of considering emotional, criminogenic, crime-related, and situational factors was discussed. Individual characteristics (e.g., age, relationship status), criminal background, and the context of the interview (e.g., presence of guilt, length of the interview and the conditions under which it was conducted as well as the attitude and behaviors of the police interrogator) were all found to play a role in the offender's decision to confess during police interrogation (Beauregard et al., 2010).

The second wave is captured in studies published in the 1990s and 2000s (Deslauriers-Varin & Bergeron, 2021). Researchers focused on empirically validating the explanations and motivations put forward in the theoretical models and found significant associations between individual, crime-related, and situational/contextual factors and confession. Ethnicity was also found to be significantly associated with confession as Caucasian were more likely to confess than individuals of other ethnicities (Cleary & Bull, 2021; St-Yves, 2002; Viljoen, et al., 2005). Regarding marital status, a study by St-Yves (2002) on sex offenders found that those who are single have a higher confession rate (38%) than individuals in a relationship (24%), perhaps because single individuals are less worried that a confession will lead to rejection (Deslauriers-Varin, et al., 2011; St-Yves, 2002). Increased rates of confession have also been found with younger suspects (Beauregard et al., 2010; Viljoen et al., 2005).

The third wave of research, during the last decade, focused largely on further analysis of the influence of situational and contextual factors, particularly the effect of interrogation techniques and the relational context in which interrogations take place (Deslauriers-Varin, 2021). Much of this research examines the role of evidence strength (e.g., Brimbal & Luke, 2019;

Deslauriers-Varin, et al., 2011, 2020; Moston & Engelberg, 2011), the way in which evidence is presented (e.g., strategic use of evidence; Clemens et al., 2020; Granhag et al., 2013), and the role of police investigators and investigative techniques (e.g., Kelly et al., 2019; Leahy-Harland & Bull, 2017; Zeng et al., 2020).

Policymakers, practitioners, scholars, and the public have become interested in interrogation methods (Kelly et al., 2016; see for example the "Mendez Principles of Effective Interviewing" in 2022). While recent studies have focused on factors (and the interactions between them) that may encourage or discourage confession, few have looked at the relative importance of these factors. In addition to the identification of static factors that may be associated with disclosure, developing best practices requires empirical information about the effectiveness of various strategies.

4.2 Contextual factors related to the disclosure process

There is evidence that confession is a dynamic process that is influenced by contextual elements and researchers have highlighted the importance of changes in the decision to confess during an interrogation (Deslauriers-Varin, et al., 2011; Walsh & Bull, 2012). Such changes may be related to contextual variables, such as the attitudes and skill level of interrogators, as well as the strategies used (Cleary & Bull, 2021). Empirical studies have shown that pressure from police interrogators influences suspect disclosure. A suspect who feels respected and understood may have more confidence, which might make it easier to confess (Collins & Carthy, 2019; Kebbell, et al., 2010; Kelly & Valencia, 2021; Wachi et al., 2014; Westera & Kebbell, 2014), while suspects who feel they are being pressured by the interviewer, for instance by the use of confrontation, argumentation, or humiliation during the interview process, are more likely to deny that they committed a crime (Holmberg & Christianson, 2002). This suggests that it is more effective for

the interviewer to elicit and/or provide evidence of inconsistencies in a suspect's story in a non-judgmental manner (May et al., 2017); direct accusations appear to lead to denial and decrease the amount of investigative-related information obtained (Adams-Quackenbush, 2019). The quality of available evidence also has an impact on confession (e.g., Gudjonsson & Petursson, 1991; Moston, et al., 1992; Phillips & Brown, 1998) as does the way the evidence is presented (e.g., Granhag, et al., 2013; Hartwig, et al., 2014). Strategies used in an interview influence confession rate, showing that interviewers' behaviors influence the course of an interview.

Research on contextual factors and interviewer strategies has helped increase our knowledge about investigative interviews. Although researchers have often focused on the correlations between confession and the factors that influence it as if they were stable over time (e.g., Walsh & Bull, 2012; Tekin, et al., 2015), there was a clear shift in recent research toward a more dynamic analysis of investigative interviews (e.g., Kelly, et al., 2016; Yang, et al., 2015). Research shows that interviews are not linear as different elements are prone to change (e.g., Kelly, et al., 2016) and that the various phases of an interview must be taken into account (Snook, et al., 2021).

4.3 A dynamic approach to investigative interviews

Research examining the way evidence related to the case is presented can be seen as the first attempts to account for a dynamic element in interviews (Granhag, et al., 2013; Hartwig, et al., 2014; Vrij & Granhag, 2012) and has led to the development of approaches such as strategic use of evidence (SUE) and Shift-Of-Strategy (SoS). Luke and Granhag (2020) have shown that information gathering is more effective when the interviewer responds immediately to any discrepancies between the suspect's statement and the evidence rather than continuing with general questions. Responding immediately to discrepancies is also associated with a change in interview

strategies by both interviewer and suspect (Luke & Granhag, 2020). The confrontation of suspect with contradictory information is associated with more skillful interviewers (Walsh & Bull, 2015). SUE and SoS advocate withholding evidence from suspects to influence them and change their counterstrategies (i.e., their actions and how they cope with stress). Researchers have found that how suspects adapt their statements (Hartwig, et al., 2014; Luke et al., 2014; Sorochinski, et al., 2014) and their strategies (Håkansson, 2019) is related to their perception of the interviewer's knowledge of available evidence. The Scharff technique is an intelligence gathering technique consisting in developing a friendly relationship with the suspect while giving the impression of knowing all the evidence and not pressing for information (Oleszkiewicz et al., 2017a). Scharff-trained handlers are perceived as less eager to gather information, but collects comparatively more new information (Oleszkiewicz et al., 2017b). The effectiveness of this technique proves that the perception of evidence and the development of humane relationship with the suspect increases disclosure.

Both timing of behaviors and the passage of time are increasingly being taken into account in the research on investigative interviews. Studies of both the effect of the timing of evidence presentation and comparison of behaviors at different times during the interview have made it possible to identify changes in behaviors during an interview, making possible a more dynamic analysis of the interview process. Pearse and Gudjonsson (1999) divided 18 police interviews in the United Kingdom into 5-minute segments, which allowed them to identify 39 different strategies and show that strategies can change over the course of an interview. Bull and Soukara (2010) adopted the idea of 5-minute segments and found that non-coercive strategies have the most positive influence on disclosure. These two studies analyzed only interviews that led to a confession. Kelly, Miller, and Redlich (2016) and Leahy-Harland and Bull (2017) used the same

idea of 5-minute segments to compare interviews that led to a confession with those where the result was no confession, making it possible to account for the effect of time on confession and to observe the differences between a cooperative and a non-cooperative suspect over a given trajectory. For example, a strategy of rapport/empathy, which involves reassuring the suspect and using open-ended questions, was associated with an increased probability of partial or full confession while describing victims' trauma and using negative questions were associated with a decreased probability (Leahy-Harland & Bull, 2017).

Verhoeven (2018) also used a dynamic methodology to study the relationship between suspects' statements at the beginning and end of the interview, looking particularly at the influence of interview strategies on suspect disclosure, and concluded that the suspect is more likely to disclose information when the interviewer uses strategies that stress information gathering, while denial is more likely if the interviewer uses a confrontational strategy.

Yang and colleagues(2015) considered the dynamics of investigative interviews based on a decision-making model that highlights the temporal nature of the interview process. They argue that looking at the trajectory of an interview makes it possible to develop a model that can account for situations in which suspects make a series of decisions during the course of an interview, decisions that may change depending on what have happened previously. Their findings show that participants were more likely to change their disclosure decisions to avoid the proximal consequences when they perceived the distal consequences to be more negative.

There has been a shift in the literature in how the concepts of dynamic analysis are treated. Until very recently, the literature on the subject was largely atheoretical and, while the approaches being used are closely related to those in decision-making theories, researchers do not usually refer to any specific theory. We argue here that the concepts developed in Game Theory could be very

helpful in understanding suspect disclosures and developing an effective methodology that makes it possible to investigate interviews as a process rather than a static event.

4.4. The Game Theory perspective

Game Theory is a mathematical model used to study decision-making (Bicchieri, 2004). It relies on rational choice theory, which sees individuals as rational actors whose actions are based on cost-benefit calculations about both possible gain and the means needed to obtain it (Cornish & Clarke, 1986). Game Theory emphasizes not only decision-making but the importance of interactions, seeing a game as an interaction between several individuals in which the gains of each player are affected by the decisions of the other players (Kelly, 2003). In analyzing both the logic behind rational decisions and in interactions between players, Game Theory deals with both communication and strategic interaction. What happens during a game is not a simple communication between two individuals but an exchange in which each decision (observable through behaviors) alters the objective environment – the concrete, existential situation of the other players – whether or not they are aware of this change (Goffman, 1969).

Applying Game Theory to investigative interviews involves integrating three factors that are seldom considered in most previous research in the area. The first is the players in the interaction. Most researchers have looked at how interviewer strategies influence suspect behaviors. Game Theory proposes that the decisions of both players, discerned through observable behaviors, should be considered.

The second factor is having the ability to describe the interaction, and this necessitate a change in the choice of the main variable used to analyze the disclosure process. Research on investigative interviews has tended to focus on a dichotomous analysis of suspect disclosure (confession vs. denial). We suggest that, rather than taking the suspect's confession as the main

object of study, the focus should shift toward investigation-relevant information (IRI), defined as information obtained during the interview that may be of relevance to the ongoing investigation (Baker-Eck & Bull, 2022; Baker-Eck et al., 2021; Bull & Rachlew, 2019; Oxburgh & Ost, 2011) or in other words, useful for proving guilt. The process of disclosure in the interview can then be considered in relation to each IRI provided by the suspect, making it possible to create both a continuous timeline and a more precise picture of the disclosure process. This ensures to see the interview as process in which the different actions of the players interact with one another, as proposed by Game Theory.

The third factor is time, which is present in Game Theory's recognition of dynamic interaction, central to this perspective. A time-oriented approach makes it possible to study the probability that an IRI will be provided by the suspect in relation to the different strategies used during the interview. Observing behavior on a continuous timeline is necessary to understand the dynamics – and evolution – of decisions during an interview.

4.5 Aim of the study

The principal objective of this study is to observe the impact of behaviors of both the interviewer and the suspect on the production of IRI. The second objective is to look at whether the effect of such behaviors lasted over the course of the interview. This is done through the lens of different concepts of the Game Theory discussed above. Interviews are considered to be a dynamic social interaction that involves both suspect and interviewer and their behavior is observed through a continuous timeline. The sub-objective of the study is to showcase the usefulness of applying Game Theory to the study of investigative interviews by considering time and interaction between players as an integrative part of the analysis.

Methodology appropriate to the analysis of the continuous timelines of investigative interviews is presented and the disclosure process is analyzed in terms of all IRI revealed by the suspect rather than being understood as a dichotomous variable (admission or denial), making it possible to observe a complex and dynamic process and the way it changes over time. The influence of time on suspect disclosure is discussed in relation to the position of different behaviors on a timeline. Multilevel logistic regression is used to examine the behaviors and strategies of both interviewer and suspect that are predictive of suspect disclosure.

The study is based on a sample of investigative interviews with online sexual offenders in Canada. Whether sex offenders differ from other offenders is often discussed in the literature. For example, sex offenders are likely to have a higher level of education (Babchishin, et al., 2011; Faust, et al., 2015) and a higher rate of employment (Clevenger, et al., 2016; Faust et al.,2015). Cybersexual offenders tend to have been convicted less often than those who commit other types of sexual crimes (Aebi, et al., 2014; Faust et al., 2015; Smid et al., 2015) and also show fewer antisocial traits than other offender groups (Babchishin, et al., 2015; Magaletta, et al., 2014). Some studies suggest that an individual who has committed a serious criminal act will try to avoid the consequences of the act by denying the accusations (Gudjonsson, 2003; Moston, et al., 1992; Phillips & Brown, 1998; St-Yves, 2004) while other researchers have found the confession rate of sex offenders to be higher than that of other kinds of offenders (Mitchell, 1983; Gudjonsson & Sigurdsson, 2000), particularly when the offense has been committed more frequently (Lippert, et al., 2010). A high level of confession among sex offenders would increase the amount of IRI provided during an interview, making such interviews of particular interest for this study.

Online sex offenses leave digital traces. Such traces are often not only abundant but also similar, demonstrating a heterogeneity that is helpful in identifying trends. The large amount of

detail in the interview makes it easier to identify the IRI provided, facilitating a sequential analysis of information presentation.

The interviews in the sample should be understood in terms of the Canadian context for police interviews. Such interviews usually involve only two participants – the interviewer and the suspect. In Canada, the suspect is allowed to contact a lawyer before the start of the interview, but the lawyer is not allowed inside the interview room. The setting thus limits the interaction to two players, enabling efficient application of Game Theory concepts.

4.6 Method

4.6.1 Sample

The sample consisted of 130 videotaped investigative interviews by the Internet Child Exploitation (ICE) special unit of Québec's provincial police department, the Sûreté du Québec (SQ). Everyone in the sample had been charged with one or more offenses related to online child sexual exploitation – including child luring or accessing and possessing, distribution of, or production of child pornographic material – and had been convicted. All suspects were male and 95% were Caucasian. Average age was 37.68 years (SD=14.06). The mean length of the interviews was 198.23 minutes (SD= 71.15; range = 46.5-493.5; median = 193.69). In total, 25,770 minutes of interview time were analyzed.

4.6.2 Data collection and grouping of variables

A data collection tool using Observer XT© was developed specifically for this study. Based on the literature on investigative interviews and adapted to the setting of Canadian investigative interviews, the collection tool made it possible to timestamp preidentified behaviors that took place during an interview, creating a continuous timeline of interview events. Two

coders were working together to code behavior from the interviewer and subject according to a grid of 77 behaviors (31 for the suspect and 26 for the interviewer). The taxonomy of investigative interviews developed by Kelly, Miller, Redlich, and Kleinman (2013) was adapted for the purpose of the study and the Canadian police investigative interview setting[9] and used to classify the different behavior into domains. Six classification categories were identified for investigative interview strategies: (a) Rapport and relationship building, (b) Context manipulation, (c) Emotion provocation, (d) Confrontation and competition, (e) Collaboration, and (f) Presentation of evidence. No taxonomy of suspect behavior was available so the categories of interviewer behaviors proposed by Kelly and colleagues (2013) were adapted to allow comparison of suspect and interviewer behavior. Table I shows how the original taxonomy was adapted to the requirements of the present study to capture observed behaviors for both interviewer and suspect rather than focusing only on interviewer strategies. Frequency of behavior for each category in the sample[10] is also presented.

Table I - Adaptation of Kelly, Miller, Redlich, and Kleinman Taxonomy (2013)

Original	Actions and responses		Frequency
Rapport and relationship building	Rapport and relationship building	Interviewer	3392 (14%)
	Silence and active denial	Suspect	1224 (5%)
Context manipulation	Domain dropped		
Emotion provocation	Emotion provocation	Interviewer	1197 (5%)

[9] As explained earlier, in the Canadian context only the interviewer and the suspect are usually allowed in the interview room. Some of the behavior included in the Kelly et al (2013) taxonomy has also been adapted. For example, the taxonomy included interviewer behaviors such as bluffing or lying about evidence, but these techniques are illegal in Canada and were not observed in the sample.

[10] The complete list of behavior included in each category and its frequency is shown in Appendix A.

	Emotional response	Suspect	5255 (21%)
Confrontation and competition	Confrontation	Interviewer	4068 (17%)
	Confrontation	Suspect	1928 (8%)
Collaboration	Collaboration	Interviewer	2077 (9%)
	Collaboration	Suspect	2190 (9%)
Presentation of evidence	Information related to the case	Interviewer	1978 (8%)
	Information related to the case (IRI)	Suspect	994 (4%)
			N total = 24303

As the present study focuses on social interaction between the interviewer and the suspect, the second domain in Kelly's taxonomy – context manipulation – was dropped. The five other categories proposed by Kelly and colleagues are explained below and the adaptations needed to make it possible to take suspect behaviors into account are described. Each domain contains several behaviors.

Rapport and Relationship Building

In Kelly et al.'s taxonomy, Rapport and relationship building involves a working relationship between the interviewer and the suspect based on mutual respect and an understanding of each other's objectives. The strategies in this domain, used by the interviewer to develop a relationship with the suspect, include finding common ground, demonstrating kindness and respect, meeting basic needs (e.g., food, water), and maintaining the well-being of the suspect. For the purposes of the study the technique of flattering the suspect by using compliments and praise,

classified as “emotion provocation” in the original taxonomy, while likely to result in a positive emotion, was considered to have more of an effect on developing a relationship and therefore has been put in the present group. A total of 7 different interviewer behaviors falls into this category.

The suspect behaviors classified as part of the rapport-based domain are very different from those of the interviewer. For instance, it is very unlikely that a suspect goes through the interview with the objective of developing a warm relationship with the interviewer. Exceptionally among the categories in this taxonomy, suspect behaviors are the opposite of those of the interviewer and include behaviors that are totally non-collaborative, including active denial of the accusations or remaining silent. A total of 4 suspect behaviors are included in this category.

Emotion provocation and Emotion response

Kelly and colleagues (2013) grouped interviewer strategies according to their underlying principle or aim. Their category of Emotion provocation and response is based on the aim of affecting the suspect’s feelings in order to trigger a response and all strategies that provoke emotions, positive or negative, are included, such as behaviors that involve identifying and exaggerating the suspect’s fears to produce negative emotions such as stress or offering rationalizations that allow the suspect to see the crime as less grave and therefore decrease the level of stress. In the present study, whether the emotion provoked is positive or negative is considered to have different consequences for suspect disclosure. Some negative emotions, such as guilt and anxiety, have been associated with a higher level of confession (Deslauriers-Varin et al.,2011; Gudjonsson, 2003; Sigurdsson et Gudjonsson, 1994; St-Yves, 2002); the effect of positive emotions has not been investigated. Given this, in the present study the category of Emotion provocation includes only those behaviors that lead to negative emotions. For example,

if the interviewer suggests that an accomplice could be interviewed, this could lead to an increase in the stress felt by the suspect and is therefore included in this category. Following this logic, two behaviors that are in the confrontation category for Kelly and colleagues– taking a judgmental attitude toward the suspect, which the suspect may see as insulting, and identifying and exaggerating fears by emphasizing the consequences of arrest – were judged to be likely to trigger negative emotions such as anxiety and have therefore been moved to the Emotional provocation and response category. Strategies such as reducing fear by minimizing the gravity of the crime or by offering a moral justification for it were also reclassified (usually into the Collaboration category) to make it possible to account for the suspect's reactions. A total of 9 interviewer behaviors are included in this category.

To make it possible to consider suspect behavior, the category dealing with emotions was adapted to include Emotion response. This adaptation follows the basic idea of the original taxonomy, which was to account for the largest possible spectrum of raw emotions. In contrast to the interviewer category, all suspect behaviors that demonstrate an emotional response, whether positive or negative, are included in this category (e.g., crying). As some Emotion provocation strategies used by the interviewer are aimed at increasing the suspect's guilt or anxiety (Kassin et al., 2007), suspect behaviors that are intended at reducing anxiety are also included; for instance, offering a moral justification for an act (e.g., "It was not a crime since the child wanted to have sexual interaction") or avoiding taking responsibility by blaming someone else can be used by the suspect to reduce anxiety and therefore fall into this category. A total of 6 suspect behaviors are included.

Confrontation

For Kelly and colleagues (2013), the Confrontation category includes behaviors in which the interviewer asserts authority and control over the suspect as a way to achieve compliance. These behaviors include expressing impatience, frustration, or anger, or suggesting negative outcomes for the suspect. They also include behaviors aimed at gaining compliance, such as confronting the suspect with discrepancies in his information. A total of 18 different interviewer behaviors are included in this category.

For the suspect, behaviors in this category include arrogance and attempts at domination, for example, trying to control the interview by making inadequate requests for the situation or by confronting the interviewer. Interrupting the interviewer or adopting an unfriendly stance that includes the use of sarcasm are also examples of the 11 behaviors included in this category.

Collaboration

The inverse of the Confrontation category, Collaboration is aimed at minimizing or eliminating authority and control over the other player (Kelly, et al., 2013). For the interviewer, it includes positive behaviors that are not part of the Rapport and relationship building category, such as congratulating the suspect for efforts and collaborations. Strategies aimed at triggering positive emotions by reducing fear through minimizing the gravity of the crime or offering moral justifications for it are considered to be in this category, which includes a total of 5 different interviewer behaviors.

For the suspect, collaboration is associated with cooperation, participation, or the appearance of being eager to please. It can also include expressing remorse or self-criticism for having committed the act. A total of 6 suspect behaviors are included in this category.

Information related to the case

The last category in Kelly et al.'s taxonomy is Presentation of evidence, in which the interviewer provides documentation of the suspect's guilt or complicity. Presentation of evidence is a central subject in research on investigative interviews and is closely correlated with an increase in the rate of confession. The title of this category was adapted for the present study to make it possible to include suspect behavior. Interviewer behaviors in this category include all information related to the case presented by the interviewer, such as showing a picture found on the suspect's computer or mentioning a victim's name. The category includes 3 different types of interviewer behaviors.

For the suspect, this category includes providing IRI by answering a question from the interviewer and admitting guilt or providing additional information. This category includes 3 different types of suspect behaviors.

4.7 Analysis

An investigative interview is a process in which the act of a player at a point in time is, at least in part, contingent upon past acts. Data in the present study were behaviors captured as discrete states on a continuous timeline. The simplest mathematical model of a process involving discrete and continuous times is a Markov model (Brent & Sykes, 1979), a sequence of events in which each event, or state, depends on one or more previous states (Manderscheid, et al., 1982). The probabilistic nature of the process can be represented by an initial distribution of states and a transition matrix that specifies the probability of moving from one state to another. An important aspect of Markov models is their recognition of indeterminacy: individual behaviors may vary widely while the overall pattern is maintained, creating a statistical approach that is more reflective

of human behavior than models that use estimates of parameters based on means (Hewes, 1975; Leik & Meeker, 1975).

Figure I - Proposed visual presentation of the Markov database concept

Time line = Behavior A → Behavior B → Behavior C → Behavior D

Dyads pairing will be transformed as follow:		
Dyads number	Behavior at Time 1	Behavior at Time 2
1	Behavior A	Behavior B
2	Behavior A	Behavior C
3	Behavior A	Behavior D
4	Behavior B	Behavior C
5	Behavior B	Behavior D
6	Behavior C	Behavior D

We wanted to determine whether a given behavior at time 1 influences subject disclosure at time 2. Each behavior was paired with the one that followed it and then paired with the one after that; that behavior was then paired with the one following, and so on. Figure 1 provides a visual presentation of the Markov data concept developed for this study. Because the objective was to observe the impact of behavior on disclosure, only dyads with disclosure of IRI at time 2 were kept for analysis. Of the 2,561,968 pairs in the data, 89,806 included a suspect presentation of IRI at time 2 and were therefore kept for analysis. Equation 1 presents a logistic regression model predicting the probability that the suspect will provide an IRI (P_{info}) at a given time (t), with the behavior preceding it at time 1 (beha) as a covariate. To account for dependencies among

observations (i.e., each behavior at time B can have more than one pairing), a random effect was included at the interview level (u_e). The coefficient β1 tests the gain of information hypothesis and estimates whether the presence of a behavior at time 1 increases the probability that information will be provided. A positive coefficient indicates that if behavior at time 1 occurs, the probability that the suspect will provide information increases. A negative coefficient indicates that if behavior at time 1 occurs, the probability that the suspect will provide information decreases.

(1) $\text{Log}\ (P_{infoT2}/1\text{-}P_{info}) = \beta0 + \beta1 + \text{behaT1} * \text{time}\ (t2\text{-}t1) + u_e$

4.7.1 Generalized linear mixed models

Generalized linear models (GLM) are an extension of linear regression models and are aligned with the data using the maximum likelihood method, making it possible to provide not only estimates of the regression coefficients but also estimated asymptotic standard errors for the coefficients (Fox, 2016), which permits the use of non-normal dependent variables. Generalized linear mixed models (GLMM) add a multilevel random effect (Demidenko, 2004) and can combine repeated measurements and process them simultaneously, thus significantly increasing the statistical power of the analysis. Classical statistical analyses assume that observations are independent and identically distributed but this assumption applied to clustered data can lead to false results. The mixed effects model treats clustered data adequately and considers two sources of variation: within clusters, (i.e., variation within an individual - intrasubject variance), and between clusters (i.e., variation between individuals - inter-subject variance). When the number of clusters is small and the number of observations per cluster is large, it is considered best to treat the cluster-specific coefficients as fixed (Demidenko, 2004). There are three assumptions made in using GLMM: 1) the random effect comes from a normal distribution; 2) the chosen link function

is appropriate – in this case the logit for binomial data was used; 3) estimation of variance shows an appropriately dispersed variability.

GLMM analyses makes it possible to predict whether behavior at time 2 is influenced by behavior at time 1 as well as the force of this influence. It also makes it possible to insert a polynomial condition – allowing to observe curve in the data instead of a line – to capture the interaction between the variable and the time at which it occurs. One of the advantages of using GLMM is that the structure of the linear predictor has the familiar structure of a linear model (Fox, 2016). This type of statistical analysis makes it possible to assume that observations are independent by adding a random effect for each interview. The software R version 4.1.2 was used to run the analysis with the lme4 package.

The sample was composed of interviews of different lengths, creating the possibility that longer interviews might play a more decisive role in the model. To make it possible to observe the effect of time, interviews must be comparable. The time was therefore standardized (scaled) to avoid this potential problem.

4.8 Results

Logistic regression analysis was used to meet two of the study objectives. The first objective was to identify behaviors that were more likely to be followed by disclosure of IRI by the suspect, i.e., behaviors that influence disclosure. The second was to look at whether the effect of such behaviors lasted over the course of the interview. Analysis was performed on every dyad of behaviors that included a disclosure from the suspect at time 2.

One approach to investigate the interaction between variables is to look at the odd ratio of each one. The odd ratio predicting disclosure derived from the logistic regression analysis is provided in Appendix B. However, interpreting the effect of the interaction term may be

challenging (Li & Barry, 2012) especially for categorical variables. The logistic regression compares one category to the others. In our case, the effect of the interviewer behavior of collaboration on suspect disclosure is compared to the other behaviors of the interviewer but also to the behaviors of the suspect, which complicate the interpretation of the model. One solution would have been to run post hoc tests with a model for each behavior as a reference category to be compared to the others in order to create a matrix of comparison. However, each model takes around 12 hours to be generated because of the random effect and the polynomial effect of time which resulted in the elimination of this strategy. Also, the coefficients of the table are difficult to interpret because of the polynomial interaction effect. For transparency purposes, the odd ratios are presented in Appendix B and the simplified model without interaction effect is compared to the actual model discussed in this paper.

Another approach, that is an equally valid techniques for exploring the nature of an interaction in a logistic regression model than the odd ratio, is to calculate predicted probabilities (Li & Barry, 2012). Because the interpretation of the behaviors on one another with the interaction of time can be confusing, researchers agree to say that it is typically useful to interpret results using a graph (e.g., Aguinis & Gottfredson, 2010; Aiken et al., 1991). The predicted value of the model, the probability of behaviors to be followed by a IRI from the suspect, is therefore presented in this article in order to facilitate the interpretation of the variables' coefficients.

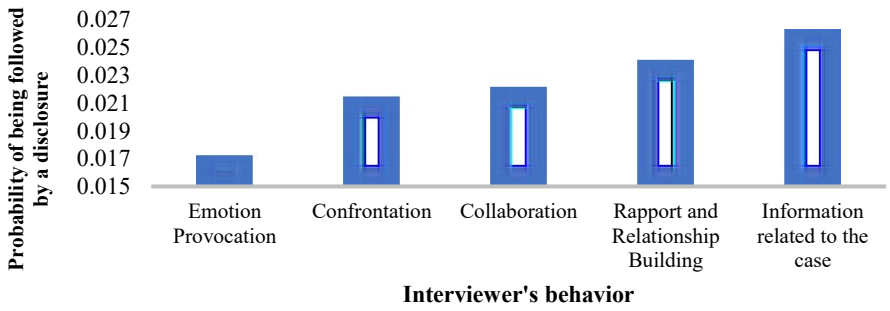
Figure II to Figure V show the predicted probabilities of disclosure for each behavior. It is important to keep in mind that there were 24 303 behaviors from the interviewer and the suspect altogether and those have been compared to the probability of being followed by a disclosure which represents 994 of the behavior (3.9%). Based on the predicted probability, the following

result section presents the immediate effect of the behaviors on disclosure and then, the impact of time is explored.

4.8.1 Behaviors preceding disclosure of an IRI by the suspect

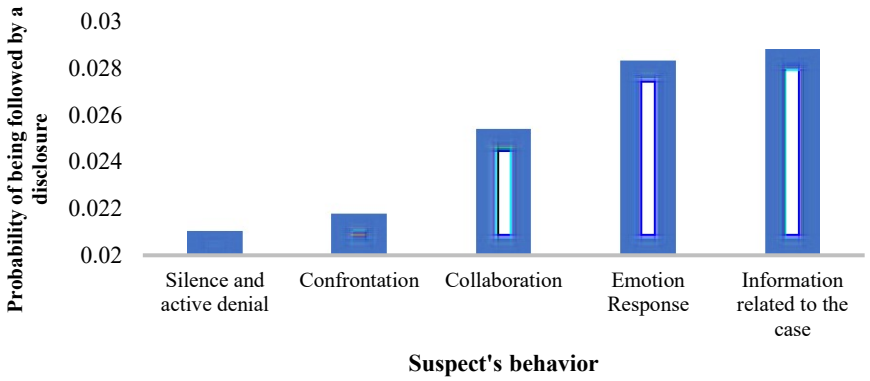
Behaviors of the interviewer related to disclosure by the suspect at time 2 are presented in Figure II. Information related to the case presented by the interviewer (e.g., presentation of evidence) was one of the best predictors that an IRI would be disclosed by the suspect. Inversely, emotion provocation was unlikely to be followed by an IRI.

Figure II - Probability that an interviewer's behavior will be followed immediately by IRI from the suspect



Disclosure of IRI is not always linked directly to an interviewer behavior but can be related to subject behavior, as shown in Figure III. The variable with the highest predictive value was having already disclosed an IRI, with the second-best predictor the suspect's emotional response. Silence, active denial, or confronting the interviewer were less likely to be followed by subject disclosure.

Figure III - Probability of the suspect's behavior being followed immediately by disclosure

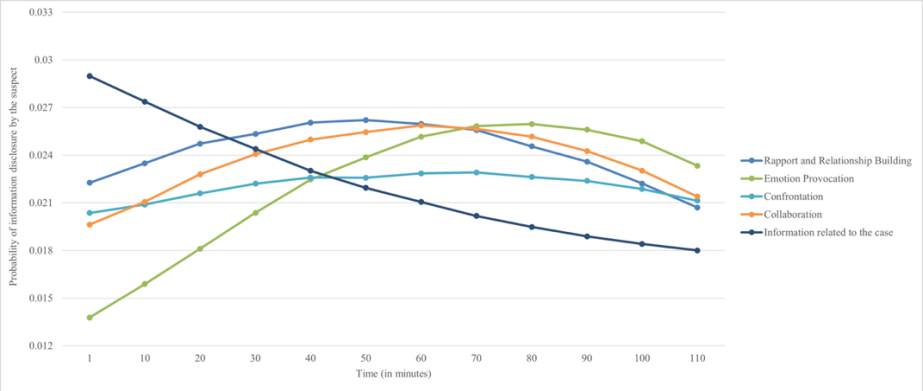


4.8.2 Time effect

Figures 2 and 3 show the probability that a behavior will be immediately followed by IRI. However, the effect on disclosure is not always immediate, and even when the effect is strong and immediate (as it is with provision of information related to the case), its impact may decrease almost immediately. Behaviors other than providing information seem to have an affect later in the interview (see figures 4 and 5).

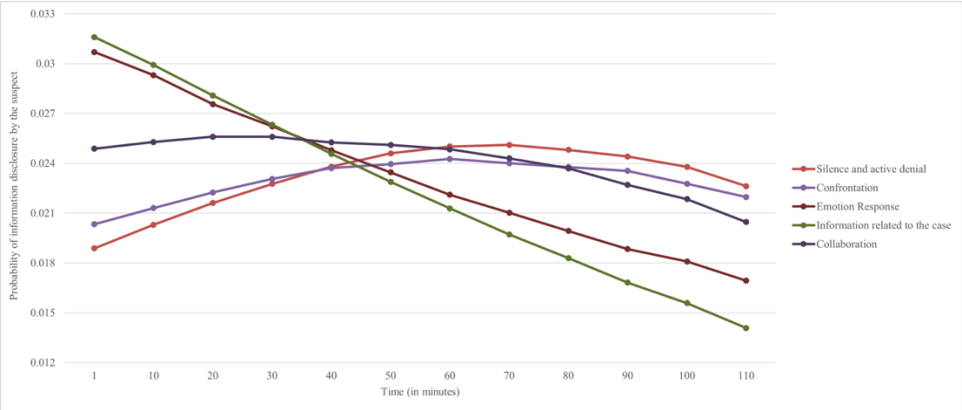
With interviewer strategies (shown in figure IV), a collaborative strategy (e.g., providing justification for the crime) seems to have a positive influence on the probability of disclosure after approximately 60 minutes, as illustrated by the orange line. Strategies oriented toward developing rapport and relationship (e.g., finding common grounds; blue line) seem to have an optimal impact after 40 minutes. The effect of strategies oriented toward provoking emotion appears after almost 70 minutes (green line). Confrontational strategies (e.g., asking questions that presume guilt) have a stable and low impact on disclosure.

Figure IV - Interviewer's behaviors prediction of an IRI



For the suspect (see figure V), strategies such as confrontation or active denial were unlikely to be followed immediately by disclosure, but these negative effects diminished over time (purple and red lines) and the probability of disclosure increased around 60 minutes after a confrontational behavior by the suspect. Collaborative behavior from the suspect has a positive but modest impact on disclosure overall and its effect diminishes slowly (dark purple line).

Figure V - Suspect behaviors predictive of IRI



4.9 Discussion

The notions of time, interaction, and players were applied to analyze investigative interviews. Because some effects have been observed and more precise information about players'

decision in the interview has been obtained, the findings suggest that Game Theory helps understand the disclosure process. Investigative interviewing is a dynamic process and suspect disclosure is influenced by the behaviors of both players. Different strategies have different effects, with some increasing the probability of IRI, while others decrease it. Results also show that the passage of time seems to have an impact on the relation of behavior to disclosure. Dividing the interviews in our data base into segments linked to seconds rather than several minutes made it possible to analyze behavior during investigative interviews as a continuous process, rather than dichotomous situation of disclosure/nondisclosure, while using Markov chains made it possible to relate the passage of time to behaviors. These two important findings are discussed below in relation to the literature on suspect disclosure.

4.9.1 The impact of strategies on suspect disclosure

The interviewer's presentation of evidence relating to the case increased the probability of IRI. This supports previous findings that the subject's perception of how much evidence is available affects the decision to conceal or reveal information (Bull, 2014; Luke, et al., 2014; Luke, et al., 2016; Tekin, et al., 2015). Confrontational behaviors, such as asking negative questions, decrease the probability of disclosure, a finding that also supports previous research (Kelly, et al., 2016; Leahy-Harland & Bull, 2017; Verhoeven, 2018).

Two suspect behaviors – providing IRI and showing an emotional response, such as crying – were often followed immediately by disclosure of IRI. Collaboration and demonstrating vulnerability by showing emotion are also associated with disclosure. Future research might investigate differences in the suspects' behavior during interviews to see if there is an identifiable profile associated with disclosure. Results also show the advantage of increasing our empirical

knowledge about suspect behavior and strategies during investigative interviews to help increase the effectiveness of interviewer strategies.

4.9.2 The impact of time on behaviors

The effect of the passage of time during an interview has seldom been considered in the literature on investigative interviews. For example, previous research has shown that presentation of evidence to the suspect is associated with confession (Granhag et al., 2013; Hartwig et al., 2014; Vrij & Granhag, 2012) and the present study not only supports this association but demonstrates that the effect diminishes over time: if the suspect does not provide an IRI immediately after the presentation of evidence, the chances of disclosure related to this strategy decrease substantially. Inversely, the influence of some behaviors is apparent only in the long-term. Interviewer strategies involving collaboration, provoking emotions, and rapport building have a large impact on the disclosure of IRI but their effect is apparent after a certain period of time. Previous research on confession has found that developing a warm and humane relationship in investigative interviews leads to an increase in disclosure (Leahy-Harland & Bull, 2017; Snook et al., 2015; St-Yves et Kebbell, 2018). Our results support this finding and also suggest that the interviewer must be patient to see the effect of this strategy. The effect of a given strategy or behavior is not always immediately apparent, demonstrating the need to study disclosure in investigative interviews as a dynamic, continuous, step-by-step process rather than a dichotomous event.

A delayed effect of strategy and behavior on disclosure can also be observed for the suspect. Emotional response and provision of IRI were found to be linked to immediate disclosure of IRI, while the longer the period of time after an IRI, the lower the probability that other IRI will be provided. This suggests that suspects tend to provide information in bursts rather than scattered throughout the interview. Active denial and confrontation did not show any immediate relation to

disclosure, but this effect diminished over time, suggesting that such behaviors do not indicate that the suspect will not provide information at a later stage in the interview.

These findings raise concerns about the length of investigative interviews. The length of interviews tends to vary according to the characteristics of the crime involved (e.g., type of crime, number of charges, number of victims, amount of evidence available). Studies in the United States suggest interviews are approximately 1.5 hours long (see Kassin, et al., 2007; Kelly, et al., 2016). Similar results were found in Canadian settings (King & Snook, 2009). The present study suggests that some strategies have an impact on disclosure only after a considerable amount of time. For example, the effect on disclosure of interviewer strategy intended to elicit emotion by identifying and exaggerating the subject's fears was apparent only after more than an hour, suggesting that this strategy should not be used in shorter interviews. Presentation of evidence, however, appears to be useful in interviews of any length as its impact on disclosure was immediate.

The gradual presentation of evidence

Research on the strategic use of evidence (SUE) suggests that evidence should be introduced gradually to increase the suspect's perception that the interviewer has access to other evidence that has not been disclosed (Tekin, et al., 2015; Tekin, et al., 2016). However, we found that even when the evidence was presented gradually, the IRIs revealed by the suspect occurred within a short time: there was a high probability that one IRI would be followed fairly quickly by another, rather than being disclosed gradually throughout the interview. Further research is needed to explain this finding. A possible hypothesis is that the suspect tends to give a bust of information each time rather than one information at the time. Future research should investigate how this burst

of information relates to the evidence presentation process and to other possibly implicated variables.

4.10 Limits of the study

The interviews were an analyzed as a series of behaviors on a timeline and were broken into dyads, making it possible to analyze each behavior in relation to the one that followed it. Consequently, the same interview repeats itself many times through the dyads that were analyzed. This means that the data were multileveled (i.e., nested). To ensure the independence of the data, a random effect was included in the formula. The analysis is therefore able to take into account when the result is related to the same interview and adjust the standard error accordingly.

As indicated by the demographic information, the sample was highly homogeneous: suspects were largely white males who had committed an offense related to child sexual exploitation. The results may therefore not be generalizable to other types of offenses. The homogeneity of the sample should, however, allow useful comparisons with future studies using samples of different offenders and different crimes.

Finally, the Canadian context as well as the interview protocol of the ICE unit of the SQ may also have played a role in the findings of the study. For example, the length of the interviews in our database tended to be longer than those observed in previous studies, which may have had an influence on strategies used as well as suspect reactions.

4.11 Conclusion

This study used the perspective provided by Game Theory to analyze investigative interviews as a dynamic social interaction involving both suspect and interviewer. Game Theory makes it possible to account for the dynamic process of disclosure, taking into account the impact

of player behaviors as well as the effect of the passage of time on behaviors. Markov chains were used to structure the database and a multilevel analysis was then used to investigate the results, making it possible to weigh both the influence of each category of strategies on disclosure and the effect of time on the behaviors studied. The findings indicate that this theoretical frame is useful in understanding investigative interviews and disclosure and suggest the ways both interviewer and subject behaviors are related to the probability of disclosure, as well as the effect of the passage of time on these behaviors. These findings have important implications for police investigators. First, they suggest which strategies are most effective to increase the probability of disclosure. Second, they provide important indications of how strategies should be used in relation to the timeframe available for a specific interview. The new theoretical and methodological approach to analyzing investigative interviews presented here provides a starting point for developing guidelines for practitioners that can help increase the level of disclosure during investigative interviews.

Chapter 5. (Article) Player preferences: Suspect profiles and behavior during investigative interviews[11]

[11] Bergeron, A., Fortin F., Deslauriers-Varin, N., & Paquette, S. (2022). Players preferences : Suspect profiles and behavior during investigative interviews, manuscript ready to submit for publication.

Abstract

Research on investigative interviews has been important in the development of ethical, legal, and effective interrogation practices (Meissner et al., 2017; see for example "Mendez Principles of Effective Interviewing" in 2021). Most of the attention, however, has been focused on the strategies and behaviors of the interviewer, particularly with regard to the general strategies that an interviewer can use to elicit a confession. Very few studies have looked at how the suspect responds during this process, and what strategies and techniques they may use. The first objective of the present study is to explore the heterogeneity of strategies and behaviors of suspects during an interview. Using the perspectives proposed by Game Theory, the suspect can be considered to act in accordance with personal preferences and tend to use the same set of behaviors throughout an interview. The second objective was to determine the level of the stability of suspect profiles. The analysis identified the presence of five different profiles: 1) Positive; 2) Justifying; 3) Accepting; 4) Controlling; 5) Irritated. The temporal analysis also shows that the probability that a suspect will continue to exhibit the same profile over the course of the interview is high. The

Student's statement regarding the contribution to the article: I declare that I am the main instigator of this article. I took on the task of: literature review, data analysis, and writing. Francis Fortin, Nadine Deslauriers-Varin, and Sarah Paquette provided intellectual input into the development of the project and assisted in writing and revising the manuscript.

present study helps determine future directions for research into the strategic interactions that take place during investigative interviews.

5.1 Introduction

Research on investigative interviews has grown over the past three decades, increasing our knowledge of ethical, science-based interview practices (e.g., Clarke, et al., 2011; Cleary & Bull, 2021; Kelly et al., 2019; Leahy-Harland & Bull, 2017) and leading to meaningful reforms. Most of the attention, however, has been focused on the strategies and behaviors of the interviewer, particularly with regard to the general strategies that an interviewer can use to elicit a confession, such as developing a good relationship with the suspect (Holmberg & Christianson, 2002; Kebbell, et al., 2010; Wachi et al., 2014), matching the level and style of language of the suspect (Dando & Bull, 2011; Sandham et al., 2021; Richardson, et al., 2014), and gradually presenting evidence throughout the interview (Tekin, et al., 2015; Tekin, et al., 2016). Very few studies, however, have looked at how the suspect responds during this process, and what strategies and techniques they may use. Both parties in an interview have specific objectives and, as noted years ago, "An effective and professional investigative interviewer needs to obtain a better understanding of life's most complex event – a face to face encounter with another person" (West, et al., 1994; p. ii). One way to analyze this interaction is by looking at the decisions of each participant and the effect of those decisions on the other participant. To take into account the shift in methodology required to

deal with this aspect (i.e., Snook, et al., 2021), we suggest that the concepts used in Game Theory be applied to investigative interviews.

5.2 The Game Theory perspective

Game Theory is a mathematical model used to study decision-making (Bicchieri, 2004). It relies on rational choice theory – the idea that humans are rational actors and that rationality involves cost-benefit calculations of both the eventual gain and the means used to obtain it (Cornish & Clarke, 1986). It also recognizes that interactions involve decision-making. In a game, the gains of each player are affected by the decisions of the other players (Kelly, 2003). Game Theory provides a way to deal with the gap between theories of communication and those that deal with strategic interaction (Goffman, 1969). What happens during the *game* is not a simple communication between two individuals but an exchange in which each decision (observable through behavior) alters the situation of the other player, whether or not this change is recognized or acknowledged (Goffman, 1969).

When applied to investigative interview research, Game Theory suggests a different approach to players (interviewer and suspect), particularly in two major aspects: recognizing the importance of both players and taking the role played by their preferences into account. Preferences are defined here as any properties of the individual that come into play when they are aware of and responsive to a situation and include motives, values, personality traits, habits, attitudes, goals, and defenses (Kelley et al., 2003). Some players cooperate, many do not; some are altruistic, others are egoistic – these choices are related to preferences (e.g., Andreoni & Miller, 2002, Andreoni & Vesterlund, 2001, Van Lange & Kuhlman, 1994, Van Lange et al., 1997) observable through players' behaviors. In other words, preferences are reflected in the observable choices made by players and are therefore a fundamental part of any social interaction. What

happens in an investigative interview cannot be analyzed fully unless the preferences of both suspect and interviewer are considered. This article will focus on the suspect's preferences because suspect behavior is often overlooked in the literature. We propose that Game Theory be used to analyze this behavior in investigative interviews, particularly with regard to how it relates to suspect preferences. The resulting suspect profiles should be useful in future research on both interviewer and suspect.

5.3 Suspect profiles

The literature on investigative interviews takes several different approaches to identifying types of suspects. St-Yves (2002) identified three suspect profiles based on a sample of sex offenders: 1) submissive collaborators, who tend to confess, 2) reluctant collaborators, who rarely confess, and 3) dormant collaborators, who do not cooperate at all. Other researchers have formed groups of suspects that can resemble profiles based on why offenders do not confess in terms of their denial strategies (Moston & Stephenson, 2009) or their reasons for confessing (Deslauriers-Varin & al., 2011) or not confessing (Bergeron & Deslauriers-Varin, 2019). Some researchers have looked at how suspect profiles relate to personality characteristics and have found that extrovert offenders with antisocial and narcissistic personalities are less likely than introverts to collaborate during police interrogations (Gudjonsson & Petursson,1991; Gudjonsson & Sigurdsson, 1999; Bernard & Proulx, 2002; St-Yves, 2002; 2004), perhaps because introverts are more likely to experience remorse and feelings of guilt and therefore more likely to confess as a way to eliminate these feelings (St-Yves, 2004). According to Gudjonsson and Petursson (1991), suspects with antisocial personalities have the lowest internal need to confess and any confession is likely to be related to external pressure (e.g., interviewers' strategies) rather than to a feeling of guilt. Extroverted suspects are more likely to experience a high level of guilt over their offense and their

confessions are more likely to be related to internal needs than to external pressure. Introverts and individuals who score high on a neuroticism scale also seem to be more likely to confess (Gudjonsson & Petursson, 1991). These findings suggest that interview strategies aimed at obtaining information related to the investigation (IRI) may affect individuals differently, depending on their personality characteristics. The literature also suggests that confession is related to a combination of factors, rather than only one. However, for any given suspect, one group of explanatory factors is likely to dominate (Bergeron & Deslauriers-Varin, 2019; Gudjonsson and Petursson, 1991), suggesting that suspect profiles may be a useful area for investigation.

5.4 Stability of preferences

While preferences change across individuals, the degree to which they are stable in individuals is relevant to the present study as the degree to which preferences can be expected to change affects the way their role in investigative interviews is understood. Stability in personality traits has been explored in other fields. The definition of stability used in psychology is related to the idea that an individual's personality traits will remain relatively stable over time, although some systematic variance is not unexpected (Schildberg-Hörisch, 2018). Researchers have found preference stability with regard to, among other things, reactions to medical treatment (Jabbarian et al., 2019), levels of risk taking (Schildberg-Hörisch, 2018), social preferences such as altruism (Bruhin et al., 2019), and decision-making (Dasgupta et al., 2017). Research on behavior modification programs has found that preferences tend to be stable for four behavioral characteristics – risk, competitiveness, self-confidence, and relative rank – and that training may lead to a change in skill but not in preferences (Maitra & Neelim, 2017). Other researchers have found that, under certain circumstances, individual preferences are malleable. Alan and colleagues(2019) designed an experiment in which children had to decide whether to continue to

work on a difficult task or switch to a less difficult one. Children who had had training aimed at increasing the ability to bounce back from failure were more likely to continue trying to complete the harder task than children without this training, who tended to switch to the easier task more quickly.

If suspects can be assumed to have highly stable preference profiles, identifiable through their behavior during the interview, particular profiles could be related to the efficacy of interviewer strategies. If preference profiles are dynamic, it becomes more difficult both to identify individual profiles and to determine their effect on investigative interviews. Given this, it is important to look at both what characterizes individual profiles and whether these profiles can be expected to remain stable over time.

5.5 Aim of the study

The literature on investigative interviews includes several studies on the influence of interviewer strategies on confession but the behaviors of suspects in such interviews have been largely overlooked. We suggest that eliminating this gap is important as the efficacy of a strategy may be directly related to suspect profiles. Previous researchers have looked at which suspect characteristics are associated with confession and denial, but personality traits are very difficult to assess during real-time interviews. The first objective of the present study was therefore to explore the heterogeneity of strategies and behaviors of suspects during an interview. Using the perspectives proposed by Game Theory, the suspect can be considered to act in accordance with personal preferences and to tend to use the same set of behaviors throughout an interview. Our second objective was to determine the level of the stability of suspect profiles. If suspects can be expected to maintain the same profile throughout the interview, it creates an important line of research to be developed. The knowledge around those profiles, regarding for example the most

effective strategies to get IRI with a specific behavior profile, will help interviewers to use observable behaviors – rather than psychological assessment, for example - to identify different types of suspects in real time and use the strategies that would be more efficient with this profile. The two objectives of this study therefore aim to test the basic Game Theory assumptions regarding suspect preferences in order to set an innovative line of future research.

This study is based on a sample of investigative interviews conducted with individuals arrested for online sexual offenses in Canada. It is particularly suited to analysis of the concepts under study for several reasons. First, previous research has shown that sex offenders differ from other offenders in several ways. For example, they are more likely to have a higher level of education (Babchishin, et al., 2011; Faust, et al., 2015) and a higher rate of employment (Clevenger, et al., 2016; Faust et al., 2015). Cybersexual offenders are also less likely to have a criminal history than offenders who commit other types of sexual crimes (Aebi, et al., 2014; Faust et al., 2015; Smid, et al., 2014) and have been found to have fewer antisocial traits than other categories of offenders (Babchishin, et al., 2015; Magaletta, et al., 2014) a higher level of extraversion may help explain their ability to create a social network on the Internet that allows access (exchange/share) to child exploitation material (Seigfried-Spellar, 2014). Some studies suggest that an individual who has committed more serious sexual abuse will try to avoid the consequences of the act by denying the accusation (Gudjonsson, 2003; Moston, et al., 1992; Phillips & Brown, 1998; St-Yves, 2004) but other researchers have found that the confession rate among sex offenders is higher than that of other kinds of offenders (Mitchell, 1983; Gudjonsson & Sigurdsson, 2000) and is likely to increase when the sexual abuse was more frequent (Lippert, et al., 2010).

Second, the investigation of online sex offenses has the advantage that computer use leaves digital traces that can be used as evidence. The amount of evidence against such suspects is often large, an important aspect in investigative interviews as the quality of the available evidence has been shown to be one of the most important factors related to confession (e.g., Brimbal et Luke, 2019; Cleary & Bull, 2021; Deslauriers-Varin et al., 2011; Moston et Engelberg, 2011). The amount and strength of evidence in online sex offenses cases being high and very similar across the different interviews of the sample therefore allows to control and limit the influence that this factor could have on results.

Finally, the sample must be understood in the Canadian context: in police interviews in Canada usually only the interviewer and the suspect are present. The suspect is permitted to call a lawyer before the interview, but the lawyer is not allowed in the interview room. Having only two players has the advantage of making it possible to apply Game Theory concepts more efficiently.

5.6 Methodology

5.6.1 Sample

The sample consisted of 130 videotaped investigative interviews conducted by the Internet Child Exploitation (ICE) unit of the Québec provincial police, the Sûreté du Québec (SQ). Each suspect in the sample had been arrested on one or more charges related to online child sexual exploitation, such as access, possession, distribution, and production of child pornographic material, and child luring. All suspects were adult males, most were Caucasian (95%), and the average age at arrest was 37.68 years (SD=14.06). All suspects in the sample were convicted following arrest. Mean length of the interviews was about 3.5 hours (198.23 minutes; SD= 71.15; range = 46.5-493.9; median = 193.69). In total, 25,770 minutes (about 430 hours) of interview time were analyzed.

5.6.2 Procedures

A data collection tool using Observer XT© was developed based on information in the literature on investigative interviews and adapted to the setting of Canadian investigative interviews. The collection tool made it possible to timestamp preidentified behaviors that occurred during the course of an interview, creating a continuous timeline of interview events. Two coders were working together to code the behavior of both the interviewer and suspect on a grid of 77 behaviors (31 for the suspect and 26 for the interviewer) but only the behavior of the suspects was considered in the present study.

5.6.3 Profiles of offenders' behaviors

The profiles in this study are based on the behavior of suspects during an investigative interview. Many different behaviors were observed in the sample, some of which were conceptually similar and could be grouped under common themes. For example, showing frustration (e.g., swearing aggressively) is very similar to speaking back to the interviewer in the sense that both express irritation with the situation. Similar behaviors were aggregated into broader theme categories by creating a matrix of correlation and combining behaviors that were conceptually similar and correlated. This exercise also increased the statistical power of the analysis by increasing the size of the material in each category. Table II shows the final categories used to create the profiles, the behaviors included in each category, the number of times each behavior was observed, and the definition of each category.

Table II- Categories and behaviors used to create profiles

Category	Behaviors	Number of times exhibited
Irritation	Appears mistrustful	556

	Interrupts the interviewer	323
	Insists that no longer remembers	110
	Expresses impatience, frustration, or anger	101
	Shows hesitation in participating	55
	Speaks back to the interviewer	23
	Disagrees aggressively	21
	Total:	**1189**
Controlling	Makes a request of the interviewer	598
	Arrogant or sarcastic statements	110
	Tries to control interview	83
	Challenges interviewer statements	41
	Tries to convince interviewer	17
	Total:	**849**
Justifying	Offers moral rationalizations or justifications	4242
	Blames the virtual world or argues that internet is not reality	78
	Avoids taking responsibility (blames someone else)	38
	Self-encouragement	18
	Total:	**4376**
Agreeable	Have fun, laughing, smiling	1992
	Total:	**1992**

Irritation. This category includes behaviors that point toward a negative reaction by the suspect. Expressions of annoyance, impatience, or anger are included in this category as are behaviors associated with mistrust of the interviewer or of the situation (examples included in *Appears mistrustful*: refuses to answer; questions the intentions of the interviewer; communicates a feeling of being tricked).

*Controllin*g. Behavior indicating that the suspect is trying to take control of the interview, such as making inappropriate requests, using sarcasm, interrupting, or changing the subject rather than answering the question, are included in this category, as is requesting that the interviewer perform an action. For example, asking to immediately see evidence the interviewer has mentioned falls into this category.

Justifying. Behaviors in this category include offering justifications or excuses for actions and attempting to minimize the effect of actions. This category includes justifications aimed at diminishing the gravity of the crime(s) as well as behaviors such as blaming someone or something else (e.g., blaming the crime on the existence of computers as without a computer, child sexual exploitation material would not have been accessible). Suspects may also offer excuses or justifications for the acts committed, such as suggesting they were helping the police by accumulating images of child sexual exploitation material or only communicating with a child to educate him/her about bad actors on the internet.

Agreeable. The interview takes place in a positive atmosphere in which the suspect smiles and laughs. Behaviors that suggest that the suspect is amused (laughs, smiles without being sarcastic) were included in this category.

5.7 Analysis

5.7.1 Latent Transition Analysis

The first objective of the present study was to determine the differences between suspects in strategies and behaviors during the interview. To do this, profiles of suspects, based on their behavior, were created. The second objective was to determine whether these profiles remained stable throughout the interview. Latent Transition Analysis (LTA; Collins & Wugalter, 1992;

Graham, et al., 1991) was felt to be appropriate to achieve the objectives of the study. LTA[12] is an extension of Latent Class Analysis (LCA) and measures dynamic latent variables. The latent class approach is based on two presuppositions. First, once groups have been determined, the probability of responding to an item (an independent variable) can be considered to be the same for each individual in the group. Second, the analysis divides the sample into smaller groups and the element that determines membership in a specific group differs from the determining element of the other identified groups (Lanza et al., 2007), therefore producing mutually exclusive and exhaustive classes (Dayton, 2008). In LTA, parameters are estimated to account for the prevalence of memberships at the time of first measurement, the incidence of transitions from one stage to another, and the probability of response to specific items (Collins & Flaherty, 2002). The probability that behavior patterns will change is estimated for each time point. The analysis also estimates the probability that there will be a transition from one class to another during the time considered. LTA thus makes it possible to identify mutually exclusive suspect profiles within a sample as well as estimate movement among profile categories during the interview.

To determine whether profiles changed during the interview, each interview was divided into three equal parts[13]. To account for the fact that the interviews in the sample were of different lengths, the number of behaviors observed was divided by the number of minutes of each interview segment to take the proportion of behaviors in each part into consideration, as well as making it

[12] Another statistical solution would have been to use repeated measure Latent Class Analysis, which represents a different approach to modeling longitudinal data. However, the emphasis in LTA is on estimating the incidence of transition from one time to another rather than creating a model of an entire vector of times for an individual (Collins & Lanza, 2010). LTA estimates item-response probabilities, so the latent class prevalence and the incidence of transitions between latent classes are estimated while adjusting for measurement error (Collins & Lanza, 2010). LTA was therefore felt to be more appropriate for the type of sample and the objectives of this study.

[13] There are no firm guidelines in LTA regarding sample size to prevent performing analyses on data that are too sparse (Collins, et al., 1996). The size of the cross-classification is not a problem in itself but often causes a problem indirectly when the sample size is small in relation to the number of cells. The number of time points integrated in the analysis should therefore be as low as possible. Three parts seemed to be an ideal choice in the present situation.

possible to determine a rate of behavior per minute. The large array of different proportions then had to be simplified. To organize a complex arrangement of data, LTA requires that each variable be categorical (Collins & Lanza, 2010). The proportion of behaviors in each category was divided into three based on: 1) absence of behavior in the category; 2) presence of behavior in the category; 3) highest incidence of behavior in the category[14].

In selecting the best LTA model, many solutions were examined using different seed data, as recommended by Lanza and colleagues(2007), to ensure that the calculations were generated randomly. The findings demonstrate that, even with a different starting point for profile generation, the identified classes are stable and recurrent across the different models. To determine how many classes were needed in the best model, each selection was examined with the possibility of from 2 to 8 classes. Likelihood index G2, Akaike information criterion (AIC; Akaike, 1974), Bayesian information criterion (BIC; Schwarz, 1978), degree of freedom, and entropy were considered in identifying the optimal solution among the generated models. In classic LCA analysis, the AIC and BIC are fit characteristics that are often used to determine the number of profiles. The literature on LTA, however, raise the fact that if a model has a positive degree of freedom, it is expected to estimate parameters using the maximum likelihood method (Ryoo et al.,2018). The G^2 in the table is equally important to determine the model. It is expected to be the lower possible. The analysis suggested that a five-class model best represented the data under consideration (see Table III). The AIC and the BIC are higher than the three and four-class models but present a higher bound between the five and the six-class models. The G^2 is a lot lower, and the entropy is higher for the five-class model compared to the three and four-class models. Analyzes were performed using PROC LTA in SAS 9.4 statistical software.

[14] The highest number of behaviors in a category is determined by the highest quartile of proportion of each behavior.

Table III - Comparison of Latent Transition Analysis Models by number of classes

N of classes	G^2	AIC	BIC	DF	Entropy
2	1920.84	1962.84	2023.06	531419	0.95
3	1815.53	1891.53	2000.5	531402	0.90
4	1773.48	1891.48	2060.66	531381	0.92
5	**1731.23**	**1899.23**	**2140.1**	**531356**	**0.93**
6	1728.42	1954.42	2278.45	531327	0.94
7	1546.17	2062.17	2802	531182	0.95
8	1489.87	2111.87	3003.67	531129	0.95

Note. The bold line shows the selected model.

5.8 Results

The probability of response is shown in Table IV and ranges from 0 to 1. These numbers represent the response probability for each item for each category of individuals. A response close to 1.00 indicates a high probability that the item characterizes the identified class, while a response closer to 0.00 indicates that this item is not part of the definition of the class. Generally, item-response probabilities falling between 0.45 and 0.55 are interpreted as the somewhat arbitrary absence/presence of the item and probabilities greater than 0.65 are consider representative of the class (e.g., Deslauriers-Varin & Beauregard, 2010).

The LTA resulted in five latent class profiles (see Table IV) and show that the first class is characterized by a positive atmosphere in which the suspect shows a high level of behavior such

as laughing and smiling (0.84) and is indicative of the Positive profile. The second profile is distinguished by justifying behavior (0.65) and is labelled Justifying. The third profile is characterized by the absence of positive emotions and of justifications (0.83; 0.76) and will be called Accepting. The fourth profile is characterized by attempts to take control of the interview (0.98), so is called Controlling. Finally, suspects in the fifth profile show a high level of irritation (0.91) and the profile is called Irritated.

Table IV - Probability of item responses for the five-class model

	Groups				
Items	*Positive*	*Justifying*	*Accepting*	*Controlling*	*Irritated*
Irritation					
None	.37	.55	.56	.14	.09
Present	.31	.45	.44	.46	.00
Highest incidence	.32	.00	.00	.41	**.91**
Controlling					
None	.27	.38	.50	.02	.22
Present	.45	.57	.38	.00	.52
Highest incidence	.28	.04	.12	**.98**	.26
Justification					
None	.07	.00	**.83**	.00	.16
Present	.40	**.65**	.17	.50	.31
Highest incidence	.54	.35	.00	.51	.52
Pleasant					
None	.00	.49	**.76**	.42	.29

Present	.16	.41	.24	.47	.64
Highest incidence	**.84**	.11	.00	.12	.06

n = 130

It is possible to estimate how many suspects can be expected to be part of each profile at a given time. The estimate of profile membership probabilities for Time 1, 2, and 3 is shown in table V.

Table V - Status membership probabilities

	Groups				
	Positive	*Justifying*	*Accepting*	*Controlling*	*Irritated*
Time 1	.39	.29	.11	.04	.17
Time 2	.34	.21	.09	.16	.21
Time 3	.34	.18	.05	.32	.11

n = 130

5.8.1 Profile dynamics

The second objective of the study was to observe whether profiles remained stable. To do this, we looked at whether there was any transition from one profile to another across the three time periods of the interview. Table VI shows the transition probabilities from Time 1 to Time 2 and from Time 2 to Time 3.

Table VI - Transition probabilities between profiles

		Positive	*Justifying*	*Accepting*	*Controlling*	*Irritated*
Time 1 to time 2 transition						
	Positive	**.82**	.00	.00	.04	.15
	Justifying	.07	**.68**	.00	.25	.00
	Accepting	.00	.00	**.77**	.20	.03
	Controlling	.00	.00	.00	**.68**	.32
	Irritated	.00	.09	.00	.15	**.76**
Time 2 to time 3 transition						
	Positive	**.98**	.00	.02	.00	.00
	Justifying	.03	**.64**	.00	.13	.20
	Accepting	.00	**.56**	.44	.00	.00
	Controlling	.00	.00	.00	**.93**	.07
	Irritated	.01	.00	.04	**.69**	.26

Those results show a certain stability to belong to a specific profile over time. From Time 1 to Time 2, suspects are most likely to remain in the profile they showed at the beginning of the interview (between 68 and 82% of individuals stay in their profile which represent the important majority). The same result can be observed between Time 2 and Time 3, where between 64 and 98% of suspects tend to stay in their profile except for the Accepting profile in which 56% tend to stay in this profile but 44% seem to be likely to transition to the Justifying profile.

5.9 Discussion

The first objective of the present study was to observe differences in suspect strategies and behaviors during investigative interviews. Different suspect profiles were identified based on their behaviors, representing their preferences, exhibited during the interviews in our sample. Preferences were defined, in accordance Game Theory, as the basis for choices made during the interaction. LTA analysis help identify five profiles, suggesting that suspects display different profiles of behaviors during the interviews. Suspects in the first profile (Positive) laugh and smile during the interview. While investigative interviews can be highly stressful for suspects, interviewers are encouraged to show empathy and ensure suspect well-being as a way to create a fruitful relationship (Alison et al., 2013; Alison et al., 2014; Baker-Eck & Bull, 2022; Baker-Eck et al., 2021). This profile might be the result of successful use of this strategy.

The second profile (Justifying) is characterized by suspects providing justifications for the act of which they are accused. Suspects in this profile were more likely to talk during an interview than remain silent. Soukara and colleagues(2009) found that emphasizing contradictions and challenging a suspect's account were the most common tactics in interviews that led to confession and Leo (1996) found a significant association between the interviewer's identification of contradictions in suspect statements and provision of incriminating information: 91% of interrogations in which this tactic was used resulted in IRI. Freely recalled statements by guilty suspects has also been found to be more likely to contradict the evidence or known facts than statements by innocent suspects (Hartwig, 2007). The more justifications a suspect provides, the more words are pronounced compared to a suspect who would remain silent and therefore the more opportunity there is for an interviewer to observe and point out contradictions in the discourse. This profile should therefore be an encouraging sign for an interviewer as it increases the probability that a suspect will make contradictory statements.

The third profile (Accepting) is characterized by an absence of positive behavior (e.g., fun) and justifications. Justifications accounted for the largest number of behaviors in the sample, with thousands of examples identified in the coding. This profile should therefore be identifiable by an interviewer, given its variance from the norm. Not providing justifications does not necessarily mean that the suspect will not provide IRI but indicates only that suspects who provide IRI do not feel the need to justify their role in relation to this information.

The fourth profile (Controlling) is characterized by a high level of attempts to gain control of the interview. Studies in social interactions have shown that, in a conversation between two individuals of asymmetrical social status, the participant who has the higher social status uses more dominant conversational signs (Mazur & Cataldo, 1989). An investigative interview presents a highly asymmetrical relationship, with the interviewer in a position of authority. Previous experiments have shown that the person who takes the dominant role in an interview has more influence over decisions and this role is therefore more desirable (Mazur & Cataldo, 1989). Some research has shown that participants paired with a dominant-speaking interlocutor tend to refuse the lower status and try to compete (Mazur & Cataldo, 1989), which may also be the case with suspects in this profile.

Finally, suspects in the fifth profile (Irritated) show a high level of irritation, expressing anger and making rude remarks. In the context of police-civilian encounters, research suggests that while police are less likely than civilians to respond to incivility with similar behavior (Reiss, 1971), disrespectful behavior by a citizen substantially increases the odds of a disrespectful police response (Mastrofski et al., 2002), just as some police behaviors can induce suspect disrespect (Reisig et al., 2004).Signs of disrespect include impolite language, negative tone, and interrupting (Sykes & Clark, 1975), behaviors found in the Irritated category. It would be very interesting to

observe interviewer strategies with suspects who display this profile to see if the atmosphere is created and maintained by negative behavior from both interviewer and suspect as there is evidence in the literature that some strategies are related to different type of attitudes (Alison et al., 2013; Alison et al., 2014). It would also be interesting to look at these behaviors on a timeline to see if it is possible to identify which participant is most likely to introduce a negative atmosphere.

5.9.1 Transition probabilities between profiles

The second objective of this study was to observe the stability of profiles. Studies have shown that, for any given suspect, one group of behaviors is likely to be predominant during an investigative interview (e.g., Bergeron & Deslauriers-Varin, 2017; Gudjonsson and Petursson, 1991). These behaviors can be understood in terms of preferences and researchers have found that preferences tend to remain stable over time (Bruhin et al., 2019; Dasgupta et al., 2017; Jabbarian et al., 2019; Schildberg-Hörisch, 2018). In line with the literature, the results of our analysis show that suspect preferences related to behaviors and strategies during investigative interviews tend to be mostly stable over time, suggesting that preferences are not dynamic. The most stable profile is the *Positive* profile. As mentioned, interviewers are encouraged to show empathy and ensure suspect well-being to create a fruitful relationship. This might create a higher level of positive atmosphere in the interview room. Moreover, previous study showed that 34.6% of suspects want to confess prior to the interrogation and acted accordingly in the process (Deslauriers-Varin et al., 2011a). Knowing that the strength of the evidence increases the level of disclosure (Cleary & Bull, 2021; Deslauriers-Varin et al., 2011; Gudjonsson et al., 2004) and that the individuals in our sample are confronted to digital proof of their actions, the effect of the desire to collaborate prior to the interview and therefore being less resistant and more positive might be enhanced in this context.

A first look at the different profiles suggests that strategies should be developed to encourage the suspect to switch from one category to another – for example, from the Irritated profile to the Positive profile. However, the stability of behavior profiles, and therefore of preferences, suggests that such attempts are likely to be unsuccessful, indicating that investigators need to use profiles to identify efficient strategies rather than trying to change them.

Although the profiles were mostly stable with the majority of suspects staying in the same behavior profile, one observation is noteworthy. Suspects in the study frequently offered justifications of their actions. Given the human tendency to make excuses after a transgression (Saxe, 1991), it should come as no surprise that anyone accused, charged, or convicted of a sexual offense denies aspects of their abusive behaviors (Ware & Marshall, 2008). Suspects in the Accepting profile, however, generally avoid excuses or justifications in the early part of the interview but are slightly more likely to transition to the justifying profile between Time 2 and Time 3. Excuses are a strategy used to correct an interaction that is seen as failing to meet social standards (Everett, 2007): humans are naturally concerned with the way others see them and strive to present themselves in a way that is likely to result in positive evaluation (Semin and Manstead, 1981). Some suspects of this behavior profile may not have been able to continue the interview without attempting to correct the way they were seen by crediting their actions to some sort of external agency.

5.9.2 Implications of the study

The first important implication of this study is from a theoretical point of view: it shows that applying Game Theory concepts to the study of investigative interviews can help to increase our knowledge in this area. For example, the idea of preferences is applicable to the context of investigative interviewing as suspects have strategic preferences that can be determined through

their behavior during an interview. These preferences are likely to be stable over time, which increases the possibility of identification. Using Game Theory therefore provides a new method for studying investigative interviews that recognizes that suspect behavior and preferences is as important as the interviewer behavior. Future research should investigate interviewers' preferences and the effect of those preferences on suspect behavior.

This study is the first step in creating a line of research that will eventually provide practical tools for interviewers. This study demonstrates that it is possible to identify different suspect profiles based on behavior during investigative interviews. This is the first study, to our knowledge, that has identified such suspect profiles, providing new information and suggesting areas for future analysis. Future studies should investigate the amount of IRI related to each of the profiles. Also, the efficacy of interviewer strategies as related to different profiles should be examined as recognizing suspect profiles may help interviewers adapt their strategies to encourage suspects to provide more IRI. Moreover, studies should compare our results using samples of different classes of offenders to determine the effect of the homogeneity of the participants in our sample and whether the profiles we found can be replicated.

From a practical point of view, this study confirms that interviewers deal with different types of suspects and that these different types can be identified by observing suspect behaviors. The nature of investigative interviews makes it difficult to obtain a complete assessment of suspect personality and experience (e.g., Gudjonsson & Petursson,1991; St-Yves, 2002); being able to identify different profiles based on behavior during an interview could simplify the interviewers' identification of the different behavior profiles. When the knowledge regarding the amount of IRI or the most efficient techniques for each behavior profile will be developed, it will allow interviewers to adapt their strategies accordingly to increase the chance of collaboration. Future

research may also test and develop new and more effective strategies related to particular behavior profiles. The present study helps determine future directions for research into the strategic interactions that take place during investigative interviews.

5.9.3 Limitations of the study

The main limitation of the study is the small sample size. Analysis revealed five different profiles for the 130 suspects in the sample, meaning that the number of individuals in each profile was small, making it difficult to determine the statistical significance of our findings. While latent class type of analysis can be adapted to smaller samples (Vermunt & Magidson, 2002), replication of our analysis with larger samples is needed to confirm (or disprove) the current findings.

LTA have been used in this research to help identify the different profile and their stability over time. The analytical strategy was the most sophisticated and adapted one known to the authors to study the research question at stake. However, the nature of the statistical method has its set of limitations. For example, suspects behaviors had to be grouped by category and the number of time points had to be restricted to three. The literature on LTA is not clear about how and when a profile is stable. When most of the participant remains in a profile, it is considered that the profile is kind of stable. This interpretation might impact the result of the study concerning the stability. Also, LTA have been used in this study to explore the different profiles of suspects and this type of approach may produce subjectivity in the decisions for the number of profiles. Model building in LTA lack of unified method in the methodological literature, and it is directly related to the complexity of the model and its evaluation (Ryoo et al., 2018). The literature state that the choice of the number of profiles is not only based on identifying homogeneous groups using fit indices, but it is also determined by the content-specific and theoretical foundations often represented by response patterns (Collins & Lanza, 2010; Ryoo et al.,2018). In other words, LTA is an analysis that is exploratory in nature and the patterns of behavior must be observed by the researcher even

if this means that the best fit statistics is not reached. Many elements, attributed to the choices forced by the nature of the statistical method, could have been different, and this might impact the results of the study.

As shown by the demographic information, the sample was highly homogeneous. Those in the sample were mainly white males who had committed an offense related to child sexual exploitation. Given this, the results might not be generalizable to those who have committed other types of offenses. The homogeneity will, however, be useful in comparisons of our findings with those for other types of suspects.

The Canadian context may also have influenced the findings as the interview protocol of the ICE unit of the SQ may be different from that of other law enforcement teams. For example, the interviews in our sample were longer than those in previous studies (see Cleary & Bull, 2021; Kelly, et al., 2016; King & Snook, 2009), which could influence the strategies used and suspect reactions. As well, suspect perception of police and experience during interviews might differ from those in other cultures (Braga, 2015; Hope et al., 2021; St-Yves, 2002). Interview training and strategies may also differ in other countries, affecting suspect reactions during interviews (Brimbal et al., 2021). The study therefore needs to be replicated with different samples to determine the impact of the Canadian context.

5.10 Conclusion

Game Theory suggests that interaction during investigative interviews is influenced by the strategies of each participant. The resulting behaviors affect the level of collaboration between suspect and interviewer as well as the way the interview is conducted (Rasmussen, 1989). Suspect behavior can be seen as the result of decisions taken according to preferences that are the result of personality, age, and gender, characteristics that do not change during the interview but influence

the interaction (Baker, et al., 1990; Haines & Leonard, 2007). In exploiting this concept of preferences, the study shows that using Game Theory to develop the knowledge around investigative interview might be useful. The analysis identified five different profiles of behavior in the sample and shows that suspects will probably continue to exhibit the same profile over the course of the interview. This information aims to start building knowledge around the different behavior profile of suspects. When the knowledge regarding the amount of IRI or the most efficient techniques for each behavior profile will be developed, it will allow interviewers to adapt their strategies accordingly to increase the chance of collaboration. The present study helps determine future directions for research into the strategic interactions that take place during investigative interviews.

Chapter 6. Thesis discussion and conclusion

6.1 Introduction

This thesis aimed at deepening the knowledge of investigative interviews, a subject that has been developed through the literature of the past three decades. This literature, however, has important limitations that need to be addressed in order to pursue scientific progress on the subject. The limitations are presented in this work as originating from the emphasis of some researchers on confession. Some of the literature on investigative interviews does not discuss the process of information gathering, but rather seems to have focused on confession, which is only one of the many goals of an investigative interview. Moreover, confession is seen as being a static event, as researchers measure the efficacy of strategies using the presence or the absence of confession. As argued in this thesis, the presence of confession is often non-dichotomous, as the suspect may give information on several occasions throughout the interview.

To reach the general objective and improve research in this field, three sub-objectives were formulated. The first sub-objective was to propose a new conceptualization of the object under study by adopting a strong theoretical perspective: Game Theory. The second and third sub-objectives were to observe different aspects of the anatomy of an investigative interview through the new perspective. The impact of behavior of both participants on the suspect disclosure and suspect strategies were observed. The first section of the discussion presents the different concepts of the Game Theory with a focus on the implications of the present thesis. Then, the important notion of time that was integrated in the thesis is discussed. The contribution for the literature and then the theoretical and practical contribution of the thesis on investigative interviews as well as on social science is presented followed by propositions for future studies.

6.2 New theoretical conception of investigative interviews: Game Theory

In this thesis, the advantages of Game Theory and the general explanation of the concepts applied to investigative interviewing have been presented. This mathematical perspective allows a behavioral economics analysis of strategies used in social interaction and allows to go beyond individual and criminological factors associated with confession and consider the contextual factors related to the interaction between suspects and interviewers. The relevance of the Game Theory has been analyzed using four major concepts. First, the participants are players who take actions, and those actions have an influence on the other participant. Second, the actions lead to outcomes that have different payoffs. Third, the actions are chosen according to players' preferences and are considered rational. Fourth, the fact that the level of information is asymmetrical is an important consideration that influence the method and the interpretation of results. These concepts are discussed in light of the current study findings.

6.2.1 Players' interactions and mutual influence

In order to follow Game Theory's perspective and truly account for the interaction between participants, the central object of the current study, which is a suspect's information, had to be adapted. To do so, the investigative interview must be focused on gathering information rather than a confession (Baker-Eck & Bull, 2022; Baker-Eck et al., 2021; Bull & Rachlew, 2019; Oxburgh & Ost, 2011; Oxburgh et al., 2010). Instead of considering a suspect's confession as the object of study, the central variable should shift towards investigation-relevant information (IRI). This thesis follows the idea of Oxburgh and Ost (2011) by using a methodological strategy consisting in coding for the amount of IRI provided by the suspect. Researchers argue that it is more important to consider the amount of IRI rather than the confession (Baker-Eck & Bull, 2022; Oxburgh & Ost, 2011), as the primary function of investigative interviews is to gather information

related to what happened and how, as well as who did what, when, and where (Milne & Bull, 2006). This methodology allowed for a more thorough examination of a suspect's behavior throughout the entire interview. It helped build a dynamic consideration of the interviewing process.

Our findings point toward the fact that the interview is a dynamic process that is influenced by the behaviors of both players. Previous studies in the field of investigative interviewing had already acknowledged that the behavior of the interviewer has an impact on the suspect response. For example, the development of a positive and warm relationship with the suspect (Holmberg & Christianson, 2002; Kebbell, et al., 2010; Wachi et al., 2014) and gradually presenting the evidence throughout the interview (Tekin, et al., 2015; Tekin, et al., 2016) increases the probabilities of confession. The present study goes further by developing knowledge on strategies, and rather than taking only the influence of the interviewer on a suspect's confession into account, behaviors of the suspect are also observed. The findings show that the behavior of each player has an impact on the probability of disclosure, not only the interviewer.

The notion of interaction in investigative interviews can be found in qualitative and exploratory oriented research such as on discourse analysis (Carter, 2011; David et al., 2017; Haworth, 2013; Heydon, 2005; Komter, 2003; Stokoe & Edwards, 2007, 2008). Conversation analytic research on interrogation focuses on the interrogation as a speech event and the publicly observable arrangements and fit of participants' actions as the main object of inquiry (Carter, 2011). This perspective and method allow to consider interaction but might be seen as contributing to a static view of the object under study. When applied to investigative interviews, Game Theory involves the dynamic analysis of actions and outcomes rather than words. Using Game Theory and its mathematical roots allows to use quantitative methods that have something of value to offer

criminologists. The formal procedures of mathematics offered by Game Theory allow for patterns to be discerned that may not be evident from simple inspection of the data: It enables rigorous testing of hypotheses, and in the case of theoretical work, to facilitate the deduction of consequences from assumptions (Greenberg, 1979). Chapter 4 was concerned with models of processes that are stochastic - that is, probabilistic. These models do not predict behavior with certainty; instead, they assign probabilities to events. Instead of focusing on the relationship between variables, the concern is primarily with sequences of events and the distribution of time intervals between events. This method allowed to demonstrate that behaviors influence the presence of IRI and that the process of interviewing is dynamic.

6.2.2 Payoffs

According to the Game Theory perspective, the participants are players who take actions that lead to outcomes that have different payoffs. The notion of payoffs has been tested in chapter 4 in relation to the outcome of IRI. Strategies and behaviors of both players have been observed and the payoffs on the outcome of disclosure have been attributed with the help of GLMM analysis. Results show that strategies have different impacts: some increase the probabilities of IRI and others decrease them. The findings point toward the importance of analyzing the many different aspects of investigative interview. Although more recent studies have focused on multiple strategies, some older studies have focused on one strategy at a time (e.g., Holmberg & Christianson, 2002; Kebbell, et al., 2010; Klaver, et al., 2008; Madon, et al., 2013; Oxburgh et al.,2010; Poole & Lamb, 1998; Powell & Snow, 2007; Tekin, et al., 2016; Wachi, et al., 2014). For example, minimization, which is a strategy consisting in offering the suspect a false sense of security by showing sympathy and tolerance (Kassin & McNall, 1991), has been associated with disclosure (Klaver, Lee, & Rose, 2008; Madon, et al., 2013). However, minimization is not the

only strategy used in investigative interviews and the analysis of the contribution of all strategies help understand the payoffs associated with each of them. Results of chapter 4 allow to attribute the payoffs to each strategy. The payoffs, or in other words, the effect level of strategies have on disclosure is innovative. A system of points (accounting for the weight the variable has on disclosure) can be used in future studies to build a comprehensive and explicative model of IRI which takes into consideration all the different strategies.

6.2.3 Preferences

Dynamic social interactions cannot be understood in isolation from players' preferences (Kelley et al., 2003). Players' preferences refer to any properties of the individual that come into play when they are aware of and responsive to the situation, and includes motives, values, personality traits, habits, attitudes, goals, preferences, and defenses (Kelley et al., 2003). The impact of those preferences is directly reflected in the interaction that follows and is therefore observable through players' behavior. This notion suggests that individual differences are fundamentally rooted in social interaction. The strategies observable in any social situation are heterogenous among individuals. Some players cooperate, many do not. Some are altruistic and others are egoistic, but the choices they make are related to substantial variations in their social preferences (e.g., Andreoni & Miller, 2002; Andreoni & Vesterlund, 2001; Van Lange & Kuhlman, 1994; Van Lange et al., 1997). Like in any other social interaction, what happens in an investigative interview cannot be analyzed without taking into consideration strategies of the suspect and the interviewer. In order to apply this aspect of Game Theory to the study of investigative interviews, the analysis of suspect's preferences has been made in chapter 5 for the first time in the literature, to our knowledge. The analysis helped identify five different profiles of suspects and confirms the idea that strategies are heterogenous among suspects and can be grouped

into a general set of strategies. Moreover, the findings of this study show that the preferences of the suspect in terms of behavior and strategies during the interview are very stable over time. Previous researchers have pointed out that a variety of reasons can explain how a suspect acts in an investigative interview (Bergeron & Deslauriers-Varin, 2019; Deslauriers-Varin & al., 2011; Gudjonsson & Petursson, 1991). Suspects confess due to a combination of factors rather than due to one factor alone. However, studies show that for any given suspect, one group of factors is likely to predominate (Bergeron & Deslauriers-Varin, 2019; Gudjonsson & Petursson, 1991). Chapter 5 presented findings in line with this literature as it demonstrated that based on the behavior, it is possible to identify the profile of the suspect and take into consideration that this profile will most likely remain stable over time.

6.2.4 Asymmetry of information

The popular image of investigative interviews represented in TV shows and movies is tainted by violence and coercion. This image has also been documented in historical writings concerning investigative interviews (Leo, 1992; St-Yves and Landry, 2004). However, a great awareness was undertaken during the Second World War which led to a significant improvement in interview techniques in many countries which decreased the level of violence (Leo, 1992). Even without violence, investigative interviews might be seen as coercive *per se*. In the ruling on Oregon v. Mathiason (1977), the U.S. Supreme Court stated that:

> "[a]ny interview of one suspected of a crime by a police officer will have coercive aspects to it, simply by virtue of the fact that the police officer is part of a law enforcement system which may ultimately cause the suspect to be charged with a crime." (Oregon v. Mathiason, 1977).

The investigative interview might therefore be seen as an institutional and interactional manifestation of social control depicted as a "battle" between police and suspects (Holdaway & Rock, 1998). This means that each aspect of this social interaction is shadowed by a power imbalance (Ainsworth, 2008; Garfinkel, 1963). This imbalance is covered by Game Theory with the notion of the asymmetrical information game. Both players know they are in a game and choose strategies, but at least one of them does not know the associated payoffs for their strategies (Kelly, 2003). The suspects know they are under arrest and being interviewed by police but most likely do not know the strategies of their interlocutor. The only informed player in the game is the interviewer who knows the strategies of the suspect but also, has all the information related to the case in hand, including the evidence gathered at this point.

This asymmetry, which can be applied to any police-civilian encounters, creates a situation in which the players have different strategies according to their roles. The strategies observed by the researchers are therefore different depending on the player who is analyzed. Different tools must be used to observe the behaviors in their contexts. Categories of behaviors for the investigators have proven to be efficient in previous studies (e.g., Kelly et al., 2013). There were, however, no clear categories of behaviors for the suspect. The existing categories were therefore used in chapter 4 to inspire an adaptation of those categories for the suspect taking into consideration their social position in the interview. Strategies and behaviors had to be adapted. Also, suspects' strategies and behaviors were explored in chapter 5 while profiles of strategies were identified.

6.3 Adding the notion of time

Time is an element that underlies the Game Theory perspective, as the theory states that dynamic interaction evolves through time. While Game Theory does not present a discussion about

the notion of time *per se*, the term dynamic refers to the overall shape of the phenomenon as it unfolds over time (Roe, 2008). It refers to "what happens" and not "what is" present or not (Roe, 2008). Moreover, strategies used in different contexts of interaction between two parties have a fundamental dimension of time (Lee & Liebenau, 1999). Thus, there is a need to observe, record, interpret "what happens" and generate new conceptions and hypotheses.

There is a recognition among scholars that time has been seriously neglected in many fields, such as organizational research (e.g., Ployhart, et al., 2002), education (e.g., Barbera, et al., 2015) and psychology (e.g., Roe, 2008). Since time plays a prominent role in everyday life, the tendency to leave time aside is somewhat paradoxical and leads to an unintentional distortion of the phenomenon described (Jones, 2000). The use of a continuous timeline for observation is highly recommended in order to analyze social interaction from our perspective (Bergstrom & Nowman, 2007; Ekman et al., 2012; van Montfort, et al., 2018; Shepherd & Griffiths, 2021).

This thesis aimed at developing a time-oriented perspective and has demonstrated in chapter 4 that using a very short unit of time, rather than by periods of times, can improve the general comprehension of dynamic interactions in investigative interviewing. This paradigm shift has permitted the use of Markov chains, which allowed to identify the impact of time on behaviors. The use of IRI instead of the dichotomous state of suspect disclosure also helps to follow the evolution of the interview more precisely through time. The findings show that time is an important aspect of impact on behaviors and allows to extend the knowledge we had on police interrogation strategies and three elements can be observed. Firstly, while previous research has shown that presentation of evidence to the suspect is associated with confession (Granhag et al., 2013; Hartwig et al., 2014; Vrij & Granhag, 2012), our findings is able to support this association but also demonstrates that the effect diminishes over time. Secondly, a specific strategy may only have

effect at a later stage of the interview. If the suspect does not provide an IRI immediately after the presentation of evidence, the chances of disclosure related to this strategy decrease substantially. Inversely, the influence of some behaviors is apparent only in the long-term. Interviewer strategies involving collaboration, provoking emotions and rapport building have a large impact on the disclosure of IRI, but their effect is only apparent after a certain period of time. Thirdly, previous research has found that developing a warm and humane relationship in investigative interviews leads to an increase in disclosure (Wachi, et al., 2014; Holmberg & Christianson, 2002; Kebbell, et al., 2010). Our results support this finding and also suggest that the interviewer must be patient in order to see the effects of this strategy. The effect of a given strategy or behavior is not always immediately apparent, demonstrating the need to study disclosure in investigative interviews as a dynamic, continuous, step-by-step process rather than as a dichotomous event. This thesis therefore allows to demonstrate the importance of taking time into consideration and sets the methodological basis to do so.

6.4 Contribution of the thesis on the literature on investigative interviewing

While this thesis was not meant to offer a complete model to explain suspect disclosure, it is setting the basis for future research in this field that would allow improvement in the investigation interviewing field. The thesis not only proposes the use of a new theoretical perspective but also demonstrates through its two empirical articles that it is useful to analyze the whole investigative interview and not only the factors associated with confession. The findings show that researchers can gain a deeper understanding of this social interaction when innovative and valuable tools are used. A huge amount of work has been accomplished throughout the writing of this thesis. First, as explained in chapter 1, researchers have extensively studied investigators' strategies, but suspects' strategies have not received as much attention. Most studies focused on

the ultimate outcome of the interrogation, indicating whether the suspect admitted guilt (either partially or fully), denied or refused to speak. The reaction of the suspect during the interview is seen as a kind of continuum in which silence stands on one end and verbalization on the other. With the application of Game Theory, there was a need to include the suspect in the observations. The work behind adapting categories of strategies to suspects has been difficult but helped to give a better description of behaviors in this context. Second, the development of the data collection grid mentioned in chapter 3 has been a colossal amount of work. A lot of time has been spent on the identification of the different behaviors for both participants as well as in the testing of the grid, not to mention the work put in by research assistants during the data collection. Finally, the path to find a solution to the many methodological limitations unraveled in the literature was challenging. The use of Markov chain analysis was a revelation for presenting the temporal perspective we were trying to illustrate.

The integration of the Game Theory perspective in the analysis of investigative interviews has introduced very important concepts. Article 1 aimed to demonstrate that the concepts of Game Theory adequately applied to the gathering of IRI. It talks about the important influence of behavior between players. Subsequently, several concepts have been tested in empirical articles: the concepts of process that evolves over time, the delayed effect of the impacts of behaviors over time, the mutual influence of participants, the preferences of (one of) the players, the stability of preferences, and the difference in behaviors reflecting the asymmetry of the relationship. They all have an influence on the way of analyzing the interrogation. Practical implications for police interviewing strategies as well as for the social sciences in general are discussed below.

6.4.1 Generalization of results

The thesis uses a sample of videotaped investigative interviews made by the Child Sexual Exploitation special unit of Quebec's provincial police department, the SQ. Each suspect in the sample was apprehended for one or more charges related to online child sexual exploitation including access, possession, distribution, production of child pornographic material and child luring. It creates a very homogeneous sample but there are nevertheless indications that the result could be generalized to other types of samples. First, the codification grid for the observation of the different strategies was created from strategies reported in the literature on investigative interviewing. The similarity between strategies identified in the literature covering different types of samples and the strategies identified in the present study indicate that the findings accurately represent what was found in previous studies and do not constitute a contrasting sample. For example, researchers have observed the presence of minimization (e.g., Kelly et al., 2019) and behaviors related to the development of a warm and human relationship between the police officer and the suspect (e.g., Holmberg and Christianson, 2002; Kebbell et al., 2010; Wachi et al., 2014) through investigative interviews, just as the present study did. Chapter 4 even uses the same categorizations as those used by Kelly and colleagues (2013) in their study because the same types of behaviors were observed.

Second, concerning the profile of suspects, previous researchers have pointed out that a variety of reasons can explain how a suspect act in an investigative interview (Bergeron & Deslauriers-Varin, 2019; Deslauriers-Varin & al., 2011; Gudjonsson and Petursson, 1991). These studies integrated samples of offenders who have committed different types of offenses and found heterogenous groups of individuals that are based on the reason for confessing and personality traits and not on individuals' offenses. This element allows to hypothesize that the different groups

of suspects identified in chapter 5 might also be applied to other types of samples, including suspects accused of different types of offenses.

6.4.2 Nature of data collection

The nature of the data collection can be a challenge for research in the field of investigative interview. Some researchers have used observations that have not been collected through real life investigative interviews. For example, the authors based their analyzes on the perception of investigators regarding the course of the interrogation and the evaluation of the techniques used (e.g., Wachi, and coll., 2014; Mueller, Schreiber Compo, Molina, Bryon and Dimentel, 2015). They proceed by using questionnaires or interviews with investigators who are necessarily biased by their own perception and experience. Other researchers have interviewed inmates to obtain their perception of interrogation (e.g., Cleary & Bull, 2019; Deslauriers-Varin, 2006; Snook, et al., 2015) and others have conducted studies on non-criminalized samples such as university students (e.g., Tekin et al., 2015; Tekin et al., 2016; Yang, Madon, & Guyll, 2015). It is difficult to generalize these results to the specific context of investigative interviews. Suspects who are interviewed by the police often have a lot more to lose than college students who participate in a study. It is difficult to conclude with certainty that the behavior of the participants can be transposed to that of an individual who risks ending up in prison because of their actions. Even studies which have looked at real investigative interviews might indirectly denaturalize the observations. For example, the interaction between the investigators and the suspect might be influenced by the presence of the researcher in the interview room (e.g., Leo, 1996a), or the behavior of investigators that knows that they are under study (e.g., Mueller et al., 2015; Sternberg, et al., 1999). The solution to this problem is to use videotaped real-life investigative interviews to analyze data.

Using videotaped real-life investigative interviews does not end all the challenges. Very often, the samples are based on interviews chosen by the police department rather than being systematically collected (e.g., Kelly, Redlich, & Miller, 2016; Leahy-Harland & Bull, 2017). There is a possible objectivity bias in the selection of the cases in the sample which could represent a slightly different reality. In addition, some researchers imposed a certain number of criteria such as the duration of the interrogation, thus eliminating several recordings, which therefore limits the generalization of their results.

The ideal solution would be to take advantage of a solid partnership with a police force in order to have access to all the videotaped investigative interviews in a determined period of time rather than a selection made by the department. Those taped, recorded because of an intervention protocol rather than for research purposes, ensures that biases and influences related to the researcher presence are controlled. Plus, access to all the recordings ensures that there is no bias in the selection of the videotapes for the analysis. The research design on which this thesis is based was developed to answer those limitations.

6.5 Practical implications of the thesis

Besides the contribution to the theoretical and empirical literature on investigative interviewing, the findings of this thesis have practical implications for law enforcement agencies. This section presents the practical implication on police interviewing and the larger implication to other asymmetrical social situation in social science.

6.5.1 Implications on police interviewing strategies

The results presented in chapter 4 raise awareness about the length of investigative interviews as the notion of time has been central to the analysis. The length of an interview might

greatly differ based on the characteristics of the crime (e.g., the type of crime, the number of charges, the number of victims, the amount of evidence). Studies conducted in the United States report an average interview time of approximately 1.5 hours (see Cleary & Bull, 2021; Kassin, et al., 2007; Kelly, et al., 2016) and similar results were found in a Canadian setting (e.g., King & Snook, 2009). The present study shows that some strategies have an impact on disclosure after a considerable amount of time. For example, an interviewer who uses a strategy aimed at provoking the emotions of the suspect by identifying and exaggerating fears is associated with an impact on disclosure more than an hour after the strategy is used. Therefore, it would be a less efficient choice of strategy in a shorter interview. As such, other strategies may be more useful for all lengths of interviews, like the presentation of evidence, and in different contexts as its impact on disclosure is immediate.

Another implication for investigative interviews is a better understanding of suspects' behaviors and their game strategies. The suspects' personality and experience (e.g., Gudjonsson & Petursson,1991; St-Yves, 2002) are very difficult to assess before and during an interview because of the nature of the encounter. Our findings confirm the presence of different types of suspects that can be identified by observing their behaviors but also, that may help investigators to achieve their objectives. Being able to identify a profile through observable behavior is an important advantage for interviewers. Future research should focus on the development of strategies that would adapt to different profiles in order to increase the chance of collaboration.

6.5.2 Larger implication of the thesis to social science

Finding of this thesis might be applied to other types of asymmetrical relationships. As such, police interviews resemble other types of interactions in the social sciences due to the presence of an asymmetrical relationship between the participants. Mishler (1975) indicates that

in all contexts in which an individual is expected to speak and ask questions, there is inevitably an asymmetry in the control of the exchange. Thus, these exchanges are made within the framework of a relationship between two people who do not have the same power. It is essential to take this asymmetry into account to explain the different strategies of the participants in the exchange. Fear (1958) explains that the interviewer's goals in a job interview context often conflict with those of the interviewee. The latter is naturally anxious to put their best image forward and to disclose only favorable information about him/her. On the other hand, the interviewer is keen to get as complete a picture as possible, especially if they perceive that the interviewee is hiding unfavorable information. To obtain this information, they will use specific techniques which depend on the context. Another parallel with the interrogation room might be drawn in the study of Rex and Schiller (2009) on how to improve classroom interaction. The authors state that the ideal situation for a teacher would be if students were engaged learners who respect one another, work hard to learn, do their homework and have good grades. The reality is that, when the students do not meet these expectations, tension arises, and teaching is now much more difficult (Rex & Schiller, 2009).

In the two aforementioned situations, the similarities with the interrogation room are notable. The police officer, the job interviewer and the teacher need the collaboration of the other participant in the social interaction in order to be able carry out their work. They need to use specific techniques to achieve these ends which are related to their role in the interaction. The other participants, for their part, might win by potentially doing the exact opposite. Those situations represent a social interaction putting at least two players against each other, who, without being enemies, have competing interests. This leads to state that the understanding of asymmetrical relationship presented in this thesis might apply to other types of relationships in criminology. It

is even more true in the criminology field as the exchanges we are concerned with naturally carry asymmetrical roles (e.g., probation officer, social reintegration officer, social worker, etc.).

6.6 Limitations of the thesis

The thesis aimed to demonstrate the importance of improving how we study investigative interviews. Innovative methods have been used but, with these, come inherent limitations that are inevitable. The study of complex interactions requires complex methods. For example, calculating the time lag of the influence of a social event that is not clearly scripted, through human behaviors, is very complex. We proceeded using recognized methods used in other fields, but the work accomplished represents only the beginning. We must mobilize and work together in this direction.

The limitations of the thesis are embedded in the many choices that have been made. First, the choices related to the analytical strategies definitively influence the findings of this thesis. The model presented in chapter 4 was based on an analysis of dyads of behaviors to account for the impact of time. However, the cumulative effect of past behaviors was not calculated and might have an even more important effect on disclosure. For example, the fact that a specific category of behaviors repeated many times before the disclosure might influence the decision of the players. This is an important element that was not taken into consideration in the analysis of this thesis. In chapter 5, the nature of the analytical strategy of LTA made the manipulation of the database very complex. Many elements come into play to take a decision on the grouping of behaviors, division of the number of behaviors, number of time periods, and number of profiles chosen. It was also very hard to go further into the analysis because of the interpretation of the profile through time.

The second set of choices concerns the methodological strategies made without strong theoretical background. In chapter 4, the behaviors of the suspects and the interviewers were grouped into categories. The categories were inspired by Kelly and colleagues (2013) who had

created them for interviewers. The categories were adapted for the suspects. No work has been done in classifying suspect behaviors with the objective of analyzing interaction. The behaviors might have been categorized very differently and possibly been more adapted to the suspects.

Suspect's behaviors have also been classified for chapter 5 and could have been done differently. Another decision that has been made in this chapter was the number of profiles for the latent transition analysis. The choices have been justified in the articles but, they come with a set of consequences in the interpretation of results.

The third set of choice concerns the theoretical frame. There is a high number of concepts in Game Theory and those could not have possibly been all tested. Many concepts would be worth studying in order to understand investigative interviews better. Just to name a few: The concept of repeated game in which the fact that the suspect might have been interviewed in the past is a very important concept to observe the effect of interview history on disclosure. The interaction of the preferences of both players is necessary to understand the dynamic in the interaction. In this thesis, the behaviors were studied in relation with IRI but in order to understand better the bigger picture of the interaction, the influence of the suspect behaviors on the interviewer would be very useful in police officers' formation. In other words, the findings of this thesis are limited to the frame of the concepts chosen to be tested. It is only the beginning of the Game Theory contribution to asymmetrical interactions.

To close the discussion on the methodological limitations of the thesis, an indirect choice impacts the interpretation of results: the thesis relies on the nature and the size of the sample. The analyses were based on 130 interviews of white males suspected of (and later sentenced for) online sexual behavior. The procedure used in the ICE unit, the Canadian context of law enforcement and the homogeneity of the sample probably have impacted the results.

The last limitation concerns the choice of the theory. Choosing to frame the concepts of investigative interview in Game Theory creates a set of limitations. Chapter 2 introduced the inherent notions of the theory. First, it suggests using real-time social situations including analysis on a continuous timeline. This element implies to have adequate data – i.e. actual recording of investigative interviews – as well as adequate resources to collect and analyze the data. It instore a complexity because it aims at translating a complex phenomenon. That might be an important obstacle for researchers.

Another implicit notion of the Game Theory that has important consequences is the emphasis on observable behaviors. Schmidt (2001) reports that in individual decision theory, a decision maker faces an external world that affects the consequences of his actions. The external factors that could influence disclosure are somehow considered unimportant in Game Theory. Even if a complete model of disclosure would be developed following the theory perspective, there will still be some elements that are not considered and could influence the phenomenon. Overall, we consider that the perspective brings more advantages to the study of investigative interviews than limitations.

6.7 Future research

Of course, my ambitious first-year Ph. D. mind would have liked to propose an exhaustive model for explaining and predicting IRI. I was imagining a mathematical formula in which observable variables are inserted and would inevitably predict the outcome of the interview. I rapidly understood the extent of the limitations held by the whole body of literature on investigative interviews. The gap to solve was too large, the work to do was too substantial. The thesis must be seen as a first step in improving research in this field. This first step creates many new possibilities for future research. First, the effect of strategies on obtaining an IRI has been

observed in this thesis, but there might exist a phenomenon of behavioral cumulation that has not been tested. One of the assumptions of Game Theory is that interaction is a process in which the actions of each participant at each point in time are partly contingent upon past actions (Kelly, 2003). The effect of the preceding behavior, but also the cumulation of prior behaviors needs to be measured. The investigative interview is a game in which players take many turns. Game Theory suggests that this repeated interaction provides the opportunity to amass cumulative experiences. For example, players collect experiences of trustworthy behavior and establish norms of cooperation and reciprocity (Ostrom, 2003; Tarrant et al., 2010). Suspects make a series of decisions throughout the interview and continuously reevaluate the situation according to the action of the other player. Recent studies have begun to work on this aspect. Research show that the effects of multiple interrogation techniques can accumulate and continually influence suspects' evaluations of available choices (Yang et al., 2017). Cabell and colleagues (2020) also show that the effects of the techniques used by the interviewer are expected to accumulate. In general, stochastic processes state that the probability of a particular state of a variable at Time "T" will depend on the state of all the variables of the system at all previous times (Greenberg, 1979). In other words, the system remembers and is influenced by its past. However, in the study presented in chapter 4, we used a Markov process, which is a stochastic process in which the system does not remember its past (Greenberg, 1979). The earlier history of the variables was not considered in the analysis. The combination of the type and number of strategies should be explored in future research to investigate their effect. The combination of behavior happening before an IRI could be joined together using other types of stochastic process analysis.

Second, the findings presented in chapter 4 indicate that there might be a burst of information during the interview as a disclosure was highly predictive of subsequent disclosure. It

would be interesting to further investigate the moment in time the IRI appears: Time series analysis (Pickup, 2015) might be used to investigate this and offers several advantages. It makes it possible to represent and explain the fluctuations of a variable over time by empirically modeling observable trends (Allen, 2017; Lewis, 2008; Pickup, 2015). The construction of the model is based on an understanding of the intrinsic trend of a variable, thus making it possible to adequately replicate its dynamics (Cromwell, et al., 1994). The trend of the time series across all the different interviews could identify a general trend and give supplemental indications of resemblance or contrast between strategy patterns.

Third, the results of chapter 5 observes different suspect profiles in order to identify the presence of typical suspects. The next step would be to compare these profiles to the efficacy of strategies used during the interview. The results presented in chapter 4 could be reproduced with a new variable in the model: the profile of the suspect. The individual differences that were observable through the profile might create different types of reaction to certain triggers. For example, strategies aimed at triggering the emotions of the suspect might positively impact the amount of IRI among the suspects in the "Pleasant" profile, but might have a negative impact on suspects in the "Irritated" profile.

Finally, while the focus of the literature was on confession and the present thesis also focused on IRI, the emphasis could be put on other variables. IRI, the dependent variable, could be replaced by each category of behaviors in order to explain other aspects of the interviews. Analysis going beyond the purpose of the thesis has been made from curiosity and indicated that the controlling behavior of the interviewer is mostly preceded by denial from the suspect as well as the suspect being confrontational. This indicates that interviewers' confronting behavior might be triggered by situations that are frustrating for him/her. Understanding what influences each

behavior of the suspect but also of the interviewer could be used in police training in order to recognize situations and act accordingly.

6.8 Conclusion

Among the general literature on interviews, only the studies on investigative interviews place so much emphasis on the factors associated with confession. Studies on job interviews, disciplinary meetings or interviews for helping relationships focus more on the procedures and on the elements that will help develop the openness of the interviewee and that will make it possible to obtain potentially sensitive information. In this literature, we mainly find information on the attitudes of the interlocutors and on the ideal behaviors to adopt for each one. Individual factors hardly ever come into play. In the investigative interview literature, studies show that when certain elements are present, the likelihood of confession is increased. However, all of these individual, criminogenic and situational factors which appear in the confession literature might be of secondary importance. The main limitation of the studies therefore lies in the approach that was used to understand and define the phenomenon.

This thesis allowed to set a theoretical and methodological basis to the study of asymmetrical interaction using the Game Theory perspective. More particularly, the context of investigative interviewing of online sex offenders has been observed and the results point toward the fact that the social interaction that takes place in the interrogation room is influenced by the strategies of each participant. Moreover, their decisions are taken according to their preferences. Several profiles of suspects have been identified based on their behavior, illustrating their strategies' preferences. The thesis also gives particular attention to the complex notion of time and proposes a continuous timeline evaluation of the interaction. The finding provides the basis to develop practical tools to police investigators on the matter of the type of strategies to use

according to the amount of time they have and on the type of suspect they are working with. The findings also contribute to setting methodologies for other types of asymmetrical interaction which are common in the field of criminology.

While the thesis presents how Game Theory can help to understand social interaction in criminology, criminology also has a lot to offer to game theorists. Criminologists work mostly with judicialized individuals in many different types of situations: probation, society reintegration, incarceration, psychosocial therapy, etc. They are also interested in understanding police intervention and therefore police-civilian interactions. These are complex social interactions with many aspects that are very useful for testing the different assumptions of the theory. First, the two individuals who are involved in the interaction hold asymmetrical roles. The client (who is or will be judicialized) meets the professional who tries to get truthful information from them. Criminologists often have a double role: on the one hand, to try to help the client and, on the other hand, to protect the public. Both participants might have different goals and the aspects of strategies, outcomes and payoffs are very present and might be different depending on the role of the participant in the interaction. Second, the interactions in these contexts are very similar. There are usually two people implicated, the interests of both people are high and the interaction is circumscribed in time. These elements allow to analyze the social interaction in the most homogeneous way as the setting is recurrent throughout the sample. Criminology settings therefore offer a viable environment for the development of Game Theory and the empirical testing of its different assumptions.

References

Adams-Quackenbush, N. M. (2019). The influence of guilt presumptive language on investigative interview outcomes. Doctoral Thesis, Maastricht University.

Aebi, M., Plattner, B., Ernest, M., Kaszynski, K. & Bessler, C. (2014). Criminal History and Future Offending of Juveniles Convicted of the Possession of Child Pornography. *Sexual Abuse: A Journal of Research and Treatment*, 26 (4), 375–390.

Aguinis, H., & Gottfredson, R. K. (2010). Best-practice recommendations for estimating interaction effects using moderated multiple regression. *Journal of organizational behavior*, *31*(6), 776-786.

Aiken, L. S., West, S. G., & Reno, R. R. (1991). *Multiple regression: Testing and interpreting interactions*. sage.

Ainsworth, J. (2008) 'You Have the Right to Remain Silent . . .' But Only if You Ask for It Just So: The Role of Linguistic Ideology in American Police Interrogation Law. *The International Journal of Speech, Language, and the Law*, 15(1):1–21.

Alan, S., Boneva, T., & Ertac, S. (2019). Ever failed, try again, succeed better: Results from a randomized educational intervention on grit. *The Quarterly Journal of Economics*, 134(3), 1121-1162.

Allen, M. (2017). *The SAGE Encyclopedia of Communication Research Methods*. California: SAGE Publications.

Alison, L., Alison, E., Eltnib, S., Noone, G., & Cole, J. (2014). *The long game: A review of the development of the interpersonal interviewing framework (IFF) for gaining long term strategic advantages with high value detainees.* Training Manuscript. University of Liverpool: Centre for Critical and Major Incident Psychology.

Alison, L. J., Alison, E., Noone, G., Elntib, S., & Christiansen, P. (2013). Why tough tactics fail and rapport gets results: Observing Rapport-Based Interpersonal Techniques (ORBIT) to generate useful information from terrorists. *Psychology, Public Policy, and Law, 19*(4), 411–431.

Ancona, D. G., Okhuysen, G. A. & Perlow, L. A. (2001) 'Taking time to integrate temporal research'. *Academy of Management Review*, 26 (4), 512–529.

Andreoni, J. Miller, J. (2002). Giving according to GARP: An experimental test of the consistency of preferences for altruism. *Econometrica*, 737-753.

Andreoni, J., Vesterlund, L. (2001). Which is the fair sex? Gender differences in altruism. *Quarterly Journal of Economics*, 293-312.

Avolio, B.J. (2007). Promoting more integrative strategies for leadership theory-building. American *Psychologist*, 62, 25–33.

Babchishin, K. M., Karl Hanson, R., & Hermann, C. A. (2011). The characteristics of online sex offenders: A meta-analysis. *Sexual Abuse*, 23(1), 92-123.

Babchishin, K. M., Hanson, R. K. & VanZuylen, H. (2015). Online Child Pornography Offenders are Different: A Meta-analysis of the Characteristics of Online and Offline Sex Offenders Against Children. *Archive of Sexual Behavior*, 44, 45–66.

Baker-Eck, B., & Bull, R. (2022). Effects of empathy and question types on suspects' provision of information in investigative interviews. *International Journal of Police Science and Management*, 1-11.

Baker-Eck, B., Bull, R., & Walsh, D. (2021). Investigative empathy: Five types of cognitive empathy in a field study of investigative interviews with suspects of sexual offences. *Investigative Interviewing: Research and Practice*, 11, 28-38.

Baker, D. D., Terpstra, D. E., & Larntz, K. (1990). The influence of individual characteristics and severity of harassing behavior on reactions to sexual harassment. *Sex Roles*, *22*(5-6), 305-325.

Baldwin, J., & McConville, M. (1980). *Confessions in Crown Court Trials.* Royal Commission on Criminal Procedure Research Study Nº 5. HMSO: London.

Barbera, E., Gros, B. & Kirschner, P.A. (2015). Paradox of time in research on educational technology. *Time & Society*, 24 (1), 96-108.

Beauregard, E., Deslauriers-Varin, N., & St-Yves, M. (2010). Interactions between factors related to the decision of sex offenders to confess during police interrogation: A classification-tree approach. *Annals of Sex Research*, 22 (3), 343-367.

Beauregard, E., & Mieczkowski, T. (2012). Risk estimations of the conjunction of victim and crime event characteristics on the lethal outcome of sexual assaults. *Violence and Victims*, 27(4), 470-486.

Bergeron, A., & Deslauriers-Varin, N. (2019). Obstacles à la confession en contexte d'interrogatoire policier: profils latents des motivations à la non-confession dans le cas d'individus reconnus coupables d'un crime. *Revue internationale de criminologie et de police technique et Scientifique,* LXXII (4), 387-409.

Berggren, E. (1975). *The psychology of confessions*. Brill.

Bergstrom, A. R., & Nowman, K. B. (2007). A continuous time econometric model of the United Kingdom with stochastic trends. Cambridge University Press.

Bernard, G., & Proulx, J. (2002). Caracteristiques du passage a l'acte de criminels violents etats-limites et narcissiques. *Canadian Journal of Criminology*, *44*(1), 51-75.

Beune, K., Giebels, E., & Sanders, K. (2009). Are you talking to me? Influencing behaviour and

culture in police interviews. *Psychology, Crime & Law*, 15(7), 597-617.

Bicchieri, C. (2004). Rationality and Game Theory. *The Oxford handbook of rationality*, 182-205.

Binmore, K. (1990). *Essays on the Fondations of Game Theory*. Oxford, Basil Blackwell.

Bischoff, M. M., & Tracey, T. J. (1995). Client resistance as predicted by therapist behavior: A study of sequential dependence. *Journal of counseling psychology*, 42(4), 487.

Blair, J. P., Reimer, T. O., & Levine, T. R. (2018). The role of consistency in detecting deception: The superiority of correspondence over coherence. *Communication Studies*, *69* (5), 483-498.

Boudon, R., & Bourricaud, F. (2002). Rationality. *In A Critical Dictionary of Sociology* (pp. 299-305). Routledge.

Braga, A. A. (2015). An analysis of race and ethnicity patterns in Boston Police Department field interrogation, observation, frisk, and/or search reports. Boston: ACLU of Massachusetts.

Brent Jr, E. E., & Sykes, R. E. (1979). A mathematical model of symbolic interaction between police and suspects. Behavioral Science, 24 (6), 388-402.

Brimbal, L., & Luke, T. J. (2019). Deconstructing the evidence: The effects of strength and reliability of evidence on suspect behavior and counter-interrogation tactics.

Brimbal, L., Meissner, C. A., Kleinman, S. M., Phillips, E. L., Atkinson, D. J., Dianiska, R. E., ... & Jones, M. S. (2021). Evaluating the benefits of a rapport-based approach to investigative interviews: A training study with law enforcement investigators. Law and human behavior, 45(1), 55.

Bruhin, A., Fehr, E., & Schunk, D. (2019). The many faces of human sociality: Uncovering the distribution and stability of social preferences. *Journal of the European Economic Association*, 17(4), 1025-1069.

Bull, R. (2014). When in interviews to disclose information to suspects and to challenge them? In R. Bull (Ed.) *Investigative interviewing*. New York: Springer

Bull, R., & Baker, B. (2020). Obtaining Valid Discourse from Suspects PEACE-fully. In Mason, M., & Rock, F. (Eds.). *The Discourse of Police Interviews*. University of Chicago Press.

Bull, R., & Rachlew, A. (2019). Investigative interviewing: From England to Norway and beyond. In Barela, S., Fallon, M., Gaggioli, G., & Ohlin, J. (Eds.). Interrogation and torture: Research on efficacy, and its integration with morality and legality, 171-196.

Bull, R., & Soukara, S. (2010). Four studies of what really happens in police interviews. In Lassiter G.D., & Meissner, C.A. (eds). *Police interrogations and false confessions: current research, practice, and policy recommendations* (pp. 81-95). Washington: American Psychological Association.

Cabell, J. J., Moody, S. A., & Yang, Y. (2020). Evaluating effects on guilty and innocent suspects: An effect taxonomy of interrogation techniques. *Psychology, Public Policy, and Law*, 26(2), 154.

Carter, E. 2011. *Analysing Police Interviews: Laughter, Confessions and the Tape*. London: Bloomsbury Academic.

Cederborg, A. C., Orbach, Y., Sternberg, K. J. & Lamb, M. E. (2000) Investigative interviews of child witnesses in Sweden. *Child Abuse and Neglect,* 24 (10): 1355–1361.

Clarke, C., & Milne, R. (2001). *A national evaluation of the PEACE Investigative Interviewing Course* (p. 187). London: Home office.

Clarke, C., Milne, R., & Bull, R. (2011). Interviewing suspects of crime: The impact of PEACE training, supervision and the presence of a legal advisor. *Journal of investigative psychology and offender profiling*, 8 (2), 149-162.

Cleary, H. (2014). Police interviewing and interrogation of juvenile suspects: A descriptive examination of actual cases. Law and human behavior, 38 (3), 271.

Cleary, H., & Bull, R. (2019). Jail inmates' perspectives on police interrogation. *Psychology, Crime & Law*, 25(2), 157-170.

Cleary, H., & Bull, R. (2021). Contextual factors predict self-reported confession decision-making: A field study of suspects' actual police interrogation experiences. *Law and Human Behavior*, 45(4), 310.

Clemens, F., & Grolig, T. (2019). Innocent of the crime under investigation: Suspects' counter-interrogation strategies and statement-evidence inconsistency in strategic vs. non-strategic interviews. *Psychology, Crime & Law*, *25*(10), 945-962.

Clemens, F., Knieps, M., & Tekin, S. (2020). Untapped potential? A survey study with German police officers into suspect interviewing practices and the strategic use of evidence. *Journal of Forensic Psychology Research and Practice*, 20(1), 53-79.

Clevenger, S. L., Navarro, J. N. & Jasinski, J. L. (2016). A Matter of Low Self-Control? Exploring Differences Between Child Pornography Possessors and Child Pornography Producers/Distributers Using Self-Control Theory. *Sexual Abuse: A Journal of Research and Treatment*, 28 (6), 555–571.

Collins, K., & Carthy, N. (2019). No rapport, no comment: The relationship between rapport and communication during investigative interviews with suspects. *Journal of Investigative Psychology and Offender Profiling*, *16*(1), 18-31.

Collins, M. & Flaherty, B. P. (2002). Latent Class Models for Longitudinal Data, (pp.287-303). In Hagenaars, J., A., & McCutcheon, A. L., (Eds). *Applied Latent Class Analysis*. Cambridge University Press.

Collins, L. M., & Lanza, S. T. (2010*). Latent class and latent transition analysis: With applications in the social, behavioral, and health sciences*. New York: Wiley.

Collins, L. M., & Wugalter, S., E. (1992). Latent class models for stage-sequential dynamic latent variables. *Multivariate Behavioral Research*, 27, 131-57.

Collins, L.M., Wugalter, S.E., & Fidler, P.L. (1996). Some Practical Issues Related to the Estimation of Latent Class and Latent Transition Parameters. In von Eye, A., & Clogg, C. C. (Eds). Categorical Variables in Developmental Research. *Academic Press*, pp. 133-146.

Cornish, D. & Clarke, R. (1986). *The reasoning criminal: rational choice perspectives on offending*. New York: Springer-Verlag.

Cromwell, J., Labys, W. & Terraza, M. (1994). *Univariate Tests for Time Series Models*. États-Unis: SAGE Publications.

Dando, C. J., & Bull, R. (2011). Maximising opportunities to detect verbal deception: Training police officers to interview tactically. *Journal of Investigative Psychology and Offender Profiling*, 8(2), 189-202.

David, G. C., Rawls, A. W., & Trainum, J. (2017). Playing the interrogation game: Rapport, coercion, and confessions in police interrogations. Symbolic Interaction, 41(1), 3-24.

Davis, D., & Leo, R. A. (2010). Three prongs of the confession problem: Issues and proposed solutions. In Henderson, C & Epstein, J. (Eds). *The Future of Evidence: How Science and Technology Will Change The Practice of Law*. ABA

Dawes, R. M., & Thaler, R. H. (1988). Anomalies: cooperation. *Journal of economic perspectives*, 2(3), 187-197.

Dawson, E., Hartwig, M., Brimbal, L., & Denisenkov, P. (2017). A room with a view: Setting

influences information disclosure in investigative interviews. *Law and human behavior*, *41* (4), 333.

Dayton, C. M. (2008). An introduction to latent class analysis. In S. Menard (Ed.). *Handbook of longitudinal research: Design, measurement, and analysis* (pp. 357-371). Burlington, MA: Elsevier.

Demidenko, E. (2004). *Mixed models: theory and applications* (1st ed., Wiley series in probability and statistics). Wiley-Interscience.

Deslauriers-Varin, N. (2006). *Les facteurs déterminants dans le processus d'aveu chez les auteurs d'actes criminels*. Thèse de maîtrise, Université de Montréal, Canada.

Deslauriers-Varin, N. (2022). Confession during Police Interrogation: A Decision Tree Analysis. *Journal of Police and Criminal Psychology.* Online first.

Deslauriers-Varin, N. (2020). Facteurs explicatifs de la confession en contexte d'interrogatoire policier: une analyse d'arbres décisionnels. *Criminologie*, 53(2), 219-254.

Deslauriers-Varin, N., & Beauregard, E. (2010). Victims' Routine Activities and Sex Offenders' Target Selection Scripts: A Latent Class Analysis. *Sexual Abuse*, 22 (3): 315-342.

Deslauriers-Varin, N., Beauregard, E., & Wong, J. (2011). Changing Their Mind About Confessing to Police: The Role of Contextual Factors in Crime Confession. *Police Quarterly*, 14 (1), 5–24.

Deslauriers-Varin, N., & Bergeron, A. (2021). Suspect Interviews and Confessions in Sex Crime Cases. In Bennel, C. & Deslauriers-Varin, N. (Ed.). *Criminal Investigations of Sexual Offenses*, Spinger, 99-113.

Deslauriers-Varin, N., Lussier, P., & St-Yves, M. (2011): Confessing their Crime: Factors

Influencing the Offender's Decision to Confess to the Police. *Justice Quarterly*, 28 (1), 113-145.

Eaton, L.G. (2004). Personality and emotional experience in daily life. In S.P. Shohov (Ed.), *Advances in psychology research* (30, 101–139). Hauppauge, NY: Nova.

Eber, N. (2013). Théorie des jeux. Paris : Dunod.

Ekman, I., Chanel, G., Järvelä, S., Kivikangas, J. M., Salminen, M., & Ravaja, N. (2012). Social interaction in games: Measuring physiological linkage and social presence. *Simulation & Gaming*, *43*(3), 321-338.

Everett, T. (2007). Excuses. *The Blackwell Encyclopedia of Sociology*.

Fabbrichesi, R. (2016). Peirce, Mead, and the theory of extended mind. Retrived from : https://air.unimi.it/handle/2434/458569

Faust, E., Bickart, W., Renaud, C., & Camp, S. (2015), Child Pornography Possessors and Child Contact Sex Offenders: A Multilevel Comparison of Demographic Characteristics and Rates of Recidivism. *Sexual Abuse: A Journal of Research and Treatment*, 27 (5) 460–478.

Fear, R.A. (1958). *The Evaluation Interview: Predicting Job Performance in Business and Industry*. New York: McGraw-Hill.

Feld, B. C. (2013). Real interrogation: What actually happens when cops question kids. *Law & Society Review*, *47* (1), 1-36.

Fisher, T. & Rosen-Zvi, I. (2008). The Confessional Penalty. *Cardozo Law Review*, 30, 871-916.

Fox, W. P. (2016). Applied Game Theory to Improve Strategic and Tactical Military Decisions. *Journal of Defense Management*, *6*, 147.

Gabbert, F., Hope, L., Luther, K., Wright, G., Ng, M., & Oxburgh, G. (2021). Exploring the use

of rapport in professional information-gathering contexts by systematically mapping the evidence base. *Applied Cognitive Psychology*, 35(2), 329-341.

Garfinkel, H. (1963). A conception of and experiments with "trust" as a condition of concerted stable actions. *The production of reality: Essays and readings on social interaction*, 381-392.

Garfinkel, H., & Sacks, H. (2005). *On formal structures of practical actions* (pp. 165-198). Routledge.

Gintis, H. (2014). *The Bounds of Reason: Game Theory and the Unification of the Behavioral Sciences*. New Jersey: Princeton University Press.

Goffman, E. (1966). Interaction ritual: Essays on face-to-face interaction.

Goffman, E. (1969). *Strategic interaction* (Vol. 1). University of Pennsylvania Press.

Goodman-Delahunty, J., & Martschuk, N. (2020). Securing reliable information in investigative interviews: Coercive and noncoercive strategies preceding turning points. *Police Practice and Research: An International Journal, 21*(2), 152–171.

Goodman-Delahunty, J., Martschuk, N., & Dhami, M. K. (2014). Interviewing high value detainees: Securing cooperation and disclosures. *Applied Cognitive Psychology*, 28 (6), 883–897.

Gordon, N. J. & Fleisher, W. L. (2011). Effective Interviewing and Interrogation Techniques. Burlington, MA: Elsevier.

Graham, I. W., Colins. L. M., Wugalter, S. E., Chung N, K. & Hansen, W.B. (1991). Modeling transitions in latent stage-sequential processes: a substance use prevention example. *Journal of Consulting and Clinical Psychology*, 59, 48-57.

Granhag, P. A. (2021). A playbook for best practice and future research on investigative

interviews. *Applied Cognitive Psychology*, 35 (2), 456-457.

Granhag, P. A., Clemens, F., & Strömwall, L. A. (2009). The usual and the unusual suspects: Level of suspicion and counter-interrogation tactics. *Journal of Investigative Psychology and Offender Profiling*, *6* (2), 129-137.

Granhag, P. A., Mac Giolla, E., Strömwall, L. A., & Rangmar, J. (2013). Counter-interrogation strategies among small cells of suspects. *Psychiatry, Psychology and Law*, *20*(5), 705-712.

Granhag, P. A., & Strömwall, L. A. (2002). Repeated interrogations: Verbal and non-verbal cues to deception. *Applied Cognitive Psychology*, 16, 243–257.

Granhag, P. A., Strömwall, L. A., Willén, R. M., & Hartwig, M. (2013). Eliciting cues to deception by tactical disclosure of evidence: The first test of the Evidence Framing Matrix. *Legal and Criminological Psychology*, *18*(2), 341-355.

Greenberg, D.F. (1979). *Mathematical Criminology*. New Jersey: Rutgers University Press.

Greenfeld, L. A. (1996). Child victimizers: Violent offenders and their victims. Publication du Bureau of Justice Statistics.

Gudjonsson, G.H. (2003). *The Psychology of Interrogations and Confessions*. John Wiley & Sons: England.

Gudjonsson, G. H., & Bownes, I. (1992). The reasons why suspects confess during custodial interrogation: Data for Northern Ireland. *Medicine, Science and the Law, 32*, 204–212.

Gudjonsson, G. H., & Petursson, H. (1991). Custodial interrogation: Why do suspects confess and how does it relate to their crime, attitude and personality? *Personality and Individual Differences*, 12(3), 295-306.

Gudjonsson, G. H., Rutter, S. & Clare, I.C.H. (1995). The Relationship Between Suggestibility

and Anxiety among Suspects detained at Police Stations. *Psychological Medicine*, 25, 875-878.

Gudjonsson, G. H., & Sigurdsson, J. F. (1999). The Gudjonsson Confession Questionnaire-Revised (GCQ-R): Factor structure and its relationship with personality. *Personality and Individual Differences*, *27*, 953–968.

Gudjonsson, G.H. & Sigurdsson, J.F. (2000). Differences and similarities between violent offenders and sex offenders. *Child Abuse and Neglect*, 24, 363-372.

Gudjonsson, G.H., Sigurdsson, J.F. & Einarsson, E. (2004). The role of personality in relation to confessions and denials. Psychology. *Crime & Law*, 10, 125-135.

Guerrien, B. (2002). *La théorie des jeux*. Paris : Economica.

Guerrien, B. (2010). *La théorie des jeux* (4e ed). Paris : Economica.

Guo, J. L., & Chen, C. (2014). A study of discursive interaction in Chinese police interrogation: Perspectives from Game Theory. *Net Journal of Social Sciences*, 2 (2), 60-70.

Haines, R., & Leonard, L. N. (2007). Individual characteristics and ethical decision-making in an IT context. *Industrial Management & Data Systems*.

Håkansson, C. (2019). Do Suspects Use the Counter-Interrogation Strategies They Say They Use?. [Master Thesis]. University Of Gothenburg.

Harrington, J.E. (2009). Games, Strategies, and Decision Making (2 ed.). UK: Worth Publishers.

Hartwig, M., Granhag, P. A., & Luke, T. (2014). Strategic use of evidence during investigative interviews: The state of the science. In D. C. Raskin,C. R. Honts, & J. C. Kircher (Eds.), *Strategic use of evidence during investigative interviews: The state of the science*. Philadelphia, PA: Elsevier.

Hartwig, M., Granhag, P. A., & Strömwall, L. A. (2007). Guilty and innocent suspects' strategies

during a police interrogation. *Psychology, Crime & Law*, 13, 213–227.

Haworth, K. (2006). The dynamics of power and resistance in police interview discourse. *Discourse & Society*, 17 (6), 739-759.

Haworth, K. (2013). Audience Design in the Police Interview: The Interactional and Judicial Consequences of Audience Orientation. *Language in Society,* 42(1):45–69.

Hewes, D. E. (1975). Statistical tests for Markov chains. *Markov Chain Tutorial, International Communication Association, Chicago*.

Heydon, G. (2005). *The language of police interviewing*. Hampshire: Palgrave Macmillan.

Hilgendorf, E. L., & Irving, B. (1981). A decision-making model of confessions. In Lloyd-Bostock, M.A. (Ed.). *Psychology in legal contexts: Applications and limitations* (pp. 67–84). London: MacMillan.

Hill, C. E., Corbett, M. M., Kanitz, B., Rios, P., Lightsey, R., & Gomez, M. (2001). Client behavior in counseling and therapy sessions: Development of a pantheoretical measure. Preceedings of Annual Meeting of the American Psychological Association.

Hines, A., Colwell, K., Hiscock-Anisman, C., Garrett, E., Ansarra, R., & Montalvo, L. (2010). Impression Management Strategies Of Deceivers And Honest Reporters In An Investigative Interview. *European Journal of Psychology Applied to Legal Context*, *2*(1).

Holdaway, S. & Rock, P. (1998). *Thinking about criminology*. London: University College London.

Holmberg, U., & Christianson, S. (2002). Murderers' and Sexual Offenders' Experiences of Police Interviews and Their Inclination to Admit or Deny Crimes. *Behavioral Sciences and the Law*, 20, 31–45.

Hoogesteyn, K., Meijer, E., & Vrij, A. (2019). The influence of room spaciousness on

investigative interviews. *Legal and Criminological Psychology*, *24*(2), 215-228.

Hoogesteyn, K., Meijer, E. H., & Vrij, A. (2020). Detainee and layperson's expectations and preferences regarding police interview rooms. *PLoS One, 15*(11), e0241683.

Hoogesteyn, K., Meijer, E. H., Vrij, A., & Merckelbach, H. (2018). Improving the disclosure of information in an investigative interview: Rapport building and the physical environment. *In-Mind Magazine, 4*(36).

Hope, L., Anakwah, N., Antfolk, J., Brubacher, S. P., Flowe, H., Gabbert, F., ... & Sumampouw, N. E. (2021). Urgent issues and prospects at the intersection of culture, memory, and witness interviews. *Legal and Criminological Psychology*, 27 (1), pp. 1-31.

Horgan, A. J., Russano, M. B., Meissner, C. A., & Evans, J. R. (2012). Minimization and maximization techniques: Assessing the perceived consequences of confessing and confession diagnosticity. *Psychology, Crime & Law*, 18 (1), 65-78.

Horowitz, M. W. (1956). The psychology of confession. *Journal of Criminal Law, Criminology and Police Science, 47*, 197–204.

Inbau, F. E., Reid, J. E., Buckley, J. P., & Jayne, B. C. (2001). *Criminal interrogation and confession* (4th Ed.). Gaithersburg, MA: Aspen.

Inbau, F., Reid, J., Buckley, J., & Jayne, B. (2013). *Criminal interrogation and confessions*. Jones & Bartlett Publishers.

Irving, B. & Hilgendorf, L. (1980). Police interrogation: the psychological approach. *Research Studies*, No1, HMSO: London.

Jabbarian, L. J., Maciejewski, R. C., Maciejewski, P. K., Rietjens, J. A., Korfage, I. J., van der

Heide, A., ... & Prigerson, H. G. (2019). The stability of treatment preferences among patients with advanced cancer. *Journal of pain and symptom management*, 57(6), 1071-1079.

Jayne, B. C. (1986). The psychological principles of criminal interrogation: An appendix. In Inbau, F.E., Reid, J.E., Buckley, J.P., & Jayne, B.C. (Ed.). (2001). *Criminal interrogation and confession* (3rd Ed.), (pp. 327–347). Baltimore, MD: Williams & Wilkins.

Jones, G.R. (2000). *Organizational Theory*, 3rd edition. Prentice Hall. P. 589.

Kask, K. (2008). *Trying to Improve Child and Young Adult Witnesses' Performance*. Unpublished thesis submitted for the degree of Doctor of Philosophy, University of Leicester.

Kassin, S. M. (2015). The social psychology of false confessions. *Social Issues and Policy Review*, 9 (1), 25-51.

Kassin, S. M., Drizin, S. A., Grisso, T., Gudjonsson, G. H., Leo, R. A., & Redlich, A. D. (2010). Police-induced confessions: Risk factors and recommendations. *Law and human behavior*, *34* (1), 3-38.

Kassin, S. M., & Fong, C.T. (1999). I'm innocent! Effects of training on judgments of truth and deception in the interrogation room. *Law and Human Behavior*, 23, 499-516.

Kassin, S. M., & Gudjonsson, G. H. (2004). The psychology of confessions: A review of the literature & issues. *Psychological Science in the Public Interest*, 5, 33–67.

Kassin, S. M., Leo, R. A., Meissner, C. A., Richman, K. D., Colwell, L. H., Leach, A. M., & La Fon, D. (2007). Police interviewing and interrogation: A self-report survey of police practices and beliefs. *Law and human behavior*, 31(4), 381-400.

Kassin, S. M. & McNall, K. (1991). Police interrogation and confession. L*aw and Human*

Behavior, 15 (3), 233-251.

Kassin, S. M, Meissner, C. A., & Norwick, R. J. (2005). I'd know a false confession if I saw one: A comparative study of college students and police investigators. *Law and Human Behavior*, 29, 211–227.

Kassin, S. M., & Neumann, K. (1997). On the Power of Confession Evidence: An Experimental Test of the Fundamental Difference Hypothesis. *Law and Human Behavior*, 21 (5), 469-484.

Kebbell, M., Alison, L., Hurren, E., & Mazerolle, P. (2010). How do sex offenders think the police should interview to elicit confessions from sex offenders? *Psychology, crime & law*, *16*(7), 567-584.

Kelley, H. H., Holmes, J. G., Kerr, N. L., Reis, H. T., Rusbult, C. E., & Van Lange, P. A. (2003). *An atlas of interpersonal situations*. Cambridge University Press.

Kelly, A. (2003). *Decision making using Game Theory*. Cambridge, UK: Cambridge University Press.

Kelly, D. G. (2008). *Evolutionary Game Theory and the Prisoner's Dilemma: a survey*. Technical Report UNC-STOR2008-08, Department of Statistics and Operations Research, University of North Carolina, Chapel Hill.

Kelly, C. E., Dawson, E., & Hartwig, M. (2021). Context manipulation in police interviews: a field experiment. *Journal of experimental criminology*, *17*(1), 67-86.

Kelly, C. E., Miller, J. C., & Redlich, A. D. (2016). The dynamic nature of interrogation. *Law and human behavior*, 40 (3), 295.

Kelly, C. E., Miller, J. C., Redlich, A. D., & Kleinman, S. M. (2013). A taxonomy of interrogation methods. *Psychology, public policy, and law*, *19*(2), 165.

Kelly, C. E., Russano, M. B., Miller, J. C., & Redlich, A. D. (2019). On the road (to admission): Engaging suspects with minimization. *Psychology, Public Policy, and Law*, *25*(3), 166.

Kelly, C. E., & Valencia, E. J. (2021). You ask and do not receive, because you ask wrongly. *International Journal of Police Science & Management*, *23*(1), 42-54.

King, L., & Snook, B. (2009). Peering inside a Canadian interrogation room: An examination of the Reid model of interrogation, influence tactics, and coercive strategies. *Criminal Justice and Behavior*, 36 (7), 674-694.

Klaver, J., Lee, Z., & Rose, V. G. (2008). Effects of personality, interrogation techniques, and plausibility in an experimental false confession paradigm. *Legal and Criminological Psychology*, 13, 71–88.

Kleinman, S. M. (2021). Milestones and signposts in the science of investigative interviewing. *Applied Cognitive Psychology*, 35 (2), 458-459.

Komter, M. (2003). The Interactional Dynamics of Eliciting a Confession in a Dutch Police Interrogation. *Research on Language and Social Interaction.* 36(4): 433–470.

Korkman, J., Santtila, P., Westeråker, M. and Sandnabba, N. K. (2008). Interviewing techniques and follow-up questions in child sexual abuse interviews. *European Journal of Developmental Psychology*, 5(1): 108–128.

Lanza, S. T., Collins, L. M., Lemmon, D. R., & Schafer, J. L. (2007). PROC LCA: A SAS procedure for latent class analysis. *Structural Equation Modelling*, 14, 671-694.

Leahy-Harland, S., & Bull, R. (2017). Police strategies and suspect responses in real-life serious crime interviews. *Journal of Police and Criminal Psychology*, 32(2), 138-151.

Leahy-Harland, S., & Bull, R. (2021) The impact of context on real-life serious crime interviews. *Police Practice and Research*, 22(1), 1009-1026.

Lee, H. & Liebenau, J. (1999). Time in Organizational Studies: Towards a New Research Direction. *Organization Studies*, 20 (6), 1035-1058.

Leik, R. K. & Meeker, B. F. (1975). *Mathematical Sociology*. Englewood Cliffs, N.J.: Prentice-Hall.

Leo, R.A. (1992). From coercion to deception: the changing nature of the police interrogation in America. Crime, *Law and Social Change*, 18, 35-59.

Leo, R. A. (1996a). Inside the interrogation room. *Journal of Criminal Law & Criminology, 86*, 266–303.

Leo, R. A. (1996b). "Miranda's Revenge: Police Interrogation as a Confidence Game." *Law and Society Review* 30(2):259–288.

Leo, R. (2009). Police Interrogation and American Justice. Cambridge, MA: Harvard University Press. Kindle Edition.

Leo, R. A., & Drizin, S. A. (2010). The three errors: Pathways to false confession and wrongful conviction. In G. D. Lassiter & C. A. Meissner (Eds.), *Police interrogations and false confessions: Current research, practice, and policy recommendations* (pp. 9–30). American Psychological Association.

Lewis, M. A. (2008). Time-Series Analysis. In Rudas, T. (Eds.), *Handbook of Probability: Theory and Applications*. California: SAGE Publications.

Li, H., & Barry, J. (2012). Interpreting interactions in logistic regression. *Cornell Statistical Consulting Unit Report*. Retrieved at https://cscu.cornell.edu/wp-content/uploads/84_lgsint.pdf

Lippert, T., Cross, T. P., Jones, L. & Walsh, W. (2010). Suspect Confession of Child Sexual Abuse to Investigators. *Child Maltreatment*, 15 (2), 161-170.

Lowe, M. L., & Haws, K. L. (2019). Confession and self-control: A prelude to repentance or relapse?. *Journal of Personality and Social Psychology*, 116 (4), 563.

Luke, T. J., & Alceste, F. (2020). The mechanisms of minimization: How interrogation tactics suggest lenient sentencing through pragmatic implication. *Law and Human Behavior*, 44 (4), 266.

Luke, T. J., Dawson, E., Hartwig, M., & Granhag, P. A. (2014). How awareness of possible evidence induces forthcoming counter-interrogation strategies. *Applied Cognitive Psychology*, *28*(6), 876-882.

Luke, T. J., & Granhag, P. A. (2020). The Shift-of-Strategy (SoS) approach: Using evidence strategically to influence suspects' counter-interrogation strategies. *Psychology, Crime & Law*, 1-26.

Luke, T. J., Hartwig, M., Shamash, B., & Granhag, P. A. (2016). Countermeasures against the à strategic use of evidence technique: Effects on suspects' strategies. *Journal of Investigative Psychology and Offender Profiling*, *13*(2), 131-147.

Madon, S.,Yang, Y., Smalarz, L., Guyll, M., & Scherr, K. C. (2013). How Factors Present During the Immediate Interrogation Situation Produce Short-Sighted Confession Decisions. *Law and Human Behavior*, 37 (1), 60–74.

Magaletta, P. R., Faust, W. Bickart, W., & McLearen, A. M. (2014). Exploring Clinical and Personality Characteristics of Adult Male Internet-Only Child Pornography Offenders. *International Journal of Offender Therapy and Comparative Criminology*, 58 (2), 137–153.

Maitra, P., & Neelim, A. (2017). Behavioral Characteristics, Stability of Preferences and

Entrepreneurial Success. Retrieved from: https://www.monash.edu/__data/assets/pdf_file/0004/2375518/Behavioral-Characteristics-Stability-of-Preferences-and-Entrepreneurial-Success.pdf

Maletzky, B. M. (1991). The use of medroxyprogesterone acetate to assist in the treatment of sexual offenders. *Annals of Sex Research*, *4*(2), 117-129.

Manderscheid, R. W., Rae, D. S., McCarrick, A. K., & Silbergeld, S. (1982). A stochastic model of relational control in dyadic interaction. *American Sociological Review*, 62-75.

Marshall, W. L. (1994). Treatment effects on denial and minimization in incarcerated sex offenders. *Behaviour Research and Therapy*.

Masip, J., Martínez, C., Blandón-Gitlin, I., Sánchez, N., Herrero, C., & Ibabe, I. (2018). Learning to detect deception from evasive answers and inconsistencies across repeated interviews: A study with lay respondents and police officers. *Frontiers in psychology*, *8*, 2207.

Mastrofski, S.D., Reisig, M.D., & McCluskey, J. (2002). Police disrespect toward the public: An encounter-based analysis. *Criminology*, 39, 519-552.

Mathieu, J.E., & Schulze, W. (2006). The influence of team knowledge and informal plans on episodic team process-performance relationships. Academy of Management Journal, 49, 605–619.

May, L., Granhag, P. A., & Tekin, S. (2017). Interviewing suspects in denial: On how different evidence disclosure modes affect the elicitation of new critical information. Frontiers in psychology, 8, 1154.

Mazur, A., & Cataldo, M. (1989). Dominance and deference in conversation. *Journal of Social and Biological Structures*, 12(1), 87-99.

McConville, M. (1993). *Corroboration and confessions. The impact of a rule requiring that*

no conviction can be sustained on the basis of confession evidence alone. The Royal Commission on Criminal Justice Research Study Nº 36. HMSO: London.

McDougall, A. J., & Bull, R. (2015). Detecting truth in suspect interviews: The effect of use of evidence (early and gradual) and time delay on Criteria-Based Content Analysis, Reality Monitoring and inconsistency within suspect statements. *Psychology, Crime & Law*, *21*(6), 514-530.

Meissner, C. A. & Kassin, S.M. (2002). "He's guilty!": Investigator Bias in Judgments of Truth and Deception. *Law and Human Behavior*, 26, 469-480.

Meissner, C. A., Redlich, A. D., Michael, S. W., Evans, J. R., Camilletti, C. R., Bhatt, S., & Brandon, S. (2014). Accusatorial and information-gathering interrogation methods and their effects on true and false confessions: A meta-analytic review. *Journal of Experimental Criminology*,10, 459–486.

Meissner, C. A., Surmon-Böhr, F., Oleszkiewicz, S., & Alison, L. J. (2017). Developing an evidence-based perspective on interrogation: A review of the US government's high-value detainee interrogation group research program. *Psychology, Public Policy, and Law*, 23(4), 438.

Mildren, J. D. (1997) Redressing the imbalance against Aboriginals in the criminal justice system. *Criminal Law Journal,* 21: 7–22.

Milne, R., & Bull, R. (2003). Interviewing by the police. *Handbook of psychology in legal contexts*, 111.

Milne, R., & Bull, R. (2006). Interviewing victims of crime, including children and people with intellectual disabilities. *Practical psychology for forensic investigations and prosecutions*, 7-24.

Mindthoff, A., Hagsand, A. V., Schreiber Compo, N., & Evans, J. R. (2019). Does alcohol loosen the tongue? Intoxicated individuals' willingness to report transgressions or criminal behavior carried out by themselves or others. *Applied cognitive psychology*, 33(3), 414-425.

Mishler, E. G. (1975). Studies in dialogue and discourse: II. Types of discourse initiated by and sustained through questioning. *Journal of Psycholinguistic Research*, 4, 99-121.

Mitchell, B. (1983). Confessions and police interrogation of suspects. *Criminal Law Review*, September, 596-604.

Morrow, J. D. (1997). A Rational Choice Approach to International Conflict. In Geva, N. & Mintz, A (Eds.) *Decision making on war and peace: The cognitive-rational debate* (pp. 11-32). Unites States: Lynne Rienner Publishers.

Moston, S., & Engelberg, T. (2011). The effects of evidence on the outcome of interviews with criminal suspects. Police Practice and Research, 12(6), 518-526.

Moston, S., & Stephenson, G. M. (2009). A typology of denial strategies by suspects in criminal investigations. R. Bull, T. Valentine & T. Williamson (Eds.). Handbook of psychology of investigative interviewing. *Current developments and future directions*, 17-34.

Moston, S. J., Stephenson, G. M., & Williamson, T. M. (1992). The effects of case characteristics on suspect behavior during police questioning. *British Journal of Criminology, 32*, 23–40.

Moston, S., Stephenson, G. M. and Williamson, T. (1993) The incidence, antecedents, and consequences of the use of the right to silence during police questioning. Criminal Behaviour and Mental Health 3: 30–47.

Mueller, D. H., Schreiber Compo, N., Molina, J., Bryon, A., & Pimentel, P. S. (2015).

Productive and Counterproductive Interviewing Techniques: Do Law Enforcement Investigators Know the Difference? *Psychology, Public Policy, and Law*, 21 (3), 295–308.

Myklebust, T. and Bjørklund, R. A. (2006). The effect of long-term training on police officers' use of open and closed questions in field investigative interviews of children (FIIC) International *Journal of Investigative Psychology and Offender Profiling,* 3: 165–181.

Narchet, F. M., Meissner, C. A., & Russano, M. B. (2011). Modeling the Influence of Investigator Bias on the Elicitation of True and False Confessions. *Law and Human Behavior*, 35, 452–465.

Normile, C. J., & Scherr, K. C. (2018). Police tactics and guilt status uniquely influence suspects' physiologic reactivity and resistance to confess. *Law and Human Behavior*, 42(6), 497.

Oleszkiewicz, S., Granhag, P. A., & Kleinman, S. M. (2017a. Gathering human intelligence via repeated interviewing: Further empirical tests of the Scharff technique. Psychology, Crime & Law, 23(7), 666-681.

Oleszkiewicz, S., Granhag, P. A., & Kleinman, S. M. (2017b). Eliciting information from human sources: Training handlers in the Scharff technique. Legal and Criminological Psychology, 22(2), 400-419.

Ostrom, E. (2003). Toward a behavioral theory linking trust, reciprocity and reputation. In Ostrom, E., Walker, J., (Ed). *Trust and Reciprocity: Interdisciplinary Lessons From Experimental Research*. New York, NY: Russell Sage Foundation; 2003, 9–79.

Oxburgh, G. E., Ost, J., & Cherryman, J. (2010). Police interviews with suspected child sex offenders: Does use of empathy and question type influence the amount of investigation relevant information obtained? *Psychology, Crime and Law*. August.

Oxburgh, G. E., Myklebust, T., & Grant, T. (2010). The question of question types in police interviews: a review of the literature from a psychological and linguistic perspective. *International Journal of Speech, Language & the Law*, *17*(1).

Oxburgh, G., & Ost, J. (2011). The use and efficacy of empathy in police interviews with suspects of sexual offences. *Journal of Investigative Psychology and Offender Profiling*, 8(2), 178-188.

Pearse, J., & Gudjonsson, G. (1999). Measuring influential police interviewing tactics: a factor analytical approach. *Legal and Criminology Psychology,* 4, 221–238.

Pearse, J., Gudjonsson, G. H., Clare, I. C. H., & Rutter, S. (1998). Police interviewing and psychological vulnerabilities: Predicting the likelihood of a confession. *Journal of Community & Applied Social Psychology, 8*, 1–21.

Peters, H. (2008). *Game Theory: A Multi-Leveled Approach*. Berlin: Spinger.

Phillips, C., & Brown, D. (1998). *Entry into the criminal justice system: A survey of police arrests and their outcomes.* London: Home Office.

Pickup, M. (2015*). Introduction to Time Series Analysis*. California: SAGE Publications.

Ployhart, R. E., Holtz, B. C. & Bliese, P. D. (2002). Longitudinal data analysis applications of random coefficient modeling to leadership research. *Leadership Quarterly*, 13 (4): 455–486.

Poole, D. A. & Lamb, M. E. (1998*). Investigative Interviews of Children: a guide for helping professionals*. Washington, DC: American Psychological Association.

Powell, M. B. and Snow, P. C. (2007) Guide to questioning children during the free narrative phase of an investigative interview. *Australian Psychologist,* 42(1): 57–65.

Rasmusen, E. (1989). *Games and Information: An introduction to Game Theory*. New York:

Blackwell.

Ray, J. V., Kimonis, E. R., et Seto, M. C. (2014). Correlates and Moderators of Child Pornography Consumption in a Community Sample. Sexual Abuse: A Journal of Research and Treatment, 26 (6), 523–545.

Reik, T. (1973). *Le besoin d'avouer: psychanalyse du crime & du châtiment*. Paris: Payot.

Reisig, M.D., McCluskey, J.D., Mastrofski, S.D., & Terrill, W. (2004) Suspect disrespect toward the Police. *Justice Quarterly*, 21:2, 241-268.

Reiss, A.J., Jr. (1971). *The police and the public*. New Haven, CT: Yale University Press.

Rex, L.A. & Schiller, L. (2009). *Using Discourse Analysis to Improve Classroom Interaction*. New York: Routledge.

Richardson, B. H., Taylor, P. J., Snook B., Conchie, S. M., & Bennell, C. (2014). Language Style Matching and Police Interrogation Outcomes. *Law and Human Behavior*, 38 (4), 357–366.

Roe, R. A. (2008). Time in applied psychology: studying what happens rather than what is. *The European Psychologist*, 13 (1), 37–52.

Ryoo, J. H., Wang, C., Swearer, S. M., Hull, M., & Shi, D. (2018). Longitudinal model building using latent transition analysis: an example using school bullying data. *Frontiers in psychology*, 9, 675.

Sacks, H. (1972). Notes on police assessment of moral character. *Studies in social interaction*, 280-293.

Sandham, A., Dando, C., Bull, R., & Ormerod. T. (2022). Improving professional observers' veracity judgements by tactical interviewing. Journal of Police and Criminal Psychology, 37(2), 279–287.

Saxe, L. (1991). Lying: Thoughts of an applied social psychologist. *American Psychologist*,

46(4), 409.

Schiemann, J. W. (2016). *Does torture work?*. Oxford University Press, USA.

Schildberg-Hörisch, H. (2018). Are risk preferences stable?. *Journal of Economic Perspectives*, 32(2), 135-54.

Schmidt, C. (2001). La théorie des jeux : Essai d'interprétation. Presse Universitaire de France.

Schwarz, G. (1978). Estimating the dimension of a model. *The annals of statistics*, 461-464.

Seigfried-Spellar, K. C. (2014). Distinguishing the viewers, downloaders, and exchangers of Internet child pornography by individual differences: Preliminary findings. Digital Investigation, 11, 252-260.

Semin, G. R., & Manstead, A. S. R. (1981). The beholder beheld: A study of social emotionality. *European Journal of Social Psychology*, 11(3), 253-265.

Sigurdsson, J. F., & Gudjonsson, G. H. (1994). Alcohol and drug intoxication during police interrogation and the reasons why suspects confess to the police. *Addiction,89*, 985–997.

Sigurdsson, J. F., & Gudjonsson, G. H. (2001). False confessions: The relative importance of psychological, criminological and substance abuse variables. *Psychology, Crime & Law*, 7, 275–289.

Simon, D. (1991). *Homicide: A Year on the Killing Streets*. New York: Owl Books. Kindle Edition.

Sivasubramaniam, D., & Heuer, L. (2012). Procedural justice evaluations in interrogations. In Cutler, B. L. (Ed.), Conviction of the innocent: Lessons from psychological research (pp. 79–102). American Psychological Association.

Shepherd, E. (2007). *Investigative interviewing: The Conversation Management approach*. Oxford, UK: Oxford University Press.

Shepherd, E., & Griffiths, A. (2021). Investigative interviewing: The conversation management approach. Oxford University Press.

Shuy, R. W. (1998). The Language of Confession, Interrogation, and Deception. Thousand Oaks, CA: Sage Publishers.

Smid, W., Schepers, K., Kamphuis, J. H., van Linden, S., & Bartling, S. (2015). Prioritizing Child Pornography Notifications: Predicting Direct Victimization. *Sexual Abuse*, 27 (4), 398 – 413.

Snook, B., Barron, T., Fallon, L., Kassin, S. M., Kleinman, S., Leo, R. A., ... & Trainum, J. L. (2021). Urgent issues and prospects in reforming interrogation practices in the United States and Canada. *Legal and criminological psychology*, 26(1), 1-24.

Snook, B., Brooks, D., & Bull, R. (2015). A lesson on interrogations from detainees: predicting self-reported confessions and cooperation. *Criminal Justice and Behavior*, 42(12), 1243-1260.

Snook, B., Eastwood, J., Stinson, M., Tedeschini, J. & House, J.C. (2010). Reforming Investigative Interviewing in Canada. *Canadian Journal of Criminology and Criminal Justice*, 52 (2), 215-229.

Sorochinski, M., Hartwig, M., Osborne, J., Wilkins, E., Marsh, J., Kazakov, D., & Granhag, P. A. (2014). Interviewing to detect deception: When to disclose the evidence?. *Journal of Police and Criminal Psychology*, 29 (2), 87-94.

Soukara, S., Bull, R., Vrij, A., Turner, M., & Cherryman, J. (2009). What really happens in police interviews of suspects? Tactics and confessions. *Psychology, Crime & Law*, *15*(6), 493-506.

Stephenson, G. M., & Moston, S. J. (1994). Police Interrogation. *Psychology, Crime & Law*, 1,

151-157.

Sternberg, K. J., Lamb M. E., Esplin, P. W., & Baradaran, L. P. (1999). Using a Scripted Protocol in Investigative Interviews: A Pilot Study. Applied Developmental Science, 3 (2), 70-76.

Stokoe, E. & Derek E. 2007. 'Black This, Black That': Racial Insults and Reported Speech in Neighbour Complaints and Police Interrogations. *Discourse and Society* 18:337–372.

Stokoe, E & Derek E. 2008. Did You Have Permission to Smash Your Neighbour's Door? Silly Questions and Their Answers in Police-Suspect Interrogations. *Discourse Studies,* 10(1):89–111.

Stolzenberg, R. M. (2003). Book Review: Time Matters: On Theory and Method. By Andrew Abbott. Chicago: University of Chicago Press, 2001.

Strömwall, L. A., Hartwig, M., & Granhag, P. A. (2006). To act truthfully: Nonverbal behavior and strategies during a police interrogation. *Psychology, Crime & Law*, 12(2), 207–219.

St-Yves, M. (2002). Interrogatoire de police & crime sexuel: Profil du suspect collaborateur. *Revue Internationales de Criminologie & de Police Technique & Scientifique*, 1, 81-96.

St-Yves, M. (2004). Les facteurs associés à la confession: la recherche empirique. In St-Yves, M. & Landry, J. (Eds.). *Psychologie des entrevues d'enquête, de la recherche à la pratique* (pp. 53-71). Cowansville, QC: Yvon Blais.

St-Yves, M. (2014). Rapport in investigative interviews: Five fundamental rules to achieve it. In St-Yves, M. (Ed.). *Investigative interviewing: The essential handbook of best practices* (pp. 1-27). Canada: Carswell.

St-Yves, M., & Kebbell, M. (2018). Investigative interviewing in suspected sexual homicides. In Routledge international handbook of sexual homicide studies (pp. 562-573). Routledge.

St-Yves, M., & Landry, J. (2004). La pratique de l'interrogatoire de police. Dans St-Yves, M. &

Landry, J. (Ed.), *Psychologie des entrevues d'enquête, la recherche à la pratique*, (pp.7–30). Cowansville, QC: Yvon Blais).

St-Yves, M., & Meissner, C. A. (2014). Interviewing Suspects. In St-Yves, M. (Ed.). *Investigative interviewing: The essential handbook of best practices* (pp. 145-190). Canada: Carswell.

Sykes, R. E., & Clark, J. P. (1975). A theory of deference exchange in police-civilian encounters. *American journal of sociology*, 81(3), 584-600.

Tarrant, C., Dixon-Woods, M., Colman, A. M., & Stokes, T. (2010). Continuity and trust in primary care: a qualitative study informed by Game Theory. *The Annals of Family Medicine*, 8(5), 440-446.

Tekin S., Granhag, P. A., Strömwall L., Giolla E. M., Vrij A., & Hartwig M. (2015). Interviewing Strategically to Elicit Admissions from Guilty Suspects. *Law and Human Behavior*, 39 (3), 244-252.

Tekin, S., Granhag, P. A., Strömwall, L. A. & Vrijd, A. (2016). How to make perpetrators in denial disclose more information about their crimes. *Psychology, crime & law*, 22 (6), 561-580.

Vallano, J. P., & Schreiber Compo, N. (2015). Rapport-building with cooperative witnesses and criminal suspects: A theoretical and empirical review. *Psychology, Public Policy, & Law*, 21,85–99.

Van Lange, P.A., De Bruin, E. Otten, W., Joireman, J.A. (1997). Development of prosocial, individualistic, and competitive orientations: Theory and preliminary evidence. *Journal of Personality and Social Psychology*, 73 (4), 733-746.

Van Lange, P.A., Kuhlman, D.M. (1994). Social value orientations and impressions of partner's

honesty and intelligence: A test of the might versus morality effect. *Journal of Personality and Social Psychology*, 67 (1), 126.

van Montfort, K., Oud, J.H.L., Voelkle, M. C. (2018). Continuous Time Modeling in the Behavioral and Related Sciences. Springer International Publishing.

Verhoeven, W. J. (2018). The complex relationship between interrogation techniques, suspects changing their statement and legal assistance. Evidence from a Dutch sample of police interviews. *Policing and Society*, 28 (3), 308-327.

Verhoeven, W.J., Stevens, L., van de Bunt, H.G., Captein, W.J.M., & Westmeijer, E.R. (2013). *Legal aid during police interrogation*. La Haye: Boom Lemma uitgevers.

Vermunt, J.K., & Magidson, J. (2002). Latent class cluster analysis. In J. A. Hagenaars and A. L. McCutcheon (Ed.), *Applied Latent Class Analysis*, (pp. 89-106). Cambridge : Cambridge University Press.

Viljoen, J. L., Klaver, J., & Roesch, R. (2005). Legal Decisions of Preadolescent and Adolescent Defendants: Predictors of Confessions, Pleas, Communication with Attorneys, and Appeals. *Law and Human Behavior,* 29 (3), 253-277.

Vredeveldt, A., van Koppen, P. J., & Granhag, P. A. (2014). The inconsistent suspect: A systematic review of different types of consistency in truth tellers and liars. *Investigative interviewing*, 183-207.

Vrij, A. (2005). Criteria-Based Content Analysis: A Qualitative Review of the First 37 Studies. *Psychology, Public Policy, and Law*, *11*(1), 3.

Vrij, A., & Granhag, P. A. (2012). Eliciting cues to deception and truth: What matters are the questions asked. *Journal of Applied Research in Memory and Cognitio*n, 1(2), 110-117.

Wachi, T., Watanabe, K., Yokota, K., Otsuka, Y., Kuraishi, H., & Lamb, M. (2014). Police interviewing styles and confessions in Japan. *Psychology, Crime & Law*, 20 (7), 673-694.

Wachi, T., Watanabe, K., Yokota, K., Otsuka, Y., & Lamb, M. E. (2016). Japanese suspect interviews, confessions, and related factors. Journal of Police and Criminal Psychology, 31(3), 217–227.

Walsh, D., & Bull, R. (2010). What really is effective in interviews with suspects? A study comparing interviewing skills against interviewing outcomes. Legal and criminological psychology, 15(2), 305-321.

Walsh, D., & Bull, R. (2012). How Do Interviewers Attempt to Overcome Suspects' Denials? *Psychiatry, Psychology and Law*, 19 (2), 151-168.

Walsh, D., & Bull, R. (2015). Interviewing suspects: examining the association between skills, questioning, evidence disclosure, and interview outcomes. *Psychology, Crime & Law*, 21 (7), 661-680.

Walsh, D., & Milne, R. (2008). Keeping the PEACE? A study of investigative interviewing practices in the public sector. *Legal and Criminological Psychology*,13,39–57.

Walsh, D., & Oxburgh, G. E. (2008). Investigative interviewing of suspects: Historical and contemporary developments in research. *Forensic Update*, *9* (2).

Watson, S. J., Luther, K., Jackson, J., Taylor, P. J., & Alison, L. (2018). Controlling the interview: The influencing of techniques of suspects of control and coercion. In International Investigative Interviewing Research Group 11th Annual Conference. Newcastle University.

Watson, J. C., & McMullen, E. J. (2005). An Examination of Therapist and Client Behavior in

High-and Low-Alliance Sessions in Cognitive-Behavioral Therapy and Process Experiential Therapy. Psychotherapy: Theory, Research, Practice, Training, 42(3), 297–310.

Ware, J., & Marshall, W. L. (2008). Treatment engagement with a sexual offender who denies committing the offense. *Clinical Case Studies*, 7(6), 592-603.

West, I., Bull R., & Koehnken, G. (1994). *Advanced interview development course trainers' manual*. Merseyside Police Interview development Unit.

Westera, N. J., & Kebbell, M. R. (2014). Investigative interviewing in suspected sex offences. In *Investigative interviewing* (pp. 1-18). Springer, New York, NY.

Westwood, S., Wood, J., & Kemshall, H. (2011). Good practice in eliciting disclosures from sex offenders. *Journal of Sexual Aggression*, *17*(2), 215-227.

Williamson, T. M. (1993). From interrogation to investigative interviewing; strategic trends in police questioning. *Journal of Community & Applied Social Psychology*, *3*(2), 89-99.

Wittgenstein, L. (1976). Cause and effect: Intuitive awareness. *Philosophia*, 6 (3), 409-425.

Wrightsman, L. S., & Kassin, S. (1993). *Confessions in the courtroom*. Sage.

Yang, Y., Guyll, M., & Madon, S. (2017). The interrogation decision-making model: A general theoretical framework for confessions. *Law and Human Behavior*, *41*(1), 80.

Yang, Y., Madon, S., & Guyll, M. (2015). Short-Sighted Confession Decisions: The Role of Uncertain and Delayed Consequences. *Law and Human Behavior*, 39 (1), 44–52.

Zeng, F., Huang, C. Y., & Bull, R. (2021). Police interview of suspects in China: Developments and analyses. *International Journal of Police Science & Management*, 23(1), 29-41.

Appendix

Appendix A – Behaviors by category

Table VII - Interviewer behaviors by category

Category	Behavior	Frequency (%)
Collaboration	Appeal to sense of cooperation	243 (11.7)
	Offer intangible rewards (e.g., encouragement, respect)	80 (3.9)
	Present scenario to allow suspect to regain or assert control	350 (16.9)
	Offer moral rationalizations	1007 (48.5)
	Appeal to self-interest	397 (19.1)
		Total : 2077 (100)
Confrontation	Give an opinion / interpretation of what happened	584 (14.4)
	Demand suspect tell the truth	138 (3.4)
	Ask suspect to focus	315 (7.7)
	Question suspect's non-verbal demeanor	41 (1)
	Emphasize interviewer's expertise and authority over the suspect	159 (3.9)
	Interviewer does not speak but stare at the suspect(Silence intentionally used)	196 (4.8)
	Object to denials by the suspect (futility of denying)	391 (9.6)
	Confront suspect without being insulting	753 (18.5)
	Adopt a non-friendly stance (interrupt suspect while talking)	147 (3.6)
	Adopt a non-friendly stance (suggest responsible for other crimes)	538 (13.2)
	Physically incommoding	41 (1.1)
	Use questions that force a choice	72 (1.8)
	Makes an analogy of guilt or confession	313 (7.7)
	Challenge values held by the suspect (disagree)	166 (4.1)
	Express impatience, frustration, or anger	26 (0.6)
	Ask unexpected/alternative questions	134 (3.3)
	Adopt a non-friendly stance (Suggestive questions)	36 (0.9)

	Express impatience, frustration, or anger (Speak harshly to the suspect)	18 (0.4)
		Total : 4068 (100)
Emotion Provocation	Identify and exaggerate fears (witnesses and family will also be interviewed)	150 (12.5)
	Identify and exaggerate fears (Maximize moral gravity of the crime)	267 (22.3)
	Appeal to conscience	100 (8.4)
	Identify and exaggerate fears (Accomplice/s will also be questioned)	9 (0.8)
	Insult suspect (Judgments about subject's life or choices)	118 (9.9)
	Identify and exaggerate fears (consequences of the arrest)	154 (12.9)
	Appeal to negative feelings about individuals	70 (5.9)
	Capitalize on consequences (Trauma for victim and family)	30 (2.5)
	Identify and exaggerate fears (Guilt / stress / discomfort)	299 (25)
		Total : 1197 (100)
Information related to the case	Confront suspect with the fact that there is evidence	147 (7.4)
	Show the suspect photos or statements from witnesses or others (Presenation of proof)	328 (16.6)
	Confront suspect with evidence of involvement (Show specific evidence)	1503 (76)
		Total : 1978 (100)
Rapport and Relationship Building	Identify and meet basic needs (Further the well-being of the suspect)	1261 (37.2)
	Demonstrate similarities with the suspect (disclose personal information)	393 (11.6)
	Identify things held in common (common grounds)	822 (24.3)
	Build emotional bond	34 (1)
	Flatter suspect (Compliments, praise, flattery)	603 (17.8)
	Touch the suspect in a friendly manner (empathy)	41 (1.2)
	Allow suspect to play role of teacher	238 (7)
		Total : 3392 (100)
		Total = 12 712

Table VIII - Suspect behaviors by category

Category	Behavior	Frequency (%)
Collaboration	Show enjoyment / laugh / smile	1992 (91)
	Show social desirability	82 (3.7)
	Express remorse	81 (3.7)
	Suggest that arrest is a relief	10 (0.5)
	Criticize or insult self	18 (0.8)
	Maximize gravity of the crime	7 (0.3)
		Total : 2190 (100)
Confrontation	Adopt a non-friendly stance (make a request)	598 (31)
	Challenge the values held by interviewer (active disagreement)	21 (1)
	Adopt a non-friendly stance (Interrupts interviewer when talking)	323 (16.8)
	Express impatience, frustration, or anger	101 (5.2)
	Adopt a non-friendly stance (Display mistrust)	556 (28.8)
	Express impatience, frustration or anger (Talk back to the interviewer)	23 (1.2)
	Adopt a non-friendly stance (Arrogant or sarcastic)	110 (5.7)
	Challenge the values held by interviewer (Express surprise)	41 (2.1)
	Adopt a non-friendly stance (Appear hesitant to speak)	55 (2.9)
	Adopt a non-friendly stance (Attempt to control interview)	83 (4.3)
	Confront without insulting (Attempt to convince the interviewer)	17 (0.9)
		Total : 1928 (100)
Emotion Response	Offer moral rationalizations or justifications	4242 (80.7)
	Cry	274 (5.2)
	Offer moral rationalizations or justifications (Suggest virtual world differs from real world)	78 (1.5)

	Self-encouragements	18 (0.3)
	Concern consequences	605 (11.5)
	Avoid taking responsibility (blame someone else)	38 (0.7)
		Total : 5255 (100)
Information related to the case	Provide IRI	260 (26.2)
	Admit to committing crime or element in crime	697 (70.1)
	Provide IRI (without being questioned)	37 (3.7)
		Total : 994 (100)
Silence and active denial	Deny accusations	197 (16.1)
	Say that lawyer asked suspect to remain silent	184 (15)
	Remain silent	733 (59.9)
	Claim that he no longer remember	110 (9)
		Total : 1224 (100)
		Total = 11591

Appendix B – Supplemental logistic regression

Table IX- Summary of logistic regression analysis for variables predicting disclosure with and without time interaction effect

Variable	Model 1: Direct effect OR (95% CI)	Model 2: With interaction effect OR (95% CI)
Interviewer		
Confrontation	0.9212655 (0.8941696-0.9491825)***	0.8899811 (0.8552339-0.9261401)***
Emotion provocation	0.9020151 (0.8551645-0.9514325)***	0.9527364 (0.8871811-1.023136)
Information related to the case	0.9492833 (0.9175375-0.9821275)**	0.8313961 (0.7933451-0.871272)***
Rapport and relationship building	1.039698 (1.010746-1.069479)**	1.016685 (0.9802206-1.054505)
Suspect		
Collaboration	1.027391 (0.9972172-1.058479)*	0.9682955 (0.9317663-1.006257)
Confrontation	0.9701574 (0.9355142-1.006083)	0.9367424 (0.89318-0.9824294)**
Emotional response	0.997191 (0.9701924-1.024941)	0.885793 (0.8540369-0.9187299)***
Information related to the case (IRI)	0.9726597 (0.9379695-1.008633)	0.8565882 (0.8147707-0.9005519)***
Silence and active denial	0.9841578 (0.9448907-1.025057)	0.9634873 (0.9141763-1.015458)
Differential time	0.9090183 (0.9016562-0.9164407)***	1.032273 (1.002081-1.063374)*
Differential time^2		0.9120522 (0.8914727-0.9331069)***
Interaction effect with time differential		
Interviewer		
Confrontation		0.9841135 (0.9464681-1.023256)
Emotion provocation		1.153188 (1.075539-1.236442)***
Information related to the case		0.829788 (0.80925-0.8508473)***
Rapport and relationship building		0.9474842 (0.9279453-0.9674346)**
Suspect		
Collaboration		0.9115061 (0.8921946-0.9312356)***
Confrontation		0.9950881 (0.9691997-1.021668)
Emotional response		0.7995526 (0.7838579-0.8155615)***
Information related to the case (IRI)		0.7478731 (0.7280845-0.7681995)***
Silence and active denial		1.030952 (1.000726-1.062091)
Interaction effect with time differential^2		

Interviewer	
Confrontation	1.051642 (1.034412-1.069159)***
Emotion provocation	0.9650783 (0.9343315-0.996837)
Information related to the case	1.125225 (1.103107-1.147786)***
Rapport and relationship building	1.010674 (0.9951035-1.026487)
Suspect	
Collaboration	1.055363 (1.038437-1.072565)***
Confrontation	1.037888 (1.017398-1.058791)*
Emotional response	1.099532 (1.082714-1.116612)***
Information related to the case (IRI)	1.078734 (1.054934-1.103071)***
Silence and active denial	1.018524 (0.996085-1.04147)

$p<0.001$ = ***; $p<0.01$ = **; $p<0.05$ = *