

# The Making of an Expert Detective

Thinking and Deciding in Criminal Investigations

Ivar A. Fahsing



POLICE LINE DO NOT CROSS



Department of Psychology

UNIVERSITY OF  
GOTHENBURG

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There is nothing more deceptive than an obvious fact. – Sherlock Holmes

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# DOCTORAL DISSERTATION

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## Abstract

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Drawing on theoretical frameworks developed in social and cognitive psychology, this thesis examines the degree to which individual and systemic factors may compensate for inherent biases in criminal detectives' judgments and decision-making. Study I – an interview study – explored criminal detectives' views of critical factors related to decision making in homicide investigations. Experienced homicide investigators in Norway ( $n = 15$ ) and the UK ( $n = 20$ ) were asked to identify decisional 'tipping point'– decisions that could change detectives' mind-set from suspect identification to suspect verification together with situational and individual factors relating to these decisions. In a content analysis, two types of decision were identified as typical and potentially critical tipping-points: (1) decisions to point-out, arrest, or charge a suspect, and (2) decisions concerning main strategies and lines of inquiry in the case. Moreover, 10 individual factors (e.g. experience) and 14 situational factors (e.g. who is the victim) were reported as related to the likelihood of mind-set shifts, most of which correspond well with previous decision-making research. Study II, using a quasi-experimental design, compared the quality of investigative decisions made by experienced detectives and novice police officers in two countries with markedly different models for the development of investigative expertise (England and Norway). In England, accredited homicide detectives vastly outperformed novice police officers in the number of adequate investigative hypotheses and actions reported. In Norway, however, bachelor educated police novices did marginally better than highly experienced homicide detectives. Adopting a similar design and the same stimulus material, Study III asked if a general test of cognitive abilities used in the selection process at the Norwegian Police University College could predict police students' ability to generate investigative hypotheses. The findings did not support such a notion and this is somewhat in line with the available knowledge in the area showing that cognitive ability tests have low predictability for applied reasoning tasks. Taken together, this thesis suggests that investigative judgments are highly susceptible to the individual characteristics and biases of the detective. The results indicate that detective-expertise might act as a viable safeguard against biased decision-making, but length of experience alone does not predict sound judgments or decisions in critical stages of criminal investigations. Education and training is a solid foundation for the making of an expert detective. Nevertheless all participants' researched across the two experiments were biased towards crime and guilt assumptive hypotheses. Hence, true abductive reasoning (i.e. to identify all competing explanations) and the presumption of innocence is hard to operationalise even for expert detectives with extensive training.

Keywords: Criminal investigation, Expert, Decision-Making, Abductive Reasoning

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This thesis is based on the appended three papers, which are referred to by their roman numerals:

- I. Fahsing, I.A., & Ask, K. (2013). Decision making and decisional tipping points in homicide investigations: An interview study of British and Norwegian detectives. *Journal of Investigative Psychology and Offender Profiling*, 10(2), 155–165. doi: 10.1002/jip.1384
- II. Fahsing, I.A., & Ask, K. (2015). The making of an expert detective: The role of experience in English and Norwegian police officers' investigative decision making. *Psychology, Crime & Law*, 1–44. doi: 10.1080/1068316X.2015.1077249
- III. Fahsing, I.A., & Ask, K. (2016). *In search of the detective personality: Police recruits' logical reasoning and ability to generate investigative hypotheses*. Manuscript submitted for publication.

## Svensk sammanfattning (Swedish summary):

Syftet med föreliggande avhandling är att utifrån socialpsykologiska och kognitiva teorier undersöka i vilken grad individuella faktorer hos brottsutredaren och systemiska skillnader i utvecklandet av utredares kompetens påverkar vanliga bedömnings- och beslutsfel under utredningar av grov kriminalitet. Genom djupintervjuer undersökte Studie I vad erfarna brottsutredare menar är de mest kritiska "tipping points" i en mordutredning (dvs. beslut som gör att utredarens fokus skiftas från undersökande till bekräftande), och vilka faktorer som kan påverka dessa bedömningar. Brottsutredare från England (N = 20) och Norge (N = 15) med lång erfarenhet av brottsutredning beskrev hur beslut som fattas under komplexa utredningar kan tänkas ändra utredarnas tankesätt från undersökande till bekräftande, samt vilka individ- eller situationsfaktorer som kan påverka denna psykologiska process. Två karaktäristiska beslut nämndes av samtliga deltagare: (1) beslut kopplade till utpekning, anhållande och häktning av en misstänkt och (2) beslut angående vilka som är de mest centrala hypoteserna och stegen i utredningsprocessen av ett fall. Tio individuella (t.ex. utredningserfarenhet) och 14 situationsbundna (t.ex. tidspress) faktorer identifierades som samverkande med förändringar i tankesätt. De flesta faktorerna korresponderade med tidigare beslutsfattandeforskning. Studie II undersökte engelska och norska polisers förmågor att identifiera nödvändiga hypoteser och utredningssteg i en brottsutredning, samt hur robusta förmågorna var mot en potentiell "tipping point" som identifierats i Studie I (beslut om anhållande). Det finns betydliga skillnader i systemen för utveckling av kompetens mellan den norska och engelska polisen. Därför jämfördes nyutbildade poliser och erfarna mordutredare från de två länderna i en vinjettbaserad studie med utredningsärenden inspirerade av verkliga rättsfall. De erfarna engelska utredningsledarna presterade klart bättre än de övriga tre grupperna, medan nyutbildade norska poliser med kandidatexamen presterade något bättre än erfarna norska mordutredare. Med utgångspunkt i forskningsdesignen och materialet utvecklade för Studie II, undersökte Studie III i vilken grad prestationen på ett test av generell kognitiv förmåga som utförs i samband med antagningen på Polishögskolan i Norge kan predicera polisstudenternas förmåga att identifiera relevanta utredningshypoteser. Resultaten gav inte stöd åt ett sådant samband, vilket delvis är i linje med den begränsade

tidigare forskningen i området. Sammantaget indikerar studierna att vissa individuella skillnader mellan poliser i betydlig grad kan påverka deras beslutsförmågor i centrala delar av en brottsutredning. Expertis i brottsutredning kan utgöra en viktig skyddsfaktor mot fällor i beslutsfattandet, men endast om expertisen utvecklas, dokumenteras och tillämpas i ett system som inte uteslutande bygger på lång praktisk erfarenhet. Lång utredningserfarenhet kommer alltså inte i sig självt att göra poliser till experter, medan utbildning utgör ett fundament för utveckling av utredningsexpertis. Samtidigt visade alla deltagargrupper i Studie II och III en klar tendens att favorisera hypoteser som innebar att brott hade begåtts (jämfört med icke-kriminella hypoteser, som olycksfall, sjukdom, frivilligt avvikande, etc.). I linje med tidigare forskning på området visar alltså avhandlingen på svårigheten att tänka abduktivt och därmed upprätthålla oskuldspresumtionen (dvs. ”oskyldig till bevisat skyldig”) – även för utredare med lång erfarenhet och utbildning



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## A MODERN-DAY WITCH-HUNT?

*In September 2008, close to the village of Loftahammar in Sweden, Ingemar Westlund (68) found the body of his wife Agneta (63) by a lake. He claimed he had last seen her alive a couple of hours before when she took the family dog out for a walk in the forest. He had just finished his weekly lawn mowing with his tractor. When she failed to return he went out to look for her. He immediately called the police and due to the nature of the injuries on her body a murder investigation commenced. Mr. Westlund told the police that he heard what seemed like a big splash from the lake just before he found her. Animal hairs which did not belong to her dog, were found on her jacket. They were not subjected to further analysis. Instead, based on a number of linear cuts containing fragments of grass on the deceased's chest the police hypothesised that she was injured and asphyxiated by some mechanical cutting device such as a heavy lawnmower. Though no forensic evidence such as blood, hair or DNA, was found on Mr. Westlund's lawn mower, and even though he had no motive or other irregularity in his statement, he was arrested on suspicion of murdering his wife. He was held in police custody for ten days and under formal suspicion for five months. In the interviews, he denied killing his wife and stuck to his initial statement. The police held several case reconstructions with the tractor lawnmower but never succeeded in getting on top of something that came close to the size of a human body. The case remained status quo for more than a year. At that time, however, the local gossip and unrest following the incident had made Mr. Westlund flee the village he had lived in all his life. A year and a half after the arrest, a forensic analyst at the National Forensic Centre found a clip on the Internet of a moose attacking a woman outside a shopping market in Alaska. He then engaged an elk specialist and together they found large amounts of elk saliva on the deceased's jacket. The local police never informed the husband or the media about the elk theory. Later on, some prints from a pair of sample elk hoofs were paired with the injuries on the deceased. The comparison showed a near perfect match. Finally, at a press conference the case against Mr. Westlund was dropped. A local journalist later informed him about the decision. The police and prosecution service never apologized for what had happened and claimed they did nothing wrong. Mr. Westlund remarked: "My life is ruined. I have been dragged through a nightmare – a modern-day witch-hunt beyond my wildest imagination."*

## INTRODUCTION

In hindsight, the investigative decision-making in the story above seems both incompetent and miserable. What probably makes Mr. Westlund's nightmare even worse is the fact that the police and the prosecution service refuse to apologize and still hold they did nothing wrong and "acted by the book" (Nielsen, 2013). The story illustrates how crucial hypotheses and evidence might be overlooked when the police investigate with seemingly no safeguards for cognitive errors, with tragic consequences for those involved – even without a wrongful conviction. The defensive response from the Swedish police and prosecution service in the case suggests a worrying ignorance of available knowledge, learning and development. Unfortunately, this case of serious investigative failure is far from unique in Scandinavia (e.g., Gudjonsson, 2003; Justitiedepartementet, 2015; Justitiekanslern, 2006; Rachlew, 2009), Europe (e.g., De Poot, Bokhorst, van Koppen, & Muller, 2004; Macpherson, 1999; Ritzer & Przybilla, 2013; van Koppen, 2008) or the rest of the world (e.g., Huff, Rattner, & Sagarin, 1996; Innocence Project 2010; Kassin, Dror, & Kukucka, 2013; Rattner, 1988; Scheck, Neufeld, & Dwyer, 2000).

Mistakes in detectives' decision-making are likely the most common type of error in criminal investigations (e.g., Carson, 2013; Irvine & Dunningham, 1993; Kassin et al., 2013; Rachlew, 2009; Simon, 2012a). Problems typically arise when the police early and prematurely shift from evidence-based investigation to suspect-driven case building, without considering competing explanations or collecting all the available evidence (Rossmo, 2009; Stelfox & Pease, 2005; van Koppen, 2008). Research on detectives' decision making is relatively scarce but suggests that serious investigative failures may have been avoided if the available knowledge had been applied in a more systematic way (Ask & Alison, 2010; Jones, Grieve, & Milne, 2008; Riksadvokaten, 2015; Rossmo, 2014; Stelfox & Pease, 2005; Westera, Keibell, Milne, & Green, 2014b). So far, very few countries have acknowledged the need for a policy enforcing the development of systemic countermeasures against investigative errors at the individual and organisational level (Granhag, Strömwall, & Cancino Montecinos, 2013; McGrory & Treacy, 2012). Despite the fact that complex criminal investigation differs hugely from other parts of police work (Innes, 2007; Stelfox, 2007), the vast majority of the European police forces still recruit and train officers based on the traditional notion of the omnipotent police

generalist, as opposed to the highly specialized expert detective (Dean & Gottschalk, 2007).

There is little research on what makes a good detective and few formal systems in place to translate knowledge into sound investigative practice and acknowledge detective expertise (De Poot et al., 2004; Fahsing, 2013; Hald, 2011; Tong, Bryant, & Horvath, 2009). Due to the lack of formal systems for recruitment and authorization, the level of expertise is often synonymous with years of professional experience (Jacob & Ebrahimpur, 2001). England and Wales, however, have turned their experiences from justice failures into reforms with programmes specifically directed towards standardization of core investigative methods, procedures, and accreditation of police investigators (ACPO, 2005, 2006, 2007, 2010, 2012). An initiative under the British Police Reform Act 2002 was the Professionalizing the Investigative Process (PIP) programme, which was formally launched by the Association of Chief Police Officers in 2005. The aim of PIP was “to enhance the crime investigation skills and ability of police officers and staff involved in the investigative process and to drive through new standards of investigation at all levels” (NCPE, 2005, p. 1). This was to be achieved by providing training in and assessment of professional investigative procedures designed to assist investigators in making accountable decisions and minimizing the risk of errors.

The scope of this thesis is to compare the investigative decision-making of police officers in England and Wales, where a policy shift has been implemented, with their counterparts in Norway, where no comparable shift has taken place (Politidirektoratet, 2013). More specifically, the aims are to explore variations in knowledge and awareness of judgment and decision-making processes among highly experienced Norwegian and British homicide detectives (Study I). Next, to examine the degree to which cross-national differences in policy, education systems, and professional standards might influence police officers’ judgements and decision-making in complex criminal investigations (Study II). Finally, since recruitment of the best candidates is vital in any profession, the thesis examines the degree to which a test of general cognitive aptitude, used in the selection process by the Norwegian police, can predict the ability to engage in diagnostic reasoning in investigative settings (Study III).

## CRIMINAL INVESTIGATION

In the 1820's, the founder of modern-day policing Sir Robert Peel described the detection of offenders as one of the fundamental functions of the police (Morris, 2007). This has remained unchanged in the United Kingdom and has later become the model for most countries around the world (Kurian, 1989). Criminal investigation is therefore one of the key strategic functions of the police service and its quality is vital for the legitimacy of the police (Maguire, 2008). The function occurs at every level of policing, from the investigation of pick pocketing in village markets to high-stake international counter-terrorism operations (Stelfox, 2008).

The main purpose of a criminal investigation is to establish if, how, where, when, why, and by whom a crime was, or will be, committed (Cook & Tattersall, 2014; Greenwood, Chaiken, & Petersilia, 1977; Gross, 1893). To do this, detectives must discover, collect, check and consider clues from various sources of information and try to construct a coherent account of the event (Dean, Fahsing, Glomseth, & Gottschalk, 2008; Innes, 2003). In some cases this is rather straightforward, but in others the challenge is considerable (De Poot et al., 2004; Stelfox, 2009). According to Stelfox (2008) there are three main reasons for this: (1) The volume, type and distribution of case-relevant information that is generated in different criminal offences will vary greatly. This variation in the information profiles from case to case makes the task unpredictable. For example, the material generated by a car accident will be very different from that generated by the sexual abuse of a child or by an attempted Internet fraud. These variations can be large even within a single crime type and investigators need to be able to make good decisions about what type of crime they are up against, what information may have been generated and how to best locate it. (2) The difficulty investigators experience in locating and securing case-relevant information is contingent on their knowledge of relevant information sources and the nature of potential traces. This knowledge will vary from being highly technical (i.e. cell-phones, DNA) to psychological (interviews with offenders, victims and witnesses). For example, skilled offenders may be able to control the availability of information by cleaning crime scenes, disposing of incriminating material or by intimidating potential witnesses. They can also control information through the choices they make in the event of being interviewed as a suspect. Victims and witnesses who are not motivated to provide information can often avoid contact with the police

altogether or can provide partial or false testimony. For these reasons, information is not always freely available to investigators, and so they must be skilled in a range of techniques in order to pursue, locate and recover it. (3) Investigative opportunities are at their greatest and more easily exploited during the early stages of an investigation. Physical material can degrade rapidly for environmental reasons, and memories can become less reliable for psychological reasons. Moreover, recorded data, such as CCTV or financial information can be disposed of or overwritten. This makes it important that such material is recovered as quickly as possible. Other factors are of course relevant but the key to success lies in the detective's ability to make effective decisions about what kind of crime he or she may be up against, what kind of case-relevant material that may have been generated and how to best identify and secure it whilst it is still available to the investigation.

Criminal homicide is considered the capital crime and the investigation of murder is often seen as the ultimate challenge for detectives (Brookman & Innes, 2013). As stated in UK by Her Majesty's Inspector of the Constabulary (2000): "the investigation of murder should set clear standards of excellence that all other criminal investigation can follow" (p. 115). According to Innes (2003), the investigation of murder is bestowed so much prestige that the public view it as an index of police competence overall. In response to particularly violent and consequential crimes, people demand that perpetrators are promptly captured and brought to justice, and failure to do so may trigger severe criticism (Bayley, 1994; Greenwood et al., 1977). For the very same reasons the investigation of potential homicide is the scope of the present thesis.

## Dirty Harry and Expedient Case Construction

The detection and prosecution of serious crime has always attracted a vast amount of public attention. Daily reports of high profile cases in the media and portrayals of fictional detectives, such as Sherlock Holmes, Lt. Colombo and Inspector Morse, have only worked to heighten this interest (Carson, 2009). The discrepancy between these fictitious masterminds and real detectives appear to be massive (Tong & Bowling, 2006). Despite the importance of the detective task and the hugely popular interest in criminal cases, the potential explanations for this discrepancy have not received much attention in research or in police practice (O'Neill & Milne, 2014).

Although there are some important studies available (e.g., Smith & Flanagan, 2000; Nilsen, 2012; Westera, Kebbell, Milne, & Green, 2014a), the vast majority of research in this field is still descriptive and does not have a “what works” perspective (Ask, 2013; Bradley & Nixon, 2009; Sherman, 2015). Obvious questions like what characterizes an optimal investigative procedure, or what individual qualities are required of an expert detective have not been systematically examined (O’Neill & Milne, 2014). There are probably many reasons for this. First of all, there is no tradition of research within the police service and many police officers are reluctant to engage with external researchers (Fahsing, 2013; Stelfox & Pease, 2005). This has resulted in what is referred to as a dialogue of the deaf – meaning that both sides talk, but neither side seems to listen (Bradley & Nixon, 2009; Punch, 2010). Second, the research-questions linked to detectives’ decision-making are quite complex and hard to operationalise in scientific experiments. Similarly, the research output might be challenging to grasp and utilize for the practitioners (Canter & Zukauskienė, 2007; Morgan, 1990). Moreover, all criminal cases are protected by legal confidentiality. This fact sets legal and ethical constraints on the research, but might also serve as a comfortable excuse for the police against unwanted scrutiny (Reiner, 2010).

Criminal investigation is a highly regulated undertaking and every step should be documented and transparent. Law defines its commencement, undertakings, and purpose (Morris, 2007). However, sociological and criminological studies indicate that traditional detective work did not always thrive in “the light of day” (Leo, 2008; Maguire, 1994, 2003; Reiner, 1997). A central characteristic of the job is the pressure to constantly perform. As pointed out by Maguire (1994): “Despite the changes in recent years, the CID<sup>1</sup> clearly remains highly results-oriented: what matters, above all else, the very *raison d’être* of the detective branch, is to arrest criminals” (p. 44). Becoming a detective was in itself a promotion that kept you away from the uniform and the streets—but only if you blended in and performed (Rachlin, 1995). As stated by one of Maguire’s (1994) detective interviewees: “A sus[pect] a day keeps the helmet away” (p.44). Furthermore, the environment in which homicide detectives operate involves daily exposure to grave violence, appalling abuse, and hardnosed suspects, all of which may encourage goal-directed thinking (Ask, Granhag, & Rebelius, 2011) and emotional involvement (Ask & Granhag, 2007a; Hobbs, 1988). Moreover, major crime enquiries are burdened with high workload, time-pressure, and

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<sup>1</sup> Criminal Investigation Department



constant media attention (Innes, 2003; Tong & Bowling, 2006). These pressures may create a work environment with a premium placed on rapid and resource-saving solutions (Barrett & Hamilton-Giachritsis, 2013; Mortimer & Shepherd, 1999). A report by the Royal Commission on Criminal Justice (1993) states that “variance in skilled performance of the tasks imposed on detectives by work systems is the proper target of human factors research” (p.13). A recent study in Norway by Knutsson (2013) shows that expediency measures are still dominating the official publications reflective of quality in criminal investigations. Similar measures prevail also in England and Wales (Carson, 2007; Tong, 2009) and in the US (Leo, 2008).

In line with this tradition of over-suspiciousness and expediency, much of the traditional detective practice has picked up a strong tendency towards guilt assumption in combination with confirmatory investigation strategies (Innes & Brookman, 2013; Kassin, Goldstein, & Savitsky, 2003; Leo, 2008; Oxburgh, Fahsing, Haworth, & Blair, 2016; Simon, 2012a). Moreover, traditional detective cultures seemingly view their undertaking as a constantly on-going ‘information game’ against the suspect, the defence and the courts (Hobbs, 1988; Kleinig, 2001). It somehow became a privilege for the police to leave out the information that did not fit with their main theory (Gudjonsson, 2003; Justitiedepartementet, 2015; Kassin et al., 2010; Riksadvokaten, 2015). Accordingly, Leo (2008) describes how American detectives viewed an interrogation as a game where the final goal was achieved without the objective collection of information. The cultural goal was to make the suspect accept and adhere to the main theory of guilt—to make him confess. This outsmarting game was “structured to promote incrimination, if necessary, over truth-finding” (Leo, 2008, p. 23). Accordingly, detectives developed a culture of not publicly revealing their actual motivation, strategies, or tactics (Rachlew, 2003). The notion of never disclosing anything more than absolutely necessary is still an important cultural artefact of the profession (Hobbs, 1988; Kleinig, 2001; Soufan, 2011). Personal commitment to winning the game was also regarded as vital; the more severe the crime, the higher the cultural status of ‘winning’ the case and the personal responsibility for restoring justice (Corsianos, 2001, 2003). The adversary system of western democracies has been criticized from the start for the risk of turning the pursuit of justice into an unfair game where the end goal of victory compromises the quality of justice (Langbein, 2003; Pound, 1910). If this is the case, it is likely to have shaped traditional detective cultures.

A related issue is the notion that good ends can sometimes only be achieved by dirty means (Reiner, 2010; Skolnick & Fyfe, 1993). This has created room for what Klockars (1980) defined as “The Dirty Harry Problem”. This kind of practice may take many forms, but it ultimately means that detectives might drift into professional cultures where the perceived good end of solving brutal crimes permits ethically, politically, or legally dubious means for its achievement. These darker sides of detective work are portrayed in BBC’s TV-series “Life on Mars” with the sometimes frighteningly passionate Detective Chief Inspector Gene Hunt as “Dirty Harry” (BBC, 2008). Although this production is fictional, the same culture and similar methods are represented in numerous official documents (e.g., Chatterton, 2008; NOU 2007:7; Royal Commission on Criminal Justice, 1993; Royal Commission on Criminal Procedure, 1981), books (e.g., Gudjonsson, 2003; Leo, 2008; Newburn, Williamson, & Wright, 2007; Rachlin, 1995; Tong et al., 2009) and journal articles (e.g., Baldwin, 1993; Rachlew, 2003; Stelfox & Pease, 2005). As stated by Her Majesty’s Inspector of Constabulary: “An emphasis on sanction detection levels has undoubtedly to a degree produced the unintended effect of officers spending time investigating crimes with a view to obtaining a detection, even when that is clearly not in the public interest ” (Flanagan, 2008, p. 10).

Bittner (1970) described police work as a ‘tainted occupation’ with an inherent drive towards a practice of discretion, building on prejudice rather than the strict rules of law. Many officers do not acknowledge such disrespectful descriptions of their own occupation and hence dismiss research as being biased and unproductive (Bradley & Nixon, 2009). Consequently police forces bear a rather restrained relationship to research in general, and to the social sciences in particular (Canter & Zukauskienė, 2007). Higher education was traditionally seen as ‘upper-class’ amongst the operational officers. It was considered pointless as it made you rigid, less practical, less street-smart and less productive (Hobbs, 1988). In line with this, the detective job was modelled upon and practised as a typical craftsmanship. As noted by Morris (2007): “Investigation[.] remains an artisan craft devoid of any higher intellectual content” (p 24). The internal notion of ‘the good detective’ was simply that some officers had an intuitive ‘nose’ for the job, while others simply did not (Rachlew & Fahsing, 2015; Tong et al., 2009). Thus, good detectives with the right combination of motivation, intuition and practical experience should be able to quickly interpret the information at hand in almost any case, speedily draw the right

inferences and solve it via the most ‘expedient case construction’—often synonymous with getting a confession (Innes, 2003; Tong & Bowling, 2006).

Accordingly, Innes (2003) argued that detectives are not seeking the ‘absolute’ truth, but rather information that support their own coherent narratives of a crime. They are scanning for data or signs which could fit with some of their preconceived patterns of crime. In order to create a coherent whole inferences are sometimes made to fill information gaps. Furthermore, pieces of the jigsaw that do not fit may be omitted from the story. Similarly, Wagenaar, van Koppen, and Crombag (1993) argued that the entire judicial process, from the first detection of a potential crime to the highest court’s verdict, can be understood as a process of continuous story construction. The role of storytelling and narratives in legal settings has previously been acknowledged in the context of judges’ and jurors’ decision-making (Hastie, Penrod, & Pennington, 2002; Pennington & Hastie, 1986, 1988, 1992). Their verdict in a court case depends on how coherent and credible the investigative story is presented by the prosecutor. This reconstructive process with its pragmatic and subjective nature is therefore not merely a product of expedient detective cultures – it is deeply rooted in the principles of human memory and cognition (e.g., Alison, Barrett, & Crego, 2007; Cohen, Freeman, & Wolf, 1996; Loftus & Loftus, 1980; Morley, 1996; Read & Miller, 1995; Schank & Abelson, 1995; Schwartz, 2005).

### Investigative Psychology and Environmental Constraints

In essence, all (major) crime inquiries are information driven (Innes, 2003; Wilmer, 1970). In any investigation, complex or straightforward, detective work involves solving three inter-related problems: (a) what happened, (b) who did it, and (c) can it be proven beyond reasonable doubt? As mentioned above, in some cases strongly incriminating evidence is already available from the outset of an investigation. These cases are what Innes (2003) termed ‘self-solvers’. In such circumstances there are typically witnesses to the crime, who can identify a suspect in combination with the presence of substantial, and incriminating physical evidence. Self-solving investigations tend to be structured around three main stages of investigative activity: initial response directed towards establishing whether a crime has actually taken place, gathering evidence in the form of interviews and inquiries, and finally, case construction which involves establishing an account of what has occurred to be presented in court.

In contrast, ‘whodunit’ investigations are cases where no obvious and ‘self-solving’ set of cues is present at the outset of the investigation. It is the early and judgment-wise, critical phase, of these kind of cases that will be the main focus of the present thesis. Typical for this kind of complex and potentially ‘high profile’ case are that no direct clues emerge from the available evidence (Roach, 2014). Instead, investigators must rely on secondary sources of information, typically in the form of vague witness statements and ambiguous physical evidence. The quality of this initial information might “make or break” the investigation (Wells, Lindsay, & Ferguson, 1979). Accordingly, a great deal of the forensic psychological research has addressed different methods for enhancing the accuracy and detail of witness accounts (see e.g., Kebbell & Wagstaff, 1999; Memon, Meissner, & Fraser, 2010), and how to assess the reliability of such information (see e.g., Fahsing, Ask, & Granhag, 2004; Hartwig, Granhag, Strömwall, & Vrij, 2002; Loftus, 1979; Penrod, Loftus, & Winkler, 1982). Consequently, the shortcomings of criminal investigation have often been attributed to unreliable witness statements, coercive interrogations of suspects and poor interviewing skills (see eg., Fahsing & Rachlew, 2009; Gudjonsson, 2003; Kassin, Tubb, Hosch, & Memon, 2001; Milne & Bull, 1999). This research has undoubtedly complemented the investigative interviewing approach which is commonly associated with information-gathering in criminal investigations (Kebbell & Milne, 1998). When investigations go wrong, however, it is an even more fundamental feature of the investigations that seem to fail, namely the detectives’ judgements, decision-making, and overall supervision of the case (e.g., Alison & Crego, 2008; Justitiedepartementet, 2015; Macpherson, 1999; NOU 2007:7; Rachlew & Fahsing, 2015; Rachlew, 2009; Royal Commission on Criminal Justice, 1993; van Koppen, 2008).

A common denominator can be noted between different accounts of criminal investigative failures; investigators strive to confirm their initial hypothesis, while seemingly ignoring or downplaying conflicting information. Accordingly, a number of studies from different traditions have identified decision-making abilities as the core in the making of an effective detective (e.g., Canter, 2004; Dean et al., 2008; Innes, 2003; Rossmo, 2009; Smith & Flanagan, 2000; Westera et al., 2014b). Investigative psychology is therefore primarily directed towards the detectives’ cognitive tasks such as the processing of information, the identification of different investigative scenarios, and decisions on the best investigative strategies or lines of

enquiry (Ask & Alison, 2010; Canter, 2000). Research has resulted in valuable insights into how detectives experience the task of investigating serious and complex crimes such as child abductions, siege incidents, terrorist threats, and murders (Hald, 2011; Innes, 2003; Maguire, Noaks, Hobbs, & Brearley, 1991; Wagenaar et al., 1993). The detectives' decision environment is often far from ideal. Crego and Alison (2004) describe officers' frustration with "having to continuously fight for staff or run an enquiry on a shoestring..." (p. 219) not to mention the "complexity involved in handling the intrusiveness of the media..." (p. 217). Innes (2003) illustrates how murder squad officers experience pressure from a number of sources:

There is always a considerable time pressure involved, therefore police officers strive to identify suspects quickly and to identify and protect all potential crime scenes and evidence from being destroyed or decaying in quality. There is always financial pressure to 'get a result' as quickly as possible. (p. 658)

Innes (2003) also refers to the pressures officers that come from having to handle huge amounts of incoming information at the beginning of an investigation, with most of this information probably proving to be irrelevant to the critical aspects of the inquiry. In such a problematic decision environment, criminal detectives are often left to their own intuitions, field-experience and rules of thumb (Tong & Bowling, 2006). We have learned a great deal about how investigations typically proceed and the challenges that investigators face in the complex reality of policing. While this type of descriptive knowledge is important in its own right, it tells little about why certain obstacles to successful investigative decision making occur and what can be done to overcome them. As mentioned earlier topics such as eyewitness testimony (e.g., Christianson, 1992; Loftus, 1979; Wells & Lindsay, 1980), and investigative interviewing (e.g., Fisher & Geiselman, 1992; Gudjonsson & Sigurdsson, 1994; Memon, 1999; Memon et al., 2010; Milne & Bull, 1999) have bridged much of the gap between the reality of policing and psychological research. Within the area of judgement and decision-making, however, there are several studies telling detectives' what not to do, but the literature provides very little positive guidance. Detectives would probably have an easier job if they could find support in evidence-based methods and operational procedures (Ask & Granhag, 2008; Rossmo, 2009). Interestingly, the famous author Sir Arthur Conan Doyle described

the essence of such a method 150 years ago—the abductive logic applied by Sherlock Holmes: “How often have I said to you that when you have eliminated the impossible, whatever remains, however improbable, must be the truth?” (Conan Doyle, 1890, p. 111).

### Investigation as Sense-making and Abductive Logic

It has been argued that abductive logic or finding the inference to the best explanation should be the starting point for any investigation (Carson, 2009; Fraser-Mackenzie, Bucht, & Dror, 2013; Innes, 2003; Keppens & Schafer, 2004; Lipton, 2007; Rønn, 2013; Simon, 2012a). The term ‘abduction’ was coined by Charles Sanders Peirce in his lifelong work on the logic of science. Peirce described abduction as the first stage of any inquiry in which we try to generate theories which may then later be assessed. He said, “[a]bduction is the process of forming explanatory hypotheses” (Peirce, 1965, p. 172). Although there is no reference in Peirce's writings on abduction to the notion of what constitutes the best explanation (Campos, 2009), it is clear that he thought of explanations as competing and more or less satisfactory—there might even be a best one. This is crucial in much modern work on abduction which encompasses a stage concerned with the assessment of tentative theories (Lipton, 2007). Abductive logic is widely recognised as a powerful mechanism for hypothetical reasoning in the absence of complete knowledge and it is generally understood as reasoning from effects to causes. It also captures important issues such as reasoning with defaults and beliefs (Ciampolini & Torroni, 2004; Josephson, 1994). Abduction has been described as ‘the logic of what might be’ and unlike deduction, but similar to induction, the conclusions from an abductive argument might turn out to be false, even if the premises are true. Unlike induction, abductive logic allows for qualified and pragmatic guessing. In deductive reasoning, *the conclusion is a direct result of the facts presented*. Example: Tim cannot see (fact). The condition when you cannot see is known as blindness (fact). Hence, Tim is blind (deduction). In inductive reasoning, *the conclusion is derived from a fact, but an inference is added*. Example: Tim cannot see (fact). All people who cannot see have probably bumped into many objects compared to people who can see (inference). Tim will have more accidents than people who can see (induction). In abductive reasoning, *we try to presume potential facts by using supporting facts*. Example: Some people cannot see (fact). Tim continued walking into objects (supporting fact). Tim might possibly be blind

(abduction). This explorative function and the absence of conclusive information make abductive inferences non-monotonic<sup>2</sup> and serving as argument to the best explanation (Harman, 1965; Kolko, 2010). Hence, in abductive logic there is often no room for true falsification like the Sherlock Holmes quote above signifies. In the Arthur Conan Doyle story, “The Silver Blaze,” are Sherlock Holmes and Scotland Yard Detective Inspector Gregory discussing the theft of a racehorse from a country estate that is guarded by a fierce watchdog:

Inspector Gregory: "You consider that to be important?"

Holmes: "Exceedingly so."

Inspector Gregory: "Is there any point to which you would wish to draw my attention?"

Holmes: "To the curious incident of the dog in the night-time."

Inspector Gregory: "The dog did nothing in the night-time."

Holmes: "That was the curious incident."

Holmes later explains how the “dog that didn’t bark” helped him to solve the crime: “I had grasped the significance of the silence of the dog, for one true inference invariably suggests others... A dog was kept in the stables, and yet, though someone had been in, and had fetched out a horse, he had not barked enough to arouse the two lads in the loft. Obviously the midnight visitor was someone whom the dog knew well.” (Doyle, 1892, p. 305).

Holmes makes an inference based on known facts, in an effort to explain them. Holmes is working on the premise that because (a) dogs bark loudly at strangers, but not at people they know; and (b) the dog didn’t bark loudly, if he barked at all; then (c) the dog knew the intruder. That sounds fine at first, and of course Holmes is a renowned problem-solver, at least in the world of fictional ink. This is perhaps how many detectives resolve an investigative challenge, but this seemingly strong piece of deductive reasoning is in reality based on weak or absent information and therefore it is abductive and non-monotonic. Holmes assumes that the watchdog behaves in a particular manner when, in fact, there might be various reasons why the dog wouldn’t bark. Firstly, the dog might have barked, but no one heard. Secondly, the stranger might have brought a sausage to appease the dog. A third possibility is the dog had been drugged. Because Holmes did not take

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<sup>2</sup> Non-monotonic inferences are defeasible; in contrast to deductive inferences, the conclusions drawn may be withdrawn in the light of further information, even though all original premises are retained.

these variables into consideration, one might conclude that the logic of Holme's argument is weak and not necessarily the best explanation. A true detective should know that this is a hypothesis based on the probability that dogs normally bark at strangers—not an absolute fact. Hence, several competing explanations may be true and even the best explanation can be overturned by new diagnostic information (Peng & Reggia, 1990).

Abductive reasoning is utilised as an explanatory inference technique in a number of applied judgment and decision-making tasks such as medical diagnosis (Feltovich, Johnson, Moller, & Swanson, 1984), scientific discovery (Peirce, 1965; Thagard, 1989), legal reasoning (Ciampolini & Torroni, 2004; Harman, 1965), computer-science (Reiter, 1987) and discourse comprehension (Kintsch, 1988). As proposed by a number of studies on detective work (Carson, 2009; Hald, 2011; Innes, 2003) abductive logic serves well as a model in depicting the criminal investigation as a highly fragile, creative and synthetic process. Like other abductive problems, criminal investigations are often complicated by the large number of potential explanations for an observation, the constant influx of new information, and the many possible ways to combine, test, and develop competing hypotheses about the most likely explanation. Put another way: Abduction plays the role of generating new ideas or hypotheses; deduction functions as evaluating the hypotheses; and induction is justifying the hypothesis with empirical data (Staat, 1993). According to this view, all tentative hypotheses should be formed on the basis of initially available information and the detectives' available schemata of potential crimes and their non-criminal alternatives. Ideally, such hypotheses should subsequently include assumptions about all likely situations, potential perpetrators, modes of conduct, and motives behind an offense. The aim is to keep track of alternative explanations of the evidence and to remind the detective of all the different avenues of enquiry which should be exhausted. Next, 'the abductive detective' should deduce and induce predictions from the different hypotheses. If they are true, what consequences follow? If they are false, what would then follow? In subsequent stages, all the competing hypotheses should (as far as possible) be tested through designated investigative actions and gradually refined through attempts of both verification and falsification.



## Investigation as Hypothesis Testing

In all diagnostic processes, the first stages are of crucial importance for the validity of the rest of the process (Joseph & Patel, 1990; Simon, 2011; Sisson, Donnelly, Hess, & Woolliscroft, 1991; Swets, 1988; Wells & Lindsay, 1980). A reason to believe a crime has been committed is the legal starting point for criminal investigations (Stelfox, 2009). Intuitively, therefore, the task structure for detectives will always begin with an initial hypothesis of a potential crime. As illustrated above, this crime-assumptive starting-point has often driven detectives into a search for confirming evidence with little, or no, search for disconfirming evidence. The fact that an already formed hypothesis leads people to not optimally utilize subsequent data that could disconfirm the hypothesis has been demonstrated in a variety of settings (Lord, Ross, & Lepper, 1979; Sainsbury, 1971; Wells, 1980). The so-called 'illusory correlation' can in subsequent stages be particularly hard to disprove if the only available data are gathered in light of the first hypotheses (Einhorn & Hogarth, 1978; Smedslund, 1963). The term was originally coined by Chapman and Chapman (1969) to describe people's tendencies to overestimate relationships between two groups when distinctive and unusual information is presented. In an experimental study of nurses Smedslund (1963) found that nurses' diagnostic reasoning was mostly based on the presence of symptoms, while the (just as diagnostic) absence of symptoms were virtually ignored. Similarly, Ward and Jenkins (1965) asked subjects to judge the degree of probability between responses and outcomes in a guessing task with only two outcomes. Like Smedslund (1963) they found that the participants' perceived control of the judgment task was based mainly on their frequency of correct guesses, rather than the actual programmed contingency between outcomes and responses. This tendency to have difficulties with the processing negative or disconfirming information was labelled by Jenkins and Sainsbury (1969) as the Feature Positive Effect (FPE). The same tendencies have later been confirmed in a number of studies (see eg., Kite & Whitley Jr, 2016).

Taken together, there is a weakness in our ability to comprehend statistical contingency in practical tasks. It is, for example, a well known problem that the scientific literature is biased by the underrepresentation of papers yielding nonsignificant findings, and a resulting misunderstanding regarding the potential value of such results (Rosenthal, 1979).

In a recent article in *Nature*, Nuzzo (2015) points out how researchers seem to fool themselves by collecting evidence in favour of a hypothesis,

instead of looking for other explanations or evidence against it. This “hypothesis myopia” might stem from a restraint in the capacity and/or motivation to consider alternative hypotheses at early stages of testing. A classical problem identified both in experimental research (Koehler, 1991; Nuzzo, 2015; Tversky & Kahneman, 1986) and in the investigation of criminal cases (Ask & Alison, 2010), is the investigators’ failure to identify all plausible alternatives before they start collecting, evaluating and integrating information to arrive at a choice. Accordingly, Fischhoff (1982) suggested that one of the most effective strategies for reducing judgmental biases is to make individuals systematically consider alternatives—a debiasing strategy recommended already by the 17<sup>th</sup>-century philosopher Francis Bacon (Lord, Lepper, & Preston, 1984). This so-called “Baconian approach to probability” argues that regardless of how many favourable results exist for a hypothesis, it only takes one unfavourable result to disprove it. Hence, reliable evidential tests should be designed to eliminate any hypothesis that is under consideration. The hypothesis that best resists the most concerted efforts to eliminate it – is the one which we should hold with most confidence (Klamberg, 2015). Such a procedure encourages the decision-maker to generate evidence that supports alternative outcomes, resulting in a more balanced and objective evaluation of the relevant evidence at the time of judgment.

The importance of such a legally defined obligation to promote accuracy goals in the criminal justice process is supported by numerous studies demonstrating that persons asked to test a single hypothesis select different information than subjects asked to test the same hypothesis against specific alternatives (Bassok & Trope, 1984; Kruglanski & Maysseless, 1988). Hence, the search for diagnostic information is context-dependent. Thus, a systematic consideration of all the competing options should lead people to use a more thorough and qualitatively better judgmental process (Hirt & Markman, 1995). The notion of considering the opposite (of guilt) also lies behind the presumption of innocence, a fundamental principle of fair trial (Stumer, 2010) and the burden of proof (Diesen, 2000; Kolflaath, 2015). Notably, all reasonable conflicting theories should be ruled out before a guilty verdict can be passed in a criminal court. As stated by (Zuckerman & Roberts, 1989), “the fact-finder has to follow a mental procedure of progressive elimination of explanations consistent with innocence” (p. 134).

A number of subsequent studies have proven this strategy effective for reducing the negative effects of several known cognitive sources of error,

such as for example confirmation bias (Lord et al., 1984), hindsight bias (Sanna & Schwarz, 2003), and overconfidence (Koriat, Lichtenstein, & Fischhoff, 1980). The ‘consider the alternatives strategy’ goes beyond the task at a hand (Hirt, Kardes, & Markman, 2004; Keeney & Raiffa, 1993), and can stimulate creative thinking and analytical problem-solving by invoking changes in mind-sets (Markman, Lindberg, Kray, & Galinsky, 2007; Markman, McMullen, & Elizaga, 2008). A similar approach is advocated in section 23(1) of the British Criminal Procedure and Investigations Act (1996) code of practice, which states: “where a criminal investigation is conducted, the investigator must take all reasonable steps for the purposes of the investigation and pursue all reasonable lines of enquiry, whether these point towards or away from the suspect”. The Norwegian practice of criminal law is essentially similar (Strandbakken, 2003). In fact, this fundamental legal obligation is a norm for the evaluation of evidence in most modern democracies (Klamberg, 2015; Langbein, 2003). This normative quality dimension, embedded in principles from early Roman Law (Stumer, 2010), can only be understood as a warning against fast and frugal decisions in criminal cases. As noted by Packer (1968): “The presumption of innocence is a direction to officials of how they are to proceed, not a prediction of the outcome”(p. 161). Ormerod, Barrett, and Taylor (2008) define the ability to step back from conjunctive conclusions and consider alternative and weaker hypotheses as the most valuable sense-making skill of a criminal detective. Sense-making is described as a set of judgements and decisions that are initiated when an individual, or organization, recognizes the shortage of their current understanding of events (Weick, Sutcliffe, & Obstfeld, 2005). This activity includes thorough problem recognition, problem framing, and option generation (Tversky & Kahneman, 1981). According to the recognition-metacognition model for unrecognized situations (Cohen et al., 1996), sense-making can be understood as an active two-way process of testing data against mental stories and building stories around the data. Neither data nor story comes first; data evoke stories and stories select and connect data (Hald, 2011; Ormerod et al., 2008; Wagenaar, 1995).

## Models of Investigative Decision-Making

Baron (2008) divides decision models into three categories: descriptive, normative, and prescriptive. The aim of descriptive models is to describe how decision makers actually make decisions. Heuristics, which are rules of

thumb, provide such descriptions and are usually compared with some ideal or normative way of making decisions. The aim of normative models is to provide policies or axioms that can aid an optimal and rational decision in certain situations. Normative models are sometimes too computationally demanding or time-consuming for practical use (Baron, 2008) – therefore we need prescriptive models. Prescriptive models create prescriptions of how humans should make decisions. Like normative models, the prescriptive models should stimulate productive judgment and decision procedures, heuristics, or rules of thumb. As shown above, abductive logic might serve as a model of how investigative information can be processed from evidence to possible explanation.

The sequence of mental operations that takes place between the presentation of a stimulus and the execution of a response is fundamental in psychology. Transferred to the domain of judgments and decision-making this is often described as ‘information processing’ (Montgomery & Svenson, 1976). Characterised by Montgomery (1983) as a search for a dominance structure, an attempt to find a representation of the decision problem such that one alternative is ‘dominant’, i.e., it is superior to all others on at least one attribute and is not inferior to any alternative on any of the other attributes. Search for dominance was hypothesised to pass through four phases (Montgomery, 1989, p. 24): pre-editing—establishing relevant decision alternatives and attributes; finding a promising alternative; testing whether the most promising alternative dominates the other alternatives; and dominance which refers to structuring, or transforming the psychological representation of alternatives so that dominance can be achieved. Likewise, Svenson (1996) describes it as a structural cognitive process from problem presentation to decision-making involving collection of traces, data, theories and hypotheses testing. Svenson (1992; 1996) also suggested the so-called differentiation and consolidation theory, which proposes four stages in the decision process: (a) detection of the decision problem; (b) differentiation of an initially chosen alternative from the other alternatives; (c) the decision stage; and (d) the post-decision consolidation stage. Svenson’s theory assigns considerable weight to post-decision processes; not only are they viewed as important in their own right for providing a complete picture of how decisions are reached, but since decision processes often are iterative or cyclic they also influence the pre-decision differentiation phase. The implications of this processing approach have influenced the methods used to study decision-making processes.

Much of the available research on detectives' decision-making can be understood in light of such information processing models. The line of experimental research conducted by Ask, Granhag and colleagues (e.g., 2006; 2007a; 2008; 2011) has typically tested how different situational and individual factors interfere with detectives' evaluation including: (a) an emphasis upon the staged and temporal dimensions of detectives' decision making; (b) a revitalisation of the picture of the detective as an adaptive decision maker which ideally should draw upon a range of possible strategies in order to reach a decision; and (c) the notion that detectives should be able to take in new information and develop their representation of the problem before they reach a final decision. Accordingly, Canter and Alison (1999) formulate a normative model for criminal investigation: "good thinking is represented by a thorough search for alternatives without favouring what one already has in mind" (p. 30).

In other domains such applied models have been designed for dealing with decision-making under uncertainty or predictions. For example, Hart, Sturmeijer, Logan, and McMurrin (2011) have described how case formulation can operationalize tacit knowledge within evidence-based violence risk assessments and create a more focused dialogue between the members of the clinical profession. Such models does not automatically solve the problem, but is meant to aid the formulation of the problem and with the integration of information to develop a more concise account of the situation (Belton & Stewart, 2002). Similar models have not yet been developed for legal decision-making. Researchers have, however, found similar tacit knowledge structures within the field of criminal investigation. Innes (2003) describes how major inquiries are typically organised as a five-stage sequence. This includes (1) an initial response that is the collection of the available evidence from the scene and witnesses; (2) the information burst stage refers to the activation and active acquisition of the mass of potentially relevant (and mostly irrelevant) information; (3) suspect development is concerned with the formulation of potential 'prime suspects'; (4) suspect targeting is concerned with the evaluation of evidence necessary to charge one of the suspects and finally, (5) case construction is concerned with eliciting a full narrative account of the crime for use in court. Dean (2000) identified a similar 5-staged process in his studies of experienced Australian detectives. He named the stages 'the 5 C's' (collect, check, consider, connect and construct). Dean, Fahsing, and Gottschalk (2006) found that detectives from Norway and Singapore acknowledged Dean's model as representative for

their daily work. Fahsing (2014) has later suggested a modification of Dean’s concept into a generic and cyclic process description for investigative tasks. The Investigative Cycle (see Figure 1) is described as a cyclic problem-solving process that may help detectives focus on the diagnostic process and strive for accuracy. Based on the available findings from psychological research demonstrating the difficulties people have performing exhaustive and unbiased hypothesis testing (Ask et al., 2008; Klayman & Ha, 1987; Thomas, Dougherty, Sprenger, & Harbison, 2008), Fahsing (2014) added a 6th C to Dean’s model – *consult*. This is to remind detectives of the fact that in critical situations they should always consult someone else. Either to get a critical view on their own judgements, or to entertain new declarative knowledge – or both. Ideally such steps and the result of them should be documented in a decision-log. The effect of formalizing dissent or the so-called ‘Devils-advocate’ approach has proven to be an important debiasing strategy in complex decision-making (Herbert & Estes, 1977; Schwenk, 1990). This process of hypotheses refinement, information gathering and re-testing should ideally run as long as there is legally obtainable information available and a need to strengthen the case construction (Dean et al., 2008; Dean & Gottschalk, 2007). In criminal investigations this normally means the detective should try to answer the six investigative questions – the 6 W’s (see eg., Cook & Tattersall, 2014; Hald, 2011). Who did What to whom? Why, hoW, Where and When did it happen?

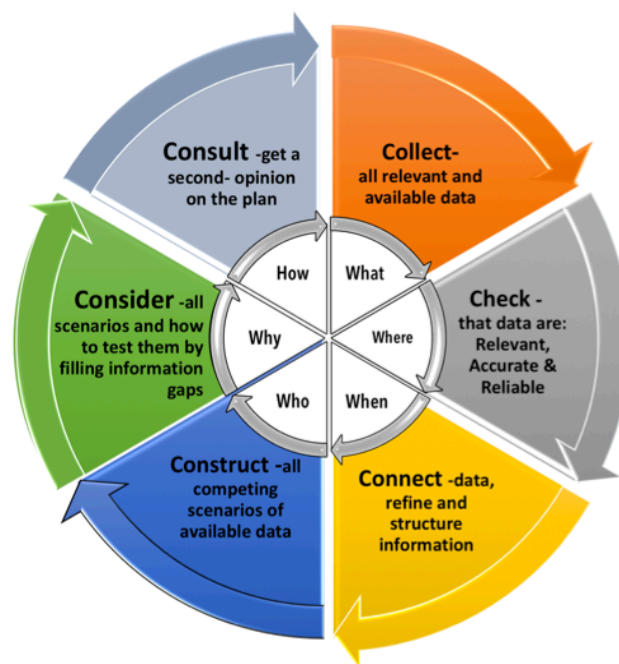


Figure 1 - Investigation as a 6 step cyclic process to answer the 6 investigative questions

In a recent report from the Prosecutor General in Norway after an enquiry of the scandalous cases against the alleged serial murder Sture Bergwall (see e.g., Ask & Alison, 2010, p. 49), the ‘Investigative Cycle’ was recommended as an example of a shared generic model for legal fact-finding worth pursuing. Hence, the lack of a shared conceptual model for legal fact-finding stands out as a major systemic shortcoming – both in the daily investigative task, and in the critical interaction between detectives, prosecutors, defence lawyers and judges.

Criminal investigations and all other forms of legal fact-finding should be approached and understood as sense-making processes. Kolko (2010) describes such processes as a ‘synthesis of design’ where the completeness of the design is heavily dependent on two critical factors: (a) the access to data, and (b) the ability of the observer to explore them with all the relevant hypotheses. Both factors are strongly dependent on the phenomenological insight and the diagnostic capacity of the sense-maker since certain data only will appear in light of certain schemata and vice versa. This close interaction between theory and data can be held as fundamental to all discoveries—scientific or not (see eg., Kuhn, 1970; Simon, 2012b). Several sense-making models exist that are based on cognitive processes (Pirulli & Card, 2005). Figure 2 illustrates the investigative process as a sense-making loop model (Pirulli & Card, 2005) composed of a series of iteratively accessible steps from the first trace of data interacting with the cognitive schemata of the detective which may develop this information into testable hypotheses and the result of the tests might serve as evidence in a criminal case construction.

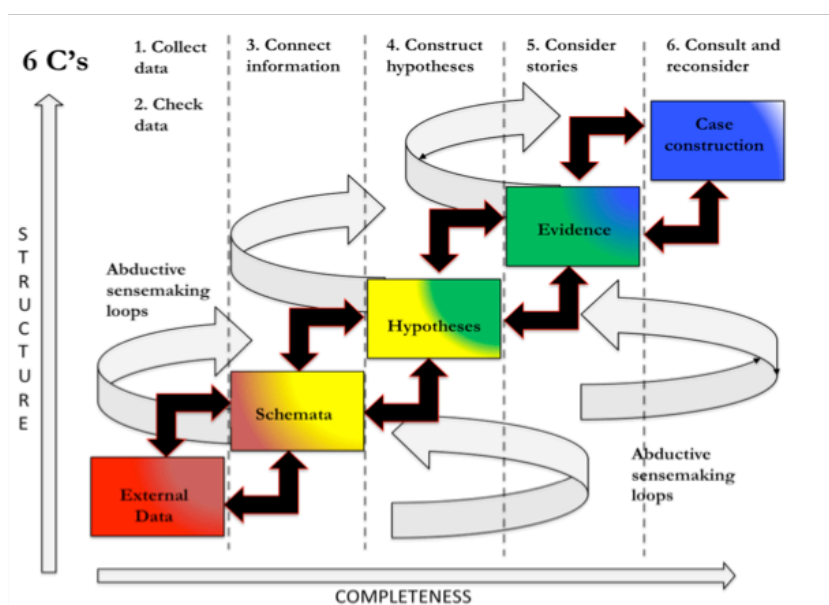


Figure 2 - Investigation as a synthesis of design created through a process of abductive sense-making

The process of interlinked decisions and hypotheses-testing activities should optimally result in the verification of one hypothesis that represents the best available construction of the truth, and a reasonable elimination of all plausible competing hypotheses. As already mentioned, investigative practice has not adopted much of the available knowledge nor from general cognitive psychology or from the emerging knowledge base on decision theory applied to criminal investigations (Dror, 2012; Hald & Rønn, 2013; Stelfox & Pease, 2005). Consequently, a systematic way of processing information is still not common knowledge or standard methodological practice for criminal detectives (Tong, 2009). In a study of 142 suspect interviews by British Fraud investigators Walsh and Bull (2010) found that using the PEACE - model for investigative interviewing contributed to overall interview quality. When it comes to judgment and decision-making, no comparable models have been developed or scientifically tested. Even the most updated guidelines and handbooks for detectives fall short of conceptualising a detailed and evidence-based model on how to think and decide in criminal investigations. As an example, the so-called 'National Decision Model' (ACPO, 20011) does not provide much positive guidance, as it tells the reader to:

1. Gather information,
2. Assess threats and develop a working strategy,
3. Consider Powers and Policy,
4. Identify Options and Contingencies and finally,
5. Take action.

According to Cook and Tattersall (2014) the model is supposed to be used in combination with the 5WH-method (Who, Where, What, When, Why and How) and the so-called 'Investigative Mind-set' which is defined by the ABC-rule (Assume nothing, Believe nothing, Challenge and Check everything). The Murder Investigation Manual (ACPO, 2000) is presented as a silver bullet to ensure successful and ethical investigations in critical and major incidents. Unfortunately, however, instead of expressing awareness and humbleness toward this highly complex task, the publication seems to uphold an existing culture of overconfidence within the police organisations. It is a paradox that while influential researchers in human decision making identified criminal justice as a particularly risky arena in the early 1970s (Tversky & Kahneman, 1974), the ACPO manuals shy away from promoting any of the available knowledge based on decision-making research. This lack



of awareness and evidence-based countermeasures probably makes detectives just as prone to cognitive bias and shortcomings as anybody else, if not more.

## BOUNDED RATIONALITY, HEURISTICS, AND COGNITIVE BIASES IN CRIMINAL INVESTIGATIONS

Human judgments, decisions and discoveries will always be based on varying degrees of belief and uncertainty (Gilovich, Griffin, & Kahneman, 2002). To cope with uncertainty, people tend to rely on a limited number of heuristics and principles that reduce complexity thereby generating simpler judgement and decision strategies. In everyday life, heuristics are helpful as they generally make our decisions more effective by guiding us in the right direction more often than not (Simon, 1977). However, in high-stake situations, where information is limited, the same heuristics, due to a number of known biases, may be just as fatal as they are helpful (e.g., Evans, 1989; Nickerson, 1998; Tversky & Kahneman, 1973b).

### Cognitive Bias

In the early 1970s, Amos Tversky and Daniel Kahneman introduced the term 'cognitive bias' to describe systematic and irrational patterns in human judgment and decision-making. The heuristics and biases research programme was inspired by Herbert Simon's notion of bounded (human) rationality. In the late 1950s, Simon challenged the research on classical rational choice, which was concerned mostly with the formalization of normative solutions to judgment and decision-making problems through probability-theory and statistics (Grove & Meehl, 1996). The bounded rationality idea holds that the study of judgment and decision-making should take into consideration inescapable environmental and cognitive constraints (e.g. limited time, information, and cognitive capacity). Humans differ from statistical machines in many ways and the so-called objective truth is not always relevant, or comparable, to human decision-making (Simon, 1955). To cope with, for example, limited working memory capacity, situational complexity and dilemmas we have developed a variety of simple decision strategies called heuristics to cope with, for example, limited working memory capacity, situational complexity and dilemmas. According to Simon

(1957), simplification of complex problems is essential in order to render them realistically solvable to humans. Rather than maximize or optimize, agents can employ procedures that exploit the simplification to solve the problem in a manner that is in some sense “good enough” or *satisficing* (pp. 204-205). Kahneman and Tversky demonstrated that everyday judgements do not adhere to laws of probability or simple statistical principles (Tversky & Kahneman, 1973a). Hence, they argued that the underlying processes in human decision-making are altogether different to those implied by rational choice models. They identified a connection between heuristics and cognitive biases which systematically led people astray in relatively simple tasks of probability assessment (Tversky & Kahneman, 1986). Contrary to Simon, who suggested that people would make economically rational decisions if only they could gather enough information, Kahneman and Tversky suggested that due to cognitive biases people will often decide against their own economic interest even when they ‘know’ better. Kahneman and Tversky argued that cognitive biases occur when heuristics trigger a tendency to make a choice that is highly inaccurate or outright wrong. The predictability of the biases invoked research into the cognitive mechanisms that caused them—the function of the heuristics. The heuristics and biases programme has later come to be viewed as one of the most influential research programmes in the history of modern psychology (Eysenck & Keane, 2005). These information-processing shortcuts, of course, do not operate in isolation, but in a combination with other regulating factors and situational dynamics such as perceptual capacity (e.g., Schank & Abelson, 1995; Simon, 1955), emotional and moral motivations (e.g., Bodenhausen, 1993; Easterbrook, 1959), and social influence (e.g., Anderson, Lepper, & Ross, 1980; Fiske & Taylor, 1991). Accordingly, subsequent research has identified a number of cognitive limitations, heuristics, and biases (Gilovich et al., 2002). The heuristics and biases with particular relevance for this thesis will be covered below (for a more complete coverage, see e.g. Gilovich et al., 2002; Kiser, 2010).

*The anchoring and adjustment heuristic* was first coined by Tversky and Kahneman (1974) as a consistent two-stage process by which people estimate values. First, a reference point is established, based on an initial value known as the anchor. This can be either presented in situ or in the form of self-generated (from previous) knowledge. Next, people make one or a series of revisions (i.e., adjustments) to the anchor to arrive at a final estimation. Kahneman and Tversky noted that the initial values that people

were exposed to had a dramatic effect, influencing subsequent revisions. When “adjustments” were typically too small and biased towards the anchor, they resulted in inaccurate final estimations (Kataoka, Latham, & Whyte, 1997). As mentioned, research suggests that police often seem to suffer from a ‘guilt bias’ (Leo, 2008; Meissner & Kassin, 2002; van Koppen, 2008). This is quite natural since it is in their job to find the guilty person when a crime has occurred and a documented reason to suspect guilt must be present in order to legally commence a criminal investigation. However, if the default anchor for any investigation is guilt, then the adjustments made probably will circle around this anchor making adjustments towards the mandatory presumption of innocence (Zuckerman, 1994) seem very far and hard to reach. Readers are referred to Wagenaar (1995) for more a comprehensive overview of how anchored narratives may hamper sound processing of evidence in the criminal justice system.

*The availability heuristic* defines the tendency to judge probability on the basis of how easily examples come to mind (Tversky & Kahneman, 1973a). This type of availability heuristic can be helpful and important in decision-making (e.g., Gigerenzer & Todd, 1999). Faced with the need to make an immediate decision, the availability heuristic allows people to quickly arrive at a conclusion, which in many situations may be both accurate and correct. For example, a very basic, but also difficult, human activity like hunting would be very hard without such immediate decisions and actions. Things that easily come to mind are believed to be more common and more accurate reflections of the world. This is probably why people go on buying new lottery tickets after a win in hopes of winning again, why they assume that vicious murders are more likely than suicides, and why they are afraid of flying due to fear of crashing. Fast assessments are made under the principle ‘if you can think of it, it must be important’. Statistically, all of these incidences are very unlikely to happen to any of us, but the relevant base-rate information is often suppressed by what first strikes our mind. Hence, the first thing you can think of gains more prominence than other equally valid evidence. A related effect to both the availability heuristic (above) and the representativeness heuristic (below) is *the feature-positive effect*. In a series of experiments with both animals and humans Smedslund (1963) and Jenkins and Sainsbury (1969) showed that the presence of instances have more influence on our learning and judgments than their absence – like in the popular saying; ‘out of sight - out of mind’. In forensic settings, this disregard of the diagnostic value of negative information was first demonstrated by

Wells and Lindsay (1980) in an archival study of line-ups. They found that positive line-up identifications of suspects were considered far more informative than non-identifications. This fundamental tendency toward positive testing strategies can lead to an illusion of correlation even for totally unrelated events. Accordingly, the availability heuristic might especially impede the detection and investigation of rare crimes (Rossmo, 2009), such as child sex homicides or maternal infanticide (Roach & Bryant, 2015) because few coroners and detectives have experienced such crimes and they are surrounded by a considerable degree of shame and taboo (Ottesen, 2012). Similarly, *the representativeness heuristic* allows for rapid judgements based on a match with the most prominent cognitive prototype that exists our mind (Kahneman & Tversky, 1973). A prototype is what we think is the most relevant or typical example of a particular event or object. This heuristic can be adaptive, allowing for a quick linkage of the most likely alternative. For example, if a woman were found dead in her home, the most prominent cognitive prototype would be to investigate the role of a potential life partner. On the other hand, it would be clearly wrong to automatically assume that her partner is the murderer, eventhough that often turns out to be the case. The investigation of serious crimes is not always a complex matter. It is sometimes a quite straightforward task (Brookman & Innes, 2013). This unpredictable alteration between simple and complex investigations makes the detective job even more captivating. In Europe, the crime statistics shows that the vast majority of investigated homicides lead to a conviction. This may be a reflection of the low homicide rates and the adequacy of law enforcement and criminal justice resources, as well as the fact that in the vast majority of homicides the victim and perpetrator are often known to each other. In Finland, for example, 90 per cent of all homicide victims between 2003 and 2011 were known to the offender (UNODC, 2013). This increases the likelihood that an investigation will establish a clear link between the perpetrator and the crime at an early stage. The statistical overrepresentation of certain patterns in homicide, and the strong underrepresentation of others, create a serious risk that phenomena occurring less often might escape the consideration of the detective.

*Framing effects.* The presentation of information will often influence its interpretation; hence information always is understood within a context or a frame. In a series of experiments Tversky and Kahneman (1981) found that their participants systematically differed in their choices when (the same) options were presented as gains (positive frame) or as losses (negative

frame). Likewise, the strength or relevance of (the same) evidence might be weighted differently depending on how it impacts the hypothesis. In a series of studies Ask et al. (2008) and Ask, Reinhard, et al. (2011) found that police trainees and law students displayed *asymmetrical scepticism* and substantial elasticity in their interpretation of the available evidence depending on the perceived strength of the evidence and how well it fitted initial hypothesis of guilt. Likewise, do dramatic effects of framing often take place in the courtroom, where opposing legal counsel present and argue variant positions on how to interpret evidence (Simon, 2012).

Ideally, observations that clearly violate prior expectations should cause adjustment towards more thorough and accurate information processing. However, the *hindsight bias* may diminish such adjustment (Fischhoff, 1975). Hindsight bias is one of the most frequently cited and researched cognitive biases in the psychological literature (eg., Arkes, Wortmann, Saville, & Harkness, 1981; Christensen-Szalanski & Willham, 1991; Guilbault, Bryant, Brockway, & Posavac, 2004; Hawkins & Hastie, 1990). For example Fischhoff and Beyth (1975) were concerned with professionals such as clinicians' or politicians' exaggerated beliefs of having known all along how their patients would recover or how elections were going to turn out. In an experiment, they asked participants from two different universities to assess the probabilities of various possible outcomes concerning upcoming events, such as President Nixon's historic journeys to China and the Soviet Union (e.g., Pres. Nixon will meet Chairman Mao; Pres. Nixon will announce that the trip was a success). After the trips, participants were asked to recall their own predictions. The results showed that participants tended to exaggerate what they had known in foresight. Hence, our scepticism and scrutiny are not evenly distributed; the facts that do not match one's views are more easily twisted, or ignored, than the facts that do (Petty, Fleming, Priester, & Feinstein, 2001). Although some issues remain unanswered, *cognitive consistency theories* play a significant role in the understanding of human reasoning and decision-making. Several studies have documented the existence of hindsight bias with regard to judgments in criminal cases. Bodenhausen (1990) found that mock jurors' interpretation of a case was influenced by their knowledge of the outcome of a prior criminal trial of the same case. Specifically, the evidence was perceived as more incriminating when the defendant had previously been found guilty, and less incriminating when the defendant had been found not guilty as compared with an unknown-outcome condition. In a study of hindsight effects in relation to the trial of O. J. Simpson, Bryant

and Brockway (1997) found that participants' a-priori probability ratings for a conviction of Simpson decreased considerably immediately after participants became aware of the acquittal verdict. In another study on mock-jurors by Simon, Snow, and Read (2004), found that participants displayed lower agreement with evidence that conflicted with a verdict after (as opposed to before) they had committed to the verdict, indicating a post-commitment rejection of dissonant information. Hence, recent research such as; Glöckner and Engel (2013) and Simon, Stenstrom, and Read (2015) suggests that cognitive consistency theories should play a greater role in the understanding of legal reasoning and decision-making. Information that falls outside of our expectations and/or challenges a held belief on a topic normally generates conflicts in the structural psychological balance (Heider, 1958) and may cause cognitive dissonance (Festinger, 1957; Harmon-Jones & Harmon-Jones, 2008). Numerous studies have shown that we are able to adjust our recollection, our conclusions and even fabricate stories in order to make sense of the past, the present or the future and thereby reducing imbalance and dissonance between new information and old beliefs. A series of experiments on simulated legal decision-making and evidence evaluation shows that coherence-shifts in one decision task can trigger shifts in a subsequent decision task involving similar underlying issues (See e.g., Simon, 2011, 2012a; Simon & Holyoak, 2002; Simon et al., 2004; Simon, 2012b). Their findings suggest that legal reasoning processes are bidirectional (guilty vs. innocent) in nature and evaluations of the evidence shift toward coherence with the emerging decision. Although these studies were conducted in laboratory settings and were not specifically directed towards criminal investigation, they do connect well with the above-mentioned findings from Ask, Granhag, et al. Ask, Granhag, et al. (2011); Ask, Reinhard, et al. (2011); Marksteiner, Ask, Reinhard, and Granhag (2011). Ask, Granhag and colleagues demonstrated how police officers in investigative settings displayed substantial elasticity in their interpretation of the available evidence depending on the perceived strength of the evidence and how well it fitted an initial hypothesis of guilt. The findings indicate that people engaging in legal reasoning in the presence of outcome knowledge, reinterpret the past to create an account that predicts the observed outcome. Another serious consequence of this effect is that it might seriously reduce our ability to learn systematically from the past and to evaluate our decisions (more) objectively. As stated by Bazerman and Chugh (2006): "In a world where everyone knew it all along, there is very little left to learn"(p. 90).

*Order-effects* refer to how the timing and order in which information appears might affect its saliency, even when the order is unimportant. The *primacy effect* implies that information presented early on in a series is weighted more heavily than subsequent information. The effect is found to be particularly salient when initial information presented is viewed as negative (Miller & Campbell, 1959; Shadish, Cook, & Campbell, 2002; Tetlock, 1983). The reverse applies for the *recency effect*, where information presented late in a session has a comparatively greater influence on the final decision made (Peters & Terborg, 1975). The order of how evidence is presented or discovered has also been found to affect the judgements of detectives (Richter & Kruglanski, 1998), crime analysts (Ask & Granhag, 2005; Dahl, Brimacombe, & Lindsay, 2008), law students (Kerstholt & Eikelboom, 2007), and judges (Dhami & Ayton, 2001; Eerland & Rassin, 2012; Kerstholt & Jackson, 1998). A study by Jonas, Schulz-Hardt, Frey, and Thelen (2001) found that the interpretation of information presented sequentially, as opposed to simultaneously, was more strongly influenced by participants' initial hypothesis, and it made them less able to generate competing hypotheses. In criminal investigations, it is the rule rather than the exception that information is acquired sequentially. This increases the risk that early evidence influences the assessment of later evidence. A central problem, therefore, is story-construction based on subsets, rather than the sum, of the evidence. Evidence discovered late in an investigation is therefore less likely to be evaluated in an unbiased way, and conflicting information that fails to support the initial hypotheses, or lines of enquiry, may be discovered but rejected, or not even discovered (e.g., Ask et al., 2008; Brookman & Innes, 2013; Hope, Memon, & McGeorge, 2004; O'Brien, 2009).

*Overconfidence.* In general, people tend to overestimate their own capabilities and have too strong a belief in the correctness of their own knowledge and judgements. This overconfidence helps us preserve our motivation and self-esteem (Adams & Adams, 1960). The same illusion, however is called the most "pervasive and potentially catastrophic" of all the cognitive biases since accidents, catastrophes and even wars arise due to an underestimation of the severity of the situation and an overestimation of actors' own capacity (Blanton, 2001; Taylor & Brown, 1988). Experts and authority figures seem to suffer even more from the overconfidence effect than do laypeople (Plous, 1993). For instance, the experts in The Federal Emergency Management Agency (FEMA) seriously overestimated their control of the rapidly escalating situation when the hurricane Katrina struck

New Orleans, with devastating consequences (Tak, Driscoll, Bernard, & West, 2007). Hence, the pervasive effects of overconfidence may seriously impact detectives' judgments as well. For example, at a US conference on suspect interrogation, the detectives were asked if the psychological influence by interrogators might compel even innocent person to confess to crimes. "No," replied one participant, "because we don't interrogate innocent people" (Kassin & Gudjonsson, 2004, p. 51). Similarly, in a study of British fraud investigators Walsh and Milne (2007) found that the vast majority of line managers believed themselves to be sufficiently skilled despite the fact that 50 per cent of their staff said otherwise. Due to such wishful assessments of the situation and of their own performance, even highly mistaken decision-makers may remain confidently optimistic about their future decisions and see no need to improve their thinking (Armor & Taylor, 1998).

*Groupthink* is the reluctance to think critically and challenge the theory that dominates within a team or group of human actors. Expressing minority or alternative views put us at risk of being disliked, whereas sharing majority views can give us a feeling of inclusion based on a (sometimes) false sense of security or confidence. Typically, this occurs once a dominant member of a group posts a certain opinion. Out of loyalty, other members not only accept that view, but also start defending it as their own. Because it is a matter of loyalty to the leader, it does not matter if the standpoint is right or wrong. A group with diverse competencies may be a great tool for a critical assessment of the ruling ideas. The "groupthink effect", however, might lead the group members into conformity and collective blindness towards alternative views (Janis, 1982). Political and military fiascos, such as the Bay of Pigs Invasion, the Vietnam War, the Watergate scandal and the 2003 invasion of Iraq are all largely said to be examples of the ensnaring effect of groupthink and social influence. In a classic experiment, Asch (1955), found that groups of strangers could persuade people to agree on statements that were obviously false by endorsing the false value as if it were correct. In an equally classic study of *obedience*, Milgram (1963) and other psychologists found that research participants were often willing to obey authority figures even when doing so clearly violated their morality and conscience. Similarly, in the so-called 'Stanford prison experiment', Haney, Banks, and Zimbardo (1973) found that decent people have natural tendency to be corrupted by powerful roles. Therefore, the usual team structure in major crime investigations,



where detectives work under the command of a senior officer, does not necessarily offer any protection against biases and tunnel vision.

Lastly, any criminal investigation risks being subjected to *confirmation bias*. Named by Evans (1989) as a “perhaps the best known and most widely accepted notion of inferential error to come out of the literature on human reasoning” (p. 41). The term was introduced in 1960 by Peter Wason, who after a series of experiments on hypothesis testing concluded that participants showed a preference for confirmation over falsification (Wason, 1960, 1968). Subsequent research has consistently shown a strong preference for positive testing strategies (see eg., Nickerson, 1998). A number of studies show a robust inclination towards a belief-consistent interpretation of available information (Klayman & Ha, 1987) and the search for new information (Klayman, 1995; Nisbett & Ross, 1980; Wason & Johnson-Laird, 1972). In everyday life, the confirmation bias is somewhat helpful as it reflects adaptive behaviour, and reduces the cognitive load required to evaluate and execute complex decisions. Just like the rest of the “fast and frugal” psychological heuristics and mechanisms, it filters and integrates new information to form a coherent system of values, beliefs and actions. The effect of confirmation bias is so hard-wearing that beliefs persist even after the information that formed the beliefs has been discredited or withdrawn (Nickerson, 1998). The psychological investment in establishing and maintaining beliefs is too high to abandon them just because the underlying information is later proven to be false or irrelevant (Jonas et al., 2001; Lord et al., 1979; Wason & Johnson-Laird, 1972). The phenomenon has proven strikingly robust across diverse domains of human thinking, including logical problem-solving (Hastie & Dawes, 2010; Hoffer, 1951; Lord et al., 1979), social interaction (Wason, 1968), medical reasoning (Snyder & Swann, 1978), military intelligence (Elstein, Shulman, & Sprafka, 1978) and in courts and police investigations (Cook & Smallman, 2008; Ask & Granhag, 2005).

## Moderating Factors

Simon (1990) describes the factors that impact our rational behaviour as acting like a pair of scissors. Rather than being separate and unrelated the external and internal factors that surround our rationality are intimately bound together. As Simon put it, “Human rational behaviour . . . is shaped by scissors whose two blades are the structure of the task environments and the computational capabilities of the actor” (Simon, 1990, p. 7). Hence, the scissor will only work if the two blades fit and work together. Moreover,

Simon argues that a result of adaptation to the environment, we are prone to make pragmatic and satisfying decisions based on the information available rather than optimal decisions based on the information we could have had. Related to bounded rationality is Brunswick's lens model (1952) which describes how the individual adapts and reacts based on cues or information from the environment. Brunswick argued that in order to understand human decision-making, or cognition in general, the environment in which the decision-making is taking place should always be considered. Later research has identified a number of factors that can moderate the influence of the above heuristics and biases on human decision-making. Time pressure and motivation are particularly relevant in the current context as they feature prominently in criminal detectives' work environment.

*Time-pressure* is pervasive in the criminal investigation environment. For example, if sound decisions are not made and acted on during the initial phase, it is, according to Stelfox (2009), "...highly unlikely that those who carry out investigative activity later in the process can compensate for these lost opportunities" (p.153). The ACPO Core Investigative Doctrine (2012) notes that the first opportunity to gather material may be the last. This raised awareness is often referred to as the 'golden hour' principle. Thus, it is important that good decisions are made during the early stage of an investigation to ensure that all potential sources of material are explored properly before being lost or contaminated. On the other hand has psychological research consistently found that time-pressure affects the quality of our judgements and decisions (Svenson & Maule, 1993). For example, do a number of studies show how time-pressure reduces the decision maker's flexibility and creativity (Bruner, Goodnow, & Austin, 1956; Kaplan, Wanshula, & Zanna, 1993). Specifically, the ability to generate alternative hypotheses and hypothesis-testing strategies is likely to be hampered (Dougherty & Harbison, 2007; Dougherty & Hunter, 2003; Thomas et al., 2008). In an experimental study, Ask and Granhag (2005) found that time-pressure made detectives more selective toward hypothesis-consistent information, less able to generate alternative explanations of criminal evidence, and more persistent in their initial belief regarding a crime-vignette. According to Klein and Hoffmann (1993), can expert decision-makers perform at high levels despite time-pressure. Alison, Doran, Long, Power, and Humphrey (2013) tested this notion in a study of English detectives. They found that time-pressure reduced hypothesis generation in a computer-based rape investigative scenario and level of professional experience did not moderate the effects. An explanation for this discrepancy in findings might be differences in task composition amongst the two studies. In some tasks (eg. in sports or in rescue operations) it is probably acceptable not to explicitly consider all alternatives and simply choose the one the expert there and then recognizes as right (Chi, Feltovich, & Glaser, 1981). Moreover, being an expert does not necessarily mean that one's

decisions are always correct (Lipshitz, Klein, Orasanu, & Salas, 2001). If you are an expert football player this is probably acceptable because to losing a match is part of the game. However, when dealing with more sensitive and critical tasks such as brain surgery or homicide investigations – one mistake is one too many (Ericsson, Prietula, & Cokely, 2007; Weiser et al., 2010).

*Motivation.* Another central aspect of human biases is the extent to which a phenomenon is driven by ‘hot’ motivational forces as opposed to ‘colder’ cognitive mechanisms (Kunda, 1990). It has long been recognized that human behaviour is largely motivated by goals, and that goals can have a strong influence on cognitive processes (Kruglanski, 1996; Kunda, 1990). The social environment is an important source of goal activation (Klein & Kunda, 1993). The mere observation of another individual’s behaviour might automatically trigger an inference of which goal the individual is pursuing (Moskowitz & Grant, 2009), which in turn makes observers more likely to strive towards the same goal (Aarts, Gollwitzer, & Hassin, 2004). It seems people generally have little conscious insight into the cognitive processes that regulate goal activation. For example, Bargh, Gollwitzer, Lee-Chai, Barndollar, and Trötschel (2001) found that a sublime priming of a cooperation goal made participants behave more altruistically. Likewise, non-conscious goal activation has been found to predict both memory performance (Dijksterhuis, Aarts, Bargh, & van Knippenberg, 2000) and creativity (Förster, Friedman, Butterbach, & Sassenberg, 2005; Hassin, Aarts, & Ferguson, 2005). As mentioned, criminal investigation is highly goal-directed, although one may debate how to best define its ultimate goal (e.g., successful prosecution, solving the crime, punishing the offender) (Maguire, 2008). In a series of experiments, Ask and colleagues have demonstrated how different forms of motivation like emotions (Ask & Granhag, 2007a; Ask & Pina, 2011), efficiency norms (Ask, Granhag, et al., 2011) and prior suspicion (Ask et al., 2008; Ask, Reinhard, et al., 2011; Marksteiner et al., 2011) significantly hampered participants’ ability to generate alternative explanations of criminal evidence in a murder case scenario. As pointed out by Ask, Granhag, et al. (2011): “this strong normative emphasis on efficiency is likely to turn the social work environment into a chronic source of activation of efficiency goals, at the expense of more time-consuming accuracy goals” (p.548). Moskowitz and Grant (2009) found evidence for significant variation in cognitive performance when individuals were tested across different stages of goal-directed behaviour. Gollwitzer, Heckhausen, and Steller (1990) named these stages the pre-decision, the pre-action, the action, and the post-action phases. Each phase is characterized by distinct tasks, and engaging in these tasks produces typical mind-sets that facilitate task completion. Hence, deliberating over which goals to pursue and planning the implementation of set goals leads to different cognitive orientations (i.e., deliberative and implemental mind-sets, respectively). Gollwitzer (1990) observed that the deliberative mind-set leads to a relatively

accurate and impartial analysis of information about the feasibility and desirability of possible goals, whereas the implemental mind-set promotes an optimistic and partial analysis of such information. Moreover, the deliberative mind-set is associated with open-mindedness, whereas the implemental mind-set is characterized by closed-mindedness. Translated to an investigative setting, it would appear that detectives are better equipped to perform an impartial search for and analysis of investigative information before (i.e., in a deliberative mind-set), as opposed to after (i.e., in an implemental mind-set), a decision has been made to arrest someone or build a case against a particular suspect. As described by Stelfox and Pease (2005), a particular challenge when investigating complex crime is to resist the premature transition from entertaining alternative explanations (i.e., deliberation) to building a case in support of the chosen alternative (i.e., implementation). Although an investigation with potential for prosecution must at some point start building a case against a particular suspect, doing so too early may be hazardous, as evidenced by numerous miscarriages of justice. How different investigative settings, decisions, actions and levels of motivational activation might correspond with Gollwitzer's theory of deliberative and implemental mind-sets has to the author's knowledge not been studied before. Hence, the present thesis will explore the applicability of the theory to complex investigations and experimentally test to what extent changes in mind-sets can predict detectives' judgements and decision-making.

## Consequences of Heuristics and Biases in the Criminal Justice System

Tversky and Kahneman (1974) noted that the effects of confirmation bias effects could extend to the legal system insofar as "beliefs concerning the likelihood of [...] the guilt of a defendant" could impact judicial decision-making (p. 1124). In line with their prediction, a growing body of literature has identified a number of ways in which such biases can pervade the entire chain of justice from eyewitnesses (Hasel & Kassin, 2009; Loftus & Ketcham, 1991) to detectives (Ask & Alison, 2010; Gudjonsson, 1995; Meissner & Kassin, 2002), forensic experts (Dror, 2011; Dror, Péron, Hind, & Charlton, 2005), jurors (Charman, Gregory, & Carlucci, 2009; Georges, Wiener, & Keller, 2013), and professional judges (Granhag, Strömwall, & Hartwig, 2005; Hasel & Kassin, 2009). In sum, this might lead to a chain-reaction amongst all actors involved in the criminal justice process, denoted by Dror (2012) as the "biased snowball effect". Likewise, Findley and Scott

(2006), describe this as a form of systemic ‘tunnel-vision’ created through a “compendium of common heuristics and logical fallacies,” to which we are all susceptible. Ultimately, this leads actors in the Criminal Justice System to “focus on a suspect, select and filter the evidence that will ‘build a case’ for conviction, while ignoring or suppressing evidence that points away from guilt” (p. 292). Likewise, Gould, Carrano, Leo, and Young (2013) describe how ‘tunnel-vision’ may cause a system-breakdown in the criminal justice process, by impeding the hierarchical and independent testing of evidence meant to take place in the pre-court and the in-court processes (Diesen, 2000; Hastie & Dawes, 2010). Gould et al. (2013) connect tunnel vision with the concept of escalation of commitment (also called sunk cost effect, see eg., Arkes & Blumer, 1985; Kahneman & Tversky, 1979; Lai, 1999) to explain why entrenchment of beliefs occur even when strong contradictory evidence has emerged:

As more resources – money, time, and emotions – are placed into a narrative involving a suspect, the actors involved are less willing or able to process negative feedback that refutes their conclusions. Instead, actors want to devote additional resources in order to recoup their original investment. As a result, evidence that points away from a suspect is ignored or devalued, and latent errors are overlooked. At this point, the police are working to rule in rather than rule out the suspect, and prosecutors have moved from ‘inspection’ mode to ‘selling’ mode. (pp. 86–87)

Interestingly, however, it is still debated whether the overall effect of heuristics and biases are productive or unproductive in the criminal justice system (Gigerenzer & Todd, 1999; Gilovich et al., 2002; Mikels, Maglio, Reed, & Kaplowitz, 2011). Snook and Cullen (2008) have argued that tunnel-vision in criminal investigation is not necessarily harmful. They state that: “Perhaps tunnel vision is used in every case, but only a very small percentage of these result in wrongful convictions’ (p. 92). Moreover, they argue that there is no empirical evidence for the claim that heuristics and biases are the underlying cause of miscarriages of justice. While Snook and Cullen might be right when arguing that building a better heuristic capacity amongst detectives represents more of a solution than a problem (Wright, 2013), it is established ‘beyond reasonable doubt’ that cognitive bias and tunnel vision

pose a serious threat to the universal principles of fair trial (e.g., Ask & Alison, 2010; Eerland & Rassin, 2012; Fraser-Mackenzie et al., 2013; Kassin et al., 2010; Kassin et al., 2013; Leo, 2008; Rassin, 2010; Rassin, Eerland, & Kuijpers, 2010).

As noted by both Glöckner and Engel (2013) and Simon (2011), ‘coherence-based reasoning’<sup>3</sup>, of which tunnel vision is an expression, may limit the ‘diagnostic value’ of evidence and seriously distort the reliability of the criminal justice process. Preferences used in decision-making are not, and should not, be fixed as assumed by classic theories of rational choice. Ideally, (legal) decision-makers should be flexible, creative and adaptive throughout the entire process, since the reconstruction of preferences seems to be the natural outcome of the very process of decision-making (Janis & Mann, 1977; Montgomery, 1983; Russo, Medvec, & Meloy, 1996).

Major crime investigations are highly complex and critical thinking operations (Innes & Brookman, 2013; Pennington & Hastie, 1992) and hence cannot be left to heuristics alone. The central question is therefore not which mode of thinking should be used, but rather how one more deliberately and functionally can move between them (Milkman, Chugh, & Bazerman, 2009). In order to achieve this, one needs situational awareness coupled with strict guidance such as education, methods, procedures, reviews and guiding policies (Graham, 2004; Jones et al., 2008; Weiser et al., 2010). A systematic development of a universally recognized professional standards and expertise building on scientific knowledge might be one step in that direction.

## EXPERIENCE AND EXPERTISE

How individuals process information, and which decision strategies they use can be related to domain specific expertise. There is a large body of research on what makes someone an expert (e.g., Benner, 1984; Chi et al., 1981; Dreyfus & Dreyfus, 2005; Dror, 2011; Einhorn, 1974; Ericsson et al., 2007; Feltovich et al., 1984; Hunt, 2006; Klein & Hoffmann, 1993; Larkin, McDermott, Simon, & Simon, 1980).

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<sup>3</sup> In plain words; ‘use what fits and ignore the rest’. For example, are adversarial court systems based on a tradition where the prosecutor takes a stand about the accused’s guilt prior to the trial. During the trial he will try to convince the judge and the jury to focus on the evidence which is coherent with guilt while the defence do the opposite.

Experts can have different degrees of expertise and several classification systems of levels of expertise have been proposed (eg., Benner, Tanner, & Chesla, 1992; Dreyfus & Dreyfus, 2005; Shanteau, 1988). Shanteau (1988) suggests three levels of decision-making expertise. Naïve decision-makers are at the lowest level of expertise and have little understanding of their field. For example, in the detective field, police students who have acquired some knowledge about the job, but have not yet practiced or applied the knowledge in real-life situations. Novice decision-makers are at the medium level of expertise. They have gained some knowledge and experience as operational police officers, but have as yet not specialised themselves in criminal investigation. At the top level are expert decision-makers who have reached the highest level of proficiency in their field. In the domain of criminal investigation, specialised detectives with high levels of both education and practical experience such as senior homicide detectives are an example of expert decision-makers. Likewise, Benner (1984) plots an individual professional progression through a series of five levels: novice, advanced beginner, competent, proficient, and expert. Novice practitioners follow basic procedural rules and do generally not move outside them, and competence develops as a result of substantial practical experience. Proficiency, in turn, is characterized by the acquisition of personal rules to formulate plans and by a reliance on intuitive decision-making. Finally, expertise is characterized by a fluid performance that happens unconsciously, automatically, and no longer depends on explicit knowledge.

Expert decision-makers are generally said to outperform novices in practical diagnostic tasks (Benner, 1984; Benner et al., 1992; Dreyfus & Dreyfus, 2000). Although it is difficult to compare measures of expertise across domains (Ericsson, 2006), research within various fields of decision-making has shown that experts and novices think and solve problems in somewhat different ways (Ross, Shafer, & Klein, 2006). As compared with novices, experts tend to have better perceptual skills (Klein & Hoffmann, 1993) and richer schemata (Rouse & Morris, 1986). Experts also possess greater tacit knowledge in specific domains (Crandall, Kyne, Miltello, & Klein, 1992). Moreover, the thought processes of experts reveal more complex and sophisticated representations of problems; experts devote proportionately more time to determining how to represent a problem, but they spend proportionately less time in executing solutions (Ross, Battaglia, Phillips, Domeshek, & Lussier, 2003).

Benner's and Dreyfus' models of expertise have been criticized by a number of scholars for failing to specify any limitations or objective criteria for testing presumed expertise (English, 1993; Rolf, 2004). Terms like 'expertise' and 'intuition'<sup>4</sup> do not have much operational value if they cannot be described, measured, or compared (Rudge, 1992). Meyer and Booker (2001) define an expert as: "a person who has background in the subject area and is recognized by his or her peers or those conducting the study as qualified to answer questions" (p. 3). Hence, the definition and identification of expertise is not always an objective and straightforward task (Ericsson et al., 2007). So far there are no established standards for the authorisation of detective expertise, hence this thesis must resort to indirect and relative measures such as years of experience, formal qualifications, recognition among peers, etc. (see, Chi et al., 1981). Most definitions of general expertise are in agreement that true expertise cannot be achieved without extensive periods of education, deliberate practice, or a combination of both (Germain & Enrique Ruiz, 2009). In most domains of expertise, an estimate of 10 years of experience, or 10,000 hours of deliberate practice, is considered to be a minimum (Ericsson et al., 2007). Such a minimum requirement will be used as an operationalisation of expertise in the present thesis.

As mentioned, experts are thought to have a better sense of what information is most relevant to handle the task at hand. Critical to this characteristic is selectivity. Selectivity is based on the attribution of differential importance and is a means of task adaptation due to, for example, limited cognitive capacity (Koriat et al., 1980). According to Chi, Feltovich, and Glaser (1981), expertise involves learning which information is most critical and which is more peripheral or even superfluous. Novices without this knowledge are therefore more prone to neglect certain key information or over-sample less important information. This knowledge is critical for directing attention and for the structuring of information in the perception process, making that process much more efficient, particularly in situations where there is time-pressure. Thus, expertise may moderate the effect of time pressure on decision quality through more effective selectivity. In addition, individuals are thought to use different strategies in high time-pressure situations compared to low time-pressure situations. Crego and Spinks (1997) suggest that police officers' use of decision strategies often depends on an automated and sometimes unconscious assessment of the

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<sup>4</sup> Intuition can be defined as something that is known or understood without proof or evidence (Merriam-Webster's Learner's Dictionary, 2016)



available time. In situations of low time pressure, individuals are thought to use analytical strategies where options are compared, whereas in situations of high time pressure, individuals are thought to use time-saving recognition primed strategies where there are stored patterns of pre-programmed responses (Flin & Arbutnot, 2002). Furthermore, recognition of primed strategies is thought to be heavily influenced by experience. For example, Calderwood, Klein and Crandall (1988) found that the performance of experienced chess players did not decrease under time-pressure; however, performance did decrease in less experienced chess-players under time-pressure. The recognition primed decision model (RPDM) states that when it comes to time-pressured decisions individuals rely on their experience. Over time, people encounter many situations and from these will develop a set of prototypical situations, or schemas, in memory. This prototype is a cognitive package that includes the type of situation, what to expect from the situation (expectancies), suitable goals, typical courses of action (COAs), and relevant cues. According to Alison et al. (2007) the ability of investigators to recognize critical cues is likely to be heavily dependent on experience.

Hence, compared to less experienced individuals, are experts thought to both have a better sense of what is the most relevant information and how to act on this in situ – (Bruine de Bruin, Parker, & Fischhoff, 2007; Hogarth, 2001; Jacobson, Gruenbaum, & Markus, 2012; Klein, Calderwood, & Clinton-Cirocco, 1986; Smith & Aamodt, 1997). This competence is thought to be critical for directing attention and taking in and classifying information in diagnostic tasks, by making the process more efficient. To illustrate, Weber, Böckenholt, Hilton, and Wallace (1993) found a positive link between years of medical experience and physicians' ability to generate relevant diagnostic hypotheses. Similar findings were reported by Stolper et al. (2010), who found that experienced general (medical) practitioners produced more accurate diagnoses than their less experienced colleagues. Other research suggests that the speed with which initial hypotheses are generated is a striking feature of expertise (Klein et al., 1986). Furthermore, there is evidence that the earlier a good hypothesis-set is created – the more predictive it is of the quality of the diagnosis (Joseph & Patel, 1990).

Professional experience is not necessarily always beneficial to diagnostic reasoning, however. In a study of early diagnostic hypotheses generation, Sisson et al. (1991) found that medical students generated more hypotheses than experienced physicians, and this finding was consistent across scenarios. Furthermore, experienced physicians' hypotheses were

found to be more general (shallower) than the students; however, the two groups did not differ in terms of the breadth of their hypotheses. Neither group were able to name all of the diagnostic categories that logically should have been included in their diagnoses. Sisson et al. assume that the fact that experienced physicians generate less specific hypotheses may reflect an unconsciously learned approach or an intuitive evolution in reasoning.

The degree to which differences in professional experience may influence detectives' decision making has not been given much attention in previous research (Ask & Alison, 2010; Stelfox, 2007; Wright, 2008). A few interesting studies are however, available. According to Alison, Barrett and Crego (2007) the ability of investigators to recognize critical cues is likely to depend heavily on experience. In support of this, Wright (2008) found that highly experienced detectives performed better than less experienced officers in an intuitive crime-scene classification task. On the other hand, in a recent study of English police officers, Alison et al. (2013) found no significant evidence for a positive relationship between professional experience and the ability to generate the highest number of investigative hypotheses in a simulated rape-crime scenario. However, as acknowledge by the authors themselves; the mere *number* of generated hypotheses may not be indicative of expertise per se. True proficiency may surface only when also the *quality* of the generated hypotheses is taken into account, which was not done in their study. The number of hypotheses generated is only of interest as long as they all are truly diagnostic and relevant to the data at hand.

A further desirable indicator of decision-making expertise is the ability to actively label and counteract the biasing influence from contextual factors (Dror, Charlton, & Peron, 2006; Lieberman, Rock, Halvorson, & Cox, 2015). As shown above, the available research has demonstrated several sources of contextual bias in criminal investigations, including time-pressure, emotional involvement, culture and occupational norms (e.g., Ask & Granhag, 2007a, 2007b; Ask, Granhag, et al., 2011). The degree to which detective expertise might act as a safeguard against such biases has not yet been systematically investigated. It will be addressed in the current research.

## England and Norway: Different Paths to Detective Expertise

In the past, police leaders seemingly held the view that the investigation of a crime required few skills in addition to the training required for general police work. In their 1919 revision of the police forces in England and

Wales, the Desborough committee<sup>5</sup> labelled the investigative task as something rather trivial that could be learned on the beat, without the need for particular training (Critchley, 1978). This view was reinforced by research conducted in the late 1970s and early 1980s, which concluded that crimes were solved primarily because members of the public provided the police with key information in the early stages of the investigation. With the absence of such information, it was seen as unlikely that the crime would be solved by additional police efforts (Greenwood et al., 1977). The implication drawn from these studies was that because crime-solving heavily depends on information provided by the public, changes in police activity or an increase in resources would make little difference in investigative outcomes. Rising levels of crime in the 1980s and 1990s, coupled with a decreasing number of crimes detected suggested deterioration in the effectiveness of crime investigation, an activity that many people saw as one of the primary roles of the police (Audit Commission, 1993). Added to this, police incompetence and poor supervision and management of major investigations had been exposed in public enquiries since the late 1970s (Irving & Hilgendorf, 1980; Morris, 2007). The first Royal Commission on Criminal Procedure (1978–1984) examined the current practice of interrogation in England and Wales and reported a widespread abuse of police powers, outright corruption and overreliance on confession evidence. The Commission resulted in the Police and Criminal Evidence Act (1984) setting out a core framework of police powers and safeguards around stop and search, arrest, detention, investigation, identification and interviewing detainees (Irving & Dunningham, 1993). Around the same time, the so-called Byford Report (1982) reviewed the flawed investigations of the murders committed by Peter Sutcliffe, more commonly known as “the Yorkshire Ripper”. Sir Byford found that the six-year enquiry, involving several different English police forces, suffered from difficulties with the operational management such as organising and processing the vast amounts of information. This shortcoming was accompanied by or led to poor decision-making relating to the early (wrongful) elimination of Peter Sutcliffe as a suspect. The same problems were later documented in the so-called Shipman inquiry into the numerous killings carried out by Dr. Harold Shipman in the North of England (Roycroft, Brown, & Innes, 2013). These problems led to the

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<sup>5</sup>As a response to the police strikes of 1918-19 the government appointed the Desborough Committee, which recommended an increase in police wages, and the creation of a uniform profession, a nationally homogenous group of men (and later women) who could be trained to do the job without intervention from local government or other intervening 'democratic' bodies (Sherman, 2001).

development and introduction of the computer software HOLMES (Home Office Large Major Enquiry System) into major incident rooms in England and Wales (Doney, 1990; Harris, 2008). From a psychological perspective, such decision support systems are indispensable, as they might counteract the well-known problem of information overload, which quickly appears as large quantities of data accumulate (Bryant, 2009). Apart from the use of computers, did these first documented observations of poor decision making seemingly have little impact on the responses that followed in the British police organization; the research and development that actually took place after the first Royal Commission mainly concerned procedural law, the introduction of computer systems, and improved methods for investigative interviewing (Williamson, 2007).

The next British Royal Commission on Criminal Justice (1993) focused even more on deficits in the supervision of criminal investigations, and for the first time investigators' decision-making was mentioned explicitly. Barrie Irving, again involved in the Commission, argued for the need to improve officers' reasoning and decision making by challenging the "common sense" about criminals and crimes, and the "working rules about causation, about suspicion and guilt ... [which] are passed from experienced to inexperienced officers" (Irving & Dunningham, 1993, p. 17). These conclusions were supported by other studies under the same commission conducted by Maguire and Norris (1992) and Baldwin and Moloney (1992), who found that although new legislation was in place and all suspect interviews were now being recorded, very little had changed for the better. The researchers found "no evidence of formal or informal quality control systems designed to minimise error" (Royal Commission on Criminal Justice, 1993, p. 20). To address these shortcomings, the commission recommended a number of changes, including an audit of on-going cases; increased disclosure of documents to the defence lawyer; an overhaul of the detective training; a clearer distinction between the role of general police officers and detectives; increased use of the HOLMES system; formal debriefs; and the introduction of policy files in all major inquiries, documenting the outset of the investigation, its lines of enquiry, any critical decisions made, and any restrictions made due to limited resources. This wave of continuous critique climaxed with the flawed Scotland Yard investigation into the death of 18-year-old Stephen Lawrence who was stabbed to death at a bus stop in South London in 1993. To this date, only two of the presumed five perpetrators have been prosecuted for this murder. The aftermath of this scandal is still

continuing and the Scotland Yard was not only held as incompetent, but also corrupted, and charged with ‘institutional racism’ (Macpherson, 1999; McGrory & Treacy, 2012; Roycroft et al., 2013).

Public trust in the British police service was now seriously threatened. To address this, a Government White paper was published in 2001: “Policing a New Century; A Blueprint for Reform”(Home Office, 2001). The paper advocated a number of radical reforms to policing which included: “the police need a clear and common understanding of the theory and practice of investigation, detective staff must be well versed in both and have the training and the experience to put it to the best use, scientific and technological advances need to be exploited to the full” (p. 41). Following this, the Association of Chief Police Officers (ACPO) and the British Police Service, have attempted to make up for the dramatic fall in public trust and confidence. The Home Office established their own research series in the early 1990s, and ACPO introduced of a series of manuals seeking to implement a new underpinning for criminal investigations in England and Wales (ACPO, 2000, 2002, 2005, 2007, 2012). This is clearly illustrated by the following excerpt from the Murder Investigation Manual (ACPO, 2000), which presents itself as:

“constructed around a model of murder investigation developed within the police service, but based upon a scientific model. The model fully recognises the core activities which occur during the course of a murder investigation, whilst promoting the principles that all investigations should be:

- intelligence led
- underpinned by research and analysis
- managed through the application of theory and logic
- dynamic and capable of rapid response.

Importantly, the model not only describes the investigative process, but is seeks to discipline the mind of the lead detective - the Senior Investigating Officer (SIO). It is suggested that if SIOs can train their minds to manage murder investigations using the model, the outcome will be an ethical and professionally led investigation” (ACPO, 2000, p. 15).

In a seminal study of the personal qualities required to succeed as an SIO in England and Wales, Smith and Flanagan (2000) identified 22 core skills. They clustered these skills into three groups: (a) ‘investigative ability’,

seen as reacting to incoming information to devise and prioritize enquiries; (b) ‘knowledge levels’, which relate to what the SIO must know (e.g., the legal points that must be proved); and (c) ‘management skills’, which include competencies with human and other resources. Unfortunately, were these findings never subjected to any further methodological conceptualisation or testing based on experimental ‘what-works’ research. Nevertheless, there has been a strong and lasting drive to improve the competence of all police officers and staff tasked with conducting investigations through the introduction of the Professionalising Investigation Programme (‘PIP’, McGrory & Treacy, 2012). The PIP aims to provide four different levels of competence for investigators: Level 1 (patrol constable), Level 2 (dedicated investigators; e.g., CID officers and specialist investigations such as child abuse investigation), Level 3 (operational command, Senior Investigating Officers), and Level 4 (strategic command). The programme was launched in 2005 and implemented in the police service by 2008. The SIO constitutes the top operational role in this system and as outlined below decision-making is one out of five defined personal qualities of an accredited SIO (ACPO, 2010):

[The SIO]...gathers, verifies and assesses all appropriate and available information to gain an accurate understanding of situations. Considers a range of possible options, evaluating evidence and seeking advice where appropriate. Makes clear, timely, justifiable decisions, reviewing these as necessary. Balances risks, costs and benefits, thinking about the wider impact of decisions. Exercises discretion and applies professional judgement, ensuring actions and decisions are proportionate and in the public interest. (para. 1)

Moreover, full-scale exercises in so-called Hydra decision-making simulation suites are compulsory at all PIP levels, both operative and strategic. Hydra is a high-fidelity immersive simulation training system designed to facilitate the development of operational decision-making skills, cooperation, and review (Eyre, Crego, & Alison, 2008). The Hydra concept is specifically tailored to develop the strategic and critical decision making skills of SIOs (Alison & Crego, 2008; Crego & Harris, 2002). As a part of the reforms, all major crime enquiries are subject to the requirement of documenting decision logs, policy files, and written reviews (ACPO, 2012). The implementation of the PIP

programme was reviewed by Flanagan (2008) who concluded that it had established a body of knowledge for investigative practice and delivered a recognizable framework to professionalize the investigative process which had been previously absent. According to Flanagan, PIP provided the opportunity to “deliver the right people, with the right skills in the right place at the right time” (Flanagan, 2008, p. 6). What this means in practice is not clear and there is no body of evidence to support the notion or the framework.

Although none of these programmes, guidelines, or documents explicitly mention abductive logic, sense-making, or any other scientifically recognised generic diagnostic method or model, the totality of the recommendations in the official guidelines might have lead the detectives into a more thorough, accurate and deliberate processing of information. Somewhat paradoxically, do the non-scientific framework from England and Wales seem to bridge the gap between research and practice better than any other known official policy in this domain. An example of this is the findings from Jones et al. (2008) who in their inspection of major crime cases found documented awareness for the notion that the SIOs in murder investigations should document all relevant hypotheses identified in the case, and the inquiry should seek to disprove each one: the remaining one is probably the strongest theory. This routine is accompanied with live case audit meant to ensure and document the recommended processes are actually followed, but also to evaluate the decision-making rationale and the examination of the process of formulating, proving and disproving hypotheses. It is likely that these combined initiatives to improve detectives’ accountability and operational decision-making have improved the overall quality of investigative work in England and Wales. However, this assumption has never been scientifically tested in relation to criminal investigation. In fact, the available research from the Home Office Research Series show that there has been no research on investigative decision-making since the research series first was established in 1992.

Despite a number of high profile cases of serious miscarriage of justice in Scandinavia and Europe at large (Fahsing & Rachlew, 2009; Granhag et al., 2013; Persak, 2014; Rachlew, 2009), no comparable change of policy towards standardised investigative methods, operational procedures, and detectives’ professional roles has yet been implemented in Norway or any other Scandinavian country (Fahsing, 2013; Hald, 2011; Rachlew, 2009; Riksadvokaten, 2015). Although the Norwegian Police University College

offers a wide range of different further education programmes within criminal investigation, none of these are compulsory to become a full-time detective (Politidirektoratet, 2013). Thus, the traditional belief in an omnipotent police officer still seems to be alive in Norway and in most other European countries (Dale, 1994; Fahsing, 2013). Furthermore, there are no standardised procedures to ensure documentation of investigation plans, critical decisions, or live auditing (Politidirektoratet, 2013; Riksadvokaten, 2015). On the other hand, all Norwegian Police officers must undertake a three-year full-time bachelor in policing before they can apply for a position in the service. This system speaks to a robust police generalist, who is expected to engage in quite complex tasks without further formal specialisation.

From the above it is evident that the paths to detective expertise are quite different in the two jurisdictions. The British initiatives comprise a number of practical steps from documentation of information and decisions to case reviews, which may serve as effective countermeasures against biased decisions and as positive drivers for increased accuracy (see also e.g., Ask, 2006; Lerner & Tetlock, 1999). To the author's knowledge, such detailed and comprehensive official guidelines on detectives' decision-making do not exist outside England and Wales, and most certainly not in any of the Scandinavian countries. The degree to which such differences in official policy might moderate detectives' decision-making remains to be systematically tested. In order to better guide future practice and policy, should therefore changes in working procedures and specific suggestions from qualitative research be followed up with experimental research in order to facilitate continuous professional development and evidence-based practices (Sherman, 2001, 2015). There is strong reason to believe that such a framework and foundation will be helpful to any detective – no matter where or when. This thesis seeks to provide an initial step in that direction.

### Is IQ a Predictor of Detective Performance?

While motivation and continuous development are assumed to be the most important factors in the development of expertise (Ericsson et al., 2007), aptitude is also of crucial importance (Hunt, 2006). The current recruitment of detectives in Norway and England stems largely from the uniformed force and by use of feeble predictors such as reputation earned during patrolling and displayed motivation (Filstad, Dean, Fahsing, & Gottschalk, 2007; Innes,



2003; Morris, 2007). More precise and valid predictors of detectives' skills are urgently needed. For what we know might the best detective candidate be sitting in a wheelchair with no chances of ever even being considered for a job in the police service.

The degree to which individual differences, such as personality traits and cognitive ability, may influence detectives' decision making has not been given much attention in previous research (Ask & Alison, 2010; Stelfox, 2007; Wright, 2008). This is somewhat surprising, given that selection based on personal abilities is common in other areas of policing (e.g., recruitment for swat, covert, surveillance or protection officers). In a few studies, however, the role of individual differences among detectives has received some support (Alison et al., 2013; Ask & Granhag, 2005; Häkkänen, Ask, Kebbell, Alison, & Granhag, 2009; Salo & Allwood, 2011; Santtila, Korpela, & Häkkänen, 2004). For instance, Ask and Granhag (2005) found that experienced detectives with high levels of need for cognitive closure (NFC)—a cognitive trait reflecting a desire for clear-cut conclusions and avoidance of ambiguity (Hirt et al., 2004; Kruglanski & Webster, 1996)—were less likely than their low-NFC peers to detect inconsistencies in the evidence gathering in a homicide case.

Police organizations around the world face the challenge of selecting the applicants who will become the most successful. Their role gives them substantial authority, and therefore society expects police officers to behave according to certain standards both on and off the job. Hence, a battery of different selection methods is in use to identify the best candidates prior to recruitment and training. Commonly used tests include minimum qualification, interviews, cognitive ability tests, personality inventories, and physical ability tests (Aamodt, 2004). Criminal investigation is thought to be perhaps the most cognitive demanding of all police tasks. For instance, the importance of intelligence to investigative work has been stressed by previous research into detectives (Maguire & Norris, 1992; O'Neill & Milne, 2014) and in textbooks on criminal investigations (Osterburg & Ward, 2000). In other domains, cognitive ability has been found to relate to job performance by facilitating facts-acquisition, learning of procedures, problem solving, and job-specific rules (Motowildo, Borman, & Schmit, 1997). These capacities are thought to be important also in law enforcement selection (Ono, Sachau, Deal, Englert, & Taylor, 2011).

Cognitive or mental ability is one of the most widely researched, applied, and also disputed psychological constructs (Baron, 1985; Weisberg

& Reeves, 2013). The U.S. Military was the first to apply large-scale testing of cognitive ability, assessing almost two million individuals during World War I (Mandler, 2007). Later, this sort of ‘intelligence testing’ developed into the dominant method for personnel selection in a wide range of public- and private-sector organisations (Hunter, 1986). The available research suggests that cognitive ability is a highly reliable predictor of overall job performance in many domains (Aamodt, 2004; Hirsh, Northrop, & Schmidt, 1986). Typically, in performance evaluation studies, cognitive ability accounts for about 25% of the variance in performance measures (Motowidlo, 2003; Ono et al., 2011).

The crucial importance of cognitive abilities to criminal investigations has been stressed by previous research on detectives (e.g., Ask, 2006; Blair & Rossmo, 2010; Fahsing & Gottschalk, 2008; Maguire & Norris, 1992; O’Neill & Milne, 2014) and in a number of previous textbooks on criminal investigations (e.g., Cook & Tattersall, 2014; Hald & Rønn, 2013; Osterburg & Ward, 2000). Interestingly, however, in law enforcement settings, meta-analyses done in the US show that cognitive ability tests have significantly lower predictive validity than for other occupational groups (Hirsh et al., 1986; Ono et al., 2011). A meta-analysis of European samples revealed similar findings (Salgado et al., 2003). One explanation for the relatively weak relationship is the social and interactive nature of most law enforcement jobs. That is, personality, maturity, motivation, and interpersonal skills may have larger effects on officers’ job performance than cognitive ability (Hirsh et al., 1986; Twersky-Glasner, 2005). Previous studies of North-American police officers by Smith & Aamodt (1997) found a significant relationship between job performance and age, experience, motivation, and level of education. The study did not control for general cognitive ability though. In a survey of British police officers, O’Neill (2011) found no correlations between Ravens Standard Progressive Matrices—a measure of fluid intelligence—and objective and subjective measures of investigative success. This may seem somewhat surprising, but O’Neill used a correlational design based on self-reporting and official clearance rates which speaks for both vague and unstable performance measures.

There are only a handful of published experimental, or quasi-experimental, studies on how cognitive ability relates to detectives’ judgments and decision-making. In the already mentioned study, including 50 Swedish detectives, Ask and Granhag (2005) found that need for cognitive closure (NFCC) moderated confirmation bias when evaluating the

strength of the evidence against a prime suspect in a fictitious homicide case. Investigators found to be high (vs. low) in NFCC were somewhat more likely to identify exonerating information when it confirmed their hypothesis, but somewhat less likely when the information disconfirmed their hypothesis. In a later study of Dutch police officers, Rassin (2010) failed to replicate these findings, but a self-constructed scale of confirmation proneness (called the Test Strategy Scale) was associated with ‘blindness’ to investigative alternatives in a significant way. Another reason for this seemingly blurred picture might be the fact that although lateral thinking, decision-making, inferences and creativity has been defined crucial for individual job performance in criminal investigations (Canter & Youngs, 2003; Fahsing & Gottschalk, 2008; Irvine & Dunningham, 1993; Smith & Flanagan, 2000) – neither of these constructs are defined in detail or with consensus in the literature (Alison et al., 2007; Ask & Alison, 2010). There is no doubt as to *if* critical thinking skills are important to become an expert detective. However a crucial question t remains; *what* type of cognitive abilities will promote investigative thinking and how can these abilities be tested in a reliable way?

A related question is to what degree cognitive ability promotes rational thinking in real-life decision-making. Numerous studies have found positive correlations between scores on tests of cognitive ability and resistance to typical decision-making biases, such as overconfidence (Stanovich & West, 2000), statistical reasoning errors (Nisbett, Krantz, Jepson, & Kunda, 1983), framing errors (Stanovich & West, 1998), and hindsight bias (Stanovich & West, 2000). Bruine de Bruin et al. (2007) found that behavioural decision-making tasks such as estimating of potential health risks were related to high scores on modified versions of the Raven’s Standard Progressive Matrices and the Nelson-Denny Reading Comprehension subtest. On the other hand, these relationships are somewhat mitigated by the fact that just as many studies have found that a number of other undesirable effects of the heuristics and biases seem to operate independent of intelligence when tested in between-subjects designs (Stanovich, 2009; Stanovich & West, 1997; Stanovich & West, 2000, 2008; Stanovich, West, & Toplak, 2013). Moreover have tasks connected with ‘scientific’ and probabilistic reasoning such as covariation detection, hypothesis testing, disjunctive reasoning, and denominator neglect not been found to support a claim for a strong relationship between intelligence tests and operational rationality (e.g., Bruine de Bruin et al., 2007; Frederick, 2005; Stanovich & West, 2000). Hence,

Stanovich and West (2014) conclude that a number of rational thinking tasks seem quite dissociated from IQ.

The notion that IQ tests do not measure all key human cognitive faculties is not new; critics of intelligence tests have been making that point for years (Neisser et al., 1996; Sternberg, 2002). The degree to which intelligence test scores are correlated with overall giftedness, practical intelligence and rational thinking is debated (Baron, 1985; Chomsky, 1972; Gardner, 2011; Stanovich & West, 2014). Taken together, the literature shows a need for a move towards a more nuanced and theory driven application of cognitive ability tests (Bruine de Bruin et al., 2007; Cokely & Kelley, 2009). Nevertheless, as already mentioned do proponents of such tests cite the abundance of research demonstrating that cognitive ability tests are excellent predictors of performance in a wide variety of jobs (Cut-e, 2016; Hunter, 1986). Consequently, are a wide range cognitive ability tests commonly used in law enforcement selection world-wide (Aamodt, 2004; Ansell, Lindfors, & Sverke, 2015; Lough & Treuer, 2013). This category of tests includes a wide variety of assessments ranging from general intelligence to combinations of specific aspects of cognitive ability as reading, math, vocabulary, and logic. As noted above, are such tests used as a screening tool also by the Norwegian Police University College (DIFI, 2014) and the same tests are applied for recruitment in a variety of other professions (Cut-e, 2016; Hunter, 1986; Ono et al., 2011). According to Aamodt (2014), this widespread use of cognitive ability tests in law enforcement selection is controversial both in light of the general critique of the relevance of IQ tests, and because cognitive ability tests tend to impact adversely on already marginalized socio-economic groups (See eg., Chomsky, 1972; Roth, Bevier, Bobko, Switzer, & Tyler, 2001).

In recent years, applicants have even challenged the legality of cognitive ability tests based on the score needed to pass the test (Aamodt, 2014). That is, should the applicants with the highest scores always be given preference over people with lower scores? Twersky-Glasner (2005) notes that such assessment instruments do not necessarily tell us what police aptitude actually is, but tend to tell what a police aptitude is not. Furthermore, police aptitude is not necessarily the same as aptitude for detection.

The bulk of research in the area is either descriptive (i.e., what types of instruments are used) or directed toward how such instruments may help detect potentially unfit candidates (Hogan & Kurtines, 1975). Because of the major consequences that follow when cognitive ability tests are used in the

recruitment of police, it is essential to conduct validation studies to ensure that the people who score high on these tests actually perform better on the job than those that do not. Until there is such evidence, the police selection procedure is largely about screening out ‘unsuccessful’ candidates (Tversky-Glasner, 2005). Based on the above, there is clearly a reason to examine what exactly constitutes good decision-making in criminal investigations, and to what degree these can be predicted by individual-difference measures.

In the specific context of investigative and diagnostic sense making, high capacity for logical reasoning should enable detectives to think of more investigative alternatives and make them more robust to irrelevant contextual influences (Hunter, 1986). As stated by Kahneman and Frederick (2002) “intelligent people are more likely to possess the relevant logical rules and also to recognize the applicability of these rules in particular situations. In the terms of the present analysis, high-IQ respondents benefit from relatively efficient System 2 operations<sup>6</sup> that enable them to overcome erroneous intuitions when adequate information is available.” (p. 68). In the current thesis, this assumption will be examined. Specifically, the relationship between measures of inductive and deductive reasoning (administered as part of the selection procedure for the Norwegian Police University College) and individuals’ ability to generate relevant investigative hypotheses will be tested (Study III).

## SUMMARY OF THE EMPIRICAL STUDIES

As illustrated above, there are a number of factors present in homicide detectives’ work environment that can bias their operational judgements and decisions. Organisational knowledge of these factors, and awareness of the potential dangers in operational contexts, are the first steps toward effective countermeasures. Accordingly, Study I, which was an interview study, explored Norwegian and English homicide detectives’ views of critical factors related to judgements and decision-making in homicide investigations. Following this, Study II tested quasi-experimentally the degree to which policy-related differences across jurisdictions (Norway vs. England), in conjunction with the amount of professional experience, influenced the

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<sup>6</sup> ‘System 2 operations’ - cognitive operations that typically are conscious, slower, effortful, and deliberately controlled.

early diagnostic phases of detectives' decision-making (i.e., investigative hypothesis generation). Using a similar design as Study II, Study III tested the degree to which a test of general cognitive ability, used in the selection process by the Norwegian Police University College, predicted investigative decision-making skills among police students.

## Study I

The aim of Study I was to discover more about how experienced homicide detectives from England and Norway think about their own professional judgements and decision-making. A specific goal was to document their knowledge and awareness about their own inferential strategies and about what factors might influence these strategies. Specifically, we explored their views from the perspective of the Gollwitzer et al. (1990) theory of changing mind-sets in different phases of action and the potential application of this theory to complex investigations.

A total of 35 experienced homicide investigators from Norway ( $n = 15$ ) and the UK ( $n = 20$ ) were interviewed to identify potential decisional 'tipping-points'—decisions that might put detectives in a goal directed mind-set focused on verifying the guilt of a suspect—and situational or individual factors that relate to these decisions. In a content analysis of the interviews, two types of decisions were identified as typically recurring and potentially critical tipping-points: (1) decisions related to the process of naming, arresting, or charging of a suspect, and (2) decisions on main strategies ('what to investigate') and the identification and priority of investigative actions ('how to investigate') in the case. In response to open-ended questions *all* participants mentioned these two proposed decisional tipping-points. We also found that experienced detectives in both England and Norway seemed quite aware of many of the risk factors and obstacles working against optimal decision making during major criminal investigations. 10 individual factors (e.g., experience, education, expertise) and 14 situational factors (e.g., information availability, time-pressure, media-attention) were reported as related to the likelihood of unconscious and potentially negative shifts in homicide detectives' mind-sets. Most of the factors reported as significant corresponded well with findings in both basic and applied decision-making research, such as the role of time-pressure (Ask & Granhag, 2007b; Bodenhausen, 1990; Svenson & Maule, 1993) excessive workload (Salo & Allwood, 2014), social stereotypes (Devine, 1989; Lindholm, 2005), pressure

from the public and media (Crego & Alison, 2004; Macpherson, 1999), and commitment to preceding decisions (Gollwitzer, 1990; Nickerson, 1998). These, and organizational pressures and team culture factors (Ask, Granhag, et al., 2011; Hofstede, 2001), were reported by more than 80% of the participants in response to open-ended questions.

*Discussion.* It has previously been pointed out that police officers are typically uninformed about essential research findings on human cognition and cognitive biases (Stelfox & Pease, 2005). Although this may well be the case, the current findings point to the possibility that experienced detectives seem to develop lay notions which in many cases correspond well with the available research literature. The results of the current study provide support for the applicability of Gollwitzer's (1990) theory of action phases in homicide investigations. British and Norwegian detectives consistently identified two specific types of investigative decisions—(a) decisions to identify, arrest, or charge a suspect, and (b) decisions on strategies, hypotheses and lines of inquiry likely to act as decisional tipping-points, i.e. trigger unconscious and narrowing shifts in mind-set. Although the two types of decisions were reported as distinct and separate, they are obviously related. One important aspect of this relationship which may be explored in future is temporal dynamics. For instance, the decision to arrest a suspect is very likely to proceed and force decisions on investigative strategies in a particular direction (i.e., focus on the suspect), because of the limited time frame during which the arrest can be sustained. Hence, many times these decisions are perhaps best seen as interlinked and mutually reinforcing, rather than separate and independent (see eg., Svenson, 1992). Moreover, because the current study used a purely explorative approach, our data does not permit any conclusions about the actual impact of these tipping-points.

## Study II

The main purpose with Study II was to test and compare police officers' ability to make high quality investigative decisions and to resist the influence of decisional tipping-points (see Study I). The process of investigation is complex and influenced by a number of stages and factors. The entire process from first suspicion-activating cue to the last note to the prosecutor is therefore very hard to reconstruct experimentally (Canter & Alison, 1999).

Hence, the present study focused on the early stages of the diagnostic process. A quasi-experiment compared experienced detectives and novice police officers from England and Norway—two countries with markedly different system for professional qualification. A total of 124 police officers took part in the study. They were recruited from four different professional groups: newly educated Norwegian police officers ( $n = 31$ ), highly experienced Norwegian homicide detectives ( $n = 32$ ), newly educated British police officers ( $n = 30$ ), and highly experienced British homicide detectives accredited as Senior Investigating Officers ( $n = 31$ ).

Participants were presented with two vignettes describing cases where a person had gone missing, which could potentially be construed as homicide cases. The presence of decisional tipping-points (Study I), was manipulated by adding a sentence in the end of the vignette stating that an arrest had been made in the case. Hence, the experimental design was a 2 (Country: England vs. Norway)  $\times$  2 (Professional experience: experienced detective vs. novice)  $\times$  2 (Tipping point: absent vs. present) mixed factorial, with tipping point as within-participants factor. After reading each case, participants were asked to identify and write down all necessary and relevant investigative hypotheses and actions. They were not allowed to use any means of assistance and were under observation given 30 minutes to individually conclude on each case. The quality of participants' responses were assessed using an exhaustive gold-standard list of plausible hypotheses and actions. The golden standard was created using a Delphi process (Hsu & Sandford, 2007; Linstone & Turoff, 1975) where a panel of 15 British and 15 Norwegian senior experts in homicide investigations were asked to identify all necessary investigative hypotheses and investigative actions through a accumulative and iterative process.

There was no significant effect of the manipulated decisional tipping-point on the number of generated gold-standard hypotheses or investigative actions, nor did the tipping-point factor interact with participants' level of experience. However, a clear and significant pattern in the form of a Country  $\times$  Experience interaction emerged. As can be seen in Table 1, the experienced officers from England significantly outperformed the other groups across all measures. The Norwegian bachelor educated novices, with only one year of professional experience, performed slightly better than the experienced Norwegian homicide detectives, and significantly outperformed their UK (novice) counterparts (see Table 1). The information presented in the two vignettes did not allow for any real discrimination between the gold-



standard hypotheses. Ideally, all of them should have been generated from the outset and tested on an equal basis. Nevertheless, all groups displayed a significant preference,  $t(124) = 43.63$ ,  $p < .001$ ,  $d = .63$ , for the crime-related hypotheses, kidnapping and murder ( $M = .52$ ,  $SD = .22$ ) compared with the non-criminal alternatives ( $M = .36$ ,  $SD = .28$ ). Only 3% of the experienced Norwegian homicide detectives produced all 6 non-criminal hypotheses in the two cases. In the vignette describing the disappearance of a young Kurdish girl, even the best performing professional group (accredited English SIO's) generated less than 50% of the non-crime hypotheses including suicide, accident, or sudden illness.

Table 1  
Mean Proportion of Generated Gold-Standard Hypotheses and Investigative Actions as a Function of Country, Experience, and Presence of Tipping Point

| Country and experience                           | No tipping point |     | Tipping point |     |
|--|------------------|-----|---------------|-----|
|  | M                | SD  | M             | SD  |
| Gold-standard hypotheses <sup>a</sup>            |                  |     |               |     |
| England  |                  |     |               |     |
| Novices  | .30              | .19 | .28           | .13 |
| Experienced                                      | .69              | .25 | .78           | .25 |
| Norway   |                  |     |               |     |
| Novices  | .52              | .23 | .50           | .23 |
| Experienced                                      | .51              | .24 | .41           | .21 |
| Gold-standard investigative actions <sup>b</sup> |                  |     |               |     |
| England  |                  |     |               |     |
| Novices  | .38              | .11 | .40           | .13 |
| Experienced                                      | .73              | .14 | .73           | .13 |
| Norway   |                  |     |               |     |
| Novices  | .62              | .15 | .60           | .14 |
| Experienced                                      | .62              | .13 | .64           | .13 |

<sup>a</sup>Values represent the proportion of generated gold-standard hypotheses out of the possible maximum. <sup>b</sup>Values represent the proportion of generated gold-standard investigative actions out of the possible maximum.

*Discussion.* Overall, the more experienced participants generated more alternative explanations and investigative actions than did the less experienced police officers. A beneficial function of professional experience was, however, only observed among the English officers. Although we did not measure decision-making effectiveness directly or in full operational scale, the relevant literature suggests that an adequate generation of relevant hypotheses (i.e., what to investigate) and investigative actions (i.e., how to investigate) is crucial to the outcome of criminal investigations and reduces the risk of cognitive biases (Alison et al., 2013; Ask, 2006; Macquet, 2009 ; Nickerson, 1998; Simon, 2012a). The results did not support our prediction that a decision to arrest a suspect would act as an investigative tipping-point (Study I). That is, contrary to the expectations, the police officers did not generate fewer relevant investigative hypotheses and actions in the case where an arrest had (vs. had not) been made, and this tendency was not moderated by officers' level of expertise. This finding may accurately reflect that strategic decisions, such as making an arrest, exert little influence on investigators' hypotheses generation and testing. On the other hand, at least two circumstances in the current experiment may have reduced the chances of observing such an effect. First, the manipulation of tipping-points was subtle—a single sentence embedded in a larger vignette. Unfortunately, there was no manipulation check to verify that participants actually picked up on this piece of information, so the salience of the manipulation remains unclear. In real-life investigations, such critical decisions are unlikely to go unnoticed. Secondly, participants were not involved in making the arrest decision, but instead read about a decision already made by a colleague. Thus, participants had little or no personal involvement in the decision, and they did not experience the transition from pre-decisional deliberation to post-decisional implementation. It could be argued, then, that the current experiment bore little resemblance to the types of decisions originally considered by Gollwitzer et al. (1990) in their definition of decision phases. As shown above, participants across all groups favoured hypotheses implying a crime (homicide or kidnap) over non-criminal hypotheses such as suicide or accident. There was no room for such discrimination in the vignettes. In an abductive test of proportional likelihood it is of course crucial to the validity of the investigation that all competing explanations are included from the outset. In practice disproving all non-criminal alternatives is sometimes the only way to warrant a so-called 'no body–murder' investigation or a murder charge (see e.g., Cook & Tattersall, 2014, p. 368).

## Study III

The main aim of Study III was to test the degree to which a test of general cognitive abilities, used in the selection process of new police students in Norway, predicts the ability to generate investigative hypotheses. A total of 166 police students took part in the experiment. They were recruited from two different locations at the Norwegian Police University College: Oslo ( $n = 88$ ) and Bodø ( $n = 78$ ). The same procedure as in Study II was followed. Thus, all participants were presented with two vignettes (Case A and B) describing cases where a person had gone missing, and which could potentially be construed as homicide cases. As in Study II, one of the cases included an arrest decision, which served as a manipulation of an investigative tipping point. After reading each case, participants were asked to identify and write down all necessary and relevant investigative hypotheses and actions<sup>7</sup>. The quality of participants' responses was assessed using the above-mentioned exhaustive gold-standard list of plausible hypotheses. Moreover, all participants gave their consent to sharing their results from a test of general cognitive ability (Cut-e, 2016) that had been administered during the selection procedure for the Police University College. The subscales assessing inductive and deductive reasoning were deemed most relevant for the hypothesis-generation task and were included in the analyses. It was hypothesised that participants' inductive and deductive reasoning scores would be positively correlated with the proportion of generated gold-standard hypotheses.

The police students generated on average almost 40 per cent of the gold-standard hypotheses in the two cases. Failing to support the predictions, a hierarchical multiple regression analysis showed that inductive and deductive reasoning scores did not significantly predict the proportion of generated gold-standard hypotheses in Case A or Case B. Moreover, inductive and deductive reasoning did not moderate the effect of the investigative tipping point on the proportion of generated hypotheses in any of the cases. A separate 2 (Case: A vs. B)  $\times$  2 (tipping-point location: Case A vs. Case B) mixed analysis of variance (ANOVA) revealed a large main effect of case ( $\eta_p^2 = .546$ ), indicating that participants generated a substantially higher percentage of gold-standard hypotheses in Case A compared with Case B. In addition, there was a statistically significant Case  $\times$  Tipping-Point

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<sup>7</sup> As new police students lack training and procedural knowledge about investigative actions, only hypothesis generation was analyzed in Study III.

Location interaction, showing that the percentage of generated hypotheses in each case depended on whether the tipping point was located in that case or not. Considering each case separately, participants tended to generate fewer hypotheses in the case when the tipping point was present (vs. absent), although the simple effect was not statistically significant for Case A or Case B. As in Study II, participants were significantly biased towards hypotheses involving a crime (e.g., abduction, murder) as compared non-criminal hypotheses (e.g., runaway, accident/illness, suicide).

*Discussion.* Study III showed that the measures of inductive and deductive reasoning ability displayed little or no relationship with police students' ability to generate hypotheses in criminal investigations. The surprisingly low correlations may indicate that neither of the measures used here (the Cut-e test or the hypotheses-generation task) capture the intended underlying constructs (see General Discussion). Another plausible explanation, however, is the fact that abductive reasoning skills (part of which were addressed by the hypothesis-generation task) are qualitatively different from deductive and inductive reasoning. Deductive reasoning applies rules in order to work out what happens in specific cases and why it happens. Broadly speaking, it is a confirmative exercise (Staat, 1993). Inductive and abductive reasoning are more closely related since they both apply knowledge and rules to seek new explanations. Inductive reasoning, however, is not ideal for exploration since it is restricted to inferences generated from previously known information. Abductive reasoning does not have the same restriction as it allows for any hypotheses, even pure guesswork, as long as it has a potential to add more explanatory power to the competing hypotheses (Lipton, 2007). This makes abductive logic inherently different from both induction and deduction since it is exploratory, and not confirmatory, in nature. The results of Study III strongly suggest that the measures of general cognitive ability currently in use in the selection of Norwegian police students is not very successful at predicting performance on a task crucial to criminal investigation—the generation of investigative hypotheses.

A further finding of Study III was that presence of an investigative tipping point was related to the proportion of generated gold-standard investigative hypotheses. This result should be interpreted with some caution, because although the number of generated hypotheses was lower when the tipping-point was present (vs. absent), this comparison was not

statistically significant for any of the two cases. One of the cases (Case A) appeared to be somewhat more effected by the presence of a tipping point than the other (Case B). Possibly, this is because participants produced more than 50% of the gold-standard hypotheses in Case A with no tipping-point present, which allows for a substantial reduction when the tipping-point is introduced; the already low baseline reporting for Case B (just above 30% with no tipping point present) may have restricted the amount of further reduction (i.e., a floor effect). As in Study II, police students were quite strongly biased towards hypotheses implying criminal explanations (e.g., murder, kidnapping). In fact, more than one third of the participants did not generate any non-criminal hypothesis in any of the cases. In a real-life investigation, such complete lack of non-criminal hypotheses would clearly hamper the diagnostic process, seriously increase the chance of tunnel-vision and guilt-bias (see e.g., Kassin et al., 2003; Marksteiner et al., 2011), and reduce the chance of finding a missing person alive. Statistically, runaways, accidents, and suicide occur much more often than do murders in Norway (e.g., less than one person is murdered for every 25 person reported missing (KRIPOS, 2014). Some participants may have understood the task as one focused on identifying a main suspect. This perception possibly arose due to an understanding among the students that solving a crime (versus solving a non-crime) is more socially rewarding within the traditional police culture. The typical efficiency goals promoted in the criminal justice process may also explain this misperception and the fact that it overrode the explicit instructions given to identify *all competing explanations*. Interestingly, the tendency to focus on criminal explanations was found also in Study II using the same materials, but among more experienced police officers. This indicates that abductive thinking understood as process of progressive reasoning towards the best explanation is difficult even under low stress conditions and when open-minded thinking is explicitly encouraged.

## GENERAL DISCUSSION

The principal aim of this thesis was to explore how detective expertise can be defined, achieved, maintained and tested in relation to criminal-investigative judgments and decision-making. The investigation of complex crime relies to a substantial degree on the individual experience and expertise of the detective in charge. The importance of these factors has been largely neglected in previous work on investigative psychology. The present research

is thus a first step towards a deeper understanding of what is meant by professionalism and proficiency within criminal investigations and legal fact-finding across jurisdictions. Drawing on the emerging traditions within applied experimental research, predictions were made as to how differences in governing policies and detective characteristics might influence the performance of one of the most fundamental activities in the criminal justice system — criminal investigation.

## Knowledge and Awareness

Study I showed that top detectives from two different jurisdictions in Europe acknowledge the relevance of Gollwitzer's (1990) mind-set theory in their professional role. Furthermore, the study identified factors that might work as decisional tipping-points in criminal investigations. The two critical tipping-points, deciding to make an arrest and deciding on investigative strategies, are not atypical or rare decisions in any way—they are daily decisions for most detectives. The effects of such pivotal decisions on detectives' decision making can lead to dramatic consequences, given that Gollwitzer (1990) theory are transferable to real-life forensic settings. Awareness of cognitive biases, as displayed by detectives in Study I, may have some protective effect, but this is just a first step towards more effective debiasing strategies with in legal fact-finding (Ask, 2006; Tversky & Koehler, 1994).

To the author's knowledge, Study I was the first to document detectives' beliefs and knowledge about their own operational decision-making across different legislative systems. Admittedly, the samples surveyed were small and may, thus, not be fully representative of the detective populations. On the other hand, given the very specialized nature of the professional group, it is rare to tap into such large amounts of detective experience. Moreover, the strong consensus in the detectives' responses indicates that our findings indeed represent prevalent views within the detective community. Our findings further indicate that experienced detectives in both England and Norway are aware of many of the risk factors and obstacles that might undermine optimal decision-making. Most of the situational factors reported as significant correspond well with findings in both general and applied decision-making research, such as the role of time pressure and excessive workload (Ask & Granhag, 2007b; Bodenhausen, 1990; Svenson & Maule, 1993), social stereotypes (Devine, 1989; Lindholm,

2005), pressure from the public and media (Crego & Alison, 2004; Macpherson, 1999), commitment to previous decisions (Gollwitzer, 1990; Nickerson, 1998), organizational pressures and team culture (Ask, Granhag, et al., 2011; Hofstede, 2001). Moreover, the typical first step in professionalizing any job activity is to provide evidence of knowledge within the field (Abbot, 1988) and a subsequent step is to document consensus between experts within the field (Einhorn, 1974). Hence, Study I can be seen as a constructive step towards such a goal, and perhaps even towards universally acknowledged professional standards for detectives.

### Expertise and Ability

The high awareness displayed amongst the detectives in Study I is somewhat comforting. On the other hand, actively applied countermeasures are perhaps even more crucial (Ask & Granhag, 2008). Compared to the rest of the world England and Wales have come quite far in the development of such applied countermeasures. As described above, the PIP programme was a huge investment made after decades of turmoil surrounding the quality of criminal investigations. The findings of Study II indicate that the investment may have been worthwhile, as the English SIO accredited officers dramatically outperformed their Norwegian colleagues with similar length of experience.

To understand why English and Norwegian police officers may have benefitted differentially from investigative experience, it is useful to recall the differences between the two systems. As a consequence of the PIP programme, the English police have a standardized four-step qualification system for detectives, comprehensive procedural guidelines, and detailed routines for systematic reviews and knowledge sharing. Furthermore, English SIOs must undergo annual refreshment training. The SIO development programme is very practice oriented and not ‘academic’ in nature (Jones et al., 2008; McGrory & Treacy, 2012). Academic terms such as ‘abductive reasoning’ are therefore not used directly in the British guidelines or accreditation procedures. Nevertheless the materials, routines, and recommendations used in the PIP programme (ACPO, 2005, 2006, 2007, 2010, 2012; Cook & Tattersall, 2014; McGrory & Treacy, 2012) are very much in line with the notion of abductive logic (Carson, 2011). The SIOs that are recruited and trained are likely to develop an affinity for abductive thinking, without the term being explicitly used.

By this they might have come closer to a notion pointed out by Nickerson (1998), namely: "The knowledge that people typically consider only one hypothesis at a time and often make the assumption at the outset that that hypothesis is true leads to the conjecture that reasoning might be improved by training people to think of alternative hypotheses early in the hypothesis-evaluation process"(p. 211). Moreover, as suggested by Ask (2006) might stricter requirements for the documentation of investigative judgements and the rationale for the different actions taken provide additional safeguards against cognitive biases. The potential success of this routine rests on several psychological mechanisms. First, stricter requirements for documentation of alternative strategies may urge the detective into a deeper and more controlled declarative and structural processing (Shiffrin & Schneider, 1977). As noted by both Glöckner and Engel (2013) and Simon (2011), the more shallow coherence-based reasoning style, may limit the 'diagnostic value' of the available evidence and seriously distort the reliability of an investigation. Major crime investigations are complex and critical thinking operations (Innes & Brookman, 2013; Pennington & Hastie, 1992). Hence, they require a shift to more conscious and controlled mind-sets. To be able to do this in high-stake situations, strict training and guidance is needed (Graham, 2004; Jones et al., 2008; Weiser et al., 2010). The compulsory training, simulations, methods, procedures, checklists, and guiding policies provided by the combined effect of the ACPO-guidelines, the HOLMES-database and PIP-accreditation regime might provide such guidance. Hence, the organisational countermeasures against biased decision-making in criminal investigations seem more advanced and developed in England than in Norway. Second, the British regime of documentation, audit and reviews is likely to increase detectives' perception of accountability. This in turn might motivate detectives to pursue crucial accuracy goals in situations where both cognitive and operational shortcuts are alluring (Lerner & Tetlock, 1999; Marksteiner et al., 2011). Previous research has found accountability to be an effective deterrent of numerous cognitive biases (Gaertner, Sedikides, Vevea, & Iuzzini, 2002). Lastly, the obligation to document and pursue alternative explanations of the event under investigation is firmly documented on page 71 the British ACPO Core investigative doctrine:



All material relevant to an investigation should be considered and any assumptions or inferences that are made during this process should be explicitly recorded. A hypothesis should be a reasonable interpretation of the material available and should offer the most logical, explanation of the facts, as they are known. It is likely, however, that there will be no single most logical explanation, but rather a series of hypotheses, each of which offers an alternative explanation.

To consider alternative accounts even within the same evidence base has been found to decrease people's confidence in a focal hypothesis (Anderson & Sechler, 1986; Edwards & Smith, 1996; Lord et al., 1984). Previous research has repeatedly shown that activating knowledge structures, or mind-set priming, can benefit the information processing also in subsequent and new contexts (Bargh & Chartrand, 2000). Once activated, a more beneficial knowledge structure can typically support interpretations of ambiguous information and thereby reduce the potentially negative effects of, for example, initial belief perseverance and confirmation bias (O'Brien & Oyserman, 2008). Once a concept is primed, other associated concepts are also activated. Hence, mind-set priming may also activate and facilitate values, norms, or goals that then serve as interpretive frames in the processing of subsequent information (Higgins, 1996; Kruglanski, 1996). The fact that major British crime detectives were superior to their Norwegian counterparts in the Study II might be explained by the fact that they were able to apply a more beneficial mind-set. The sum of their PIP level 3 competencies might have enabled them to generate both deeper and wider sets of competing hypotheses than the other participant-groups. Pfeffer and Sutton (2013) and Hinds et al. (2003) have documented how bridging the knowledge-doing gap has yielded increased performance and safer decisions in a number of different branches from nursing to aviation.

The relatively poor performance among the experienced Norwegian practitioners stands in stark contrast to the relatively high levels of knowledge and awareness displayed among Norwegian detectives in Study I. First of all, the written test used in the study may not necessarily reflect the real-life diagnostic abilities of Norwegian and English detectives. Next, the British documentation regime might have made English detectives better in expressing their ideas. Thus, the decision-making competence might be more tacit in Norway than in England. Typically, if you invite a seasoned detective

to tell you about his methods he will probably try to convey this by telling a story about how he solved one of his cases. His methods and hypotheses are elusive - even to himself. As described by Innes (2003) the detective craft is characterised by tacit knowledge as in many other crafts and professions. Thus the policy changes in England might have made their operational knowledge and competence more explicit. This provides an opportunity to discuss, review and develop the practice as well as increasing the possibility of researching detectives' decision-making. The formation of the *Journal of Homicide and Major Incident Investigation* in 2005 may have made British detectives become even more conversant in their own practice and more effective knowledge sharers. Moreover, although the official measures on investigative effectiveness still favour decisional expediency over accuracy, the internal regime of documentation, audit and written reviews may have motivated English SIOs towards higher degrees of optimisation and accuracy. On the other hand, Norwegian detectives without the same drivers for maximisation, may be more prone to be what Simon (1955; 1982) called 'satisfiers - ready to act as soon as they have enough information to satisfy their own requirements (See also Montgomery & Svenson, 1989).

The lack of relationship between professional experience and performance in the Norwegian sample might at first seem surprising. However, this is not the first study that fails to demonstrate a beneficial role of presumed expertise or of lengthy experience (Rolf, 2004). Alison et al. (2013) found that experience alone did not moderate the debilitating influence of time pressure on detectives' decision making in a simulated rape investigation. Moreover, Ask and Granhag (2005) found that experienced Swedish police investigators were actually less likely than undergraduate university students to consider alternative explanations in a staged homicide investigation. Likewise, a number of studies on lie detection explored the presumed relationship between length of police service and lie detection accuracy with no significant findings (Ekman & O'Sullivan, 1991; Porter, Woodworth, & Birt, 2000; Vrij & Mann, 2001). In medical settings, some studies have found that increased experience is associated with an unchanged, or even diminished, clinical ability to perform accurate diagnoses among psychotherapists (Dawes, 1996) and physicians (Ericsson et al., 2007). Experienced physicians' ability to diagnose rare diseases was only regained after they had undergone a refresher course (Ericsson et al., 2007). While expertise often leads to an impressive understanding or ability, it can also create illusions of competence and even situational incompetence. This so-

called ‘curse of expertise’ can prevent highly skilled individuals, teams and organisations from thinking ‘out of the box’ both tactically and strategically (Hinds, 1999). As concluded by Dror (2011), further scientific studies of expertise are crucial to understanding experts’ paradoxical functional degradation in certain legal and forensic settings. Hence, to develop actual detective expertise, what matters is not only the sheer number of years on the job, but also the type of experience gathered on the job. A deliberate cultivation of reflectiveness (rather than impulsivity) is what Baron (1985) called “actively open-minded thinking”. The superior performance displayed by the English SIOs raises the question whether other countries would benefit from the introduction of similar programmes and be inspired by what is already in place in England and Wales. While this cannot be answered on the basis of a single cross-sectional study, our findings point in that direction.

The relatively good performance displayed by Norwegian novices in Study II shows that even police generalists can do rather well on quite complex diagnostic tasks. The same has been found in studies of medical expertise (Sisson et al., 1991). The high diagnostic performance amongst novices may stem from the fact that having just graduated with a Bachelor in policing, they possess updated declarative and procedural knowledge combined with a strong motivation for optimal performance. Recent developments within the police profession, at least in Norway, have introduced a growing emphasis on lateral thinking, scientific method and intellectually demanding tasks (Larsson, 2010; Weisburd & Neyroud, 2011). The modern police service may therefore attract more students with an aptitude for abstract reasoning than before. Nevertheless, experienced English SIO’s (largely without academic degrees) performed much better than did Norwegian police novices with a Bachelor’s degree. This suggests that higher education alone does not produce detective expertise, but that it might provide a solid foundation.

### Aptitude for Detection

An obvious limitation with any quasi-experimental design like Study II is the lack of control over variables that co-vary with the treatment variables of interest. This limitation pertains to differences between officers, both at different levels of experience and of differing nationality. As for experience, it was empirically established that variations in age could not account for the observed differences between novices and experts. We cannot overlook,

however, that experts and novices differed in terms of other stable characteristics related to investigative decision-making ability. One such potential individual-difference variable—general cognitive ability—was examined in Study III.

The results of Study III showed that police students' ability to generate investigative hypotheses was not significantly related to their aptitude for inductive or deductive reasoning. Moreover, individual-level variables such as age, gender, preference for detective work, and level of education were not predictive either. This finding was somewhat surprising given that tests that purportedly measure general cognitive ability should display a relationship with a wide range of cognitive tasks. As mentioned previously however the lack of relationship may well reflect the fact that inductive and deductive reasoning are distinctly different from the type of reasoning—abduction—that is required in investigative work. Study III adds to previous research failing to demonstrate consistent correlations between cognitive tests of individual differences and detectives' work performance. For example, Ask and Granhag (2005) and Rassin (2010) report conflicting evidence regarding whether the need for cognitive closure is significantly related to how detectives evaluate ambiguous criminal evidence. With regard to the potential of cognitive ability tests in the current setting, the findings resonate with what has been established in other domains—that IQ is not the same as practical thinking skills and is no safeguard against cognitive biases (Stanovich & West, 2008).

According to Stanovich (2009), equally as important as intelligence is 'rational thinking mind-ware and procedures' (p. 38). To the author's knowledge, this has not been tested in applied forensic settings, but translated to an investigative setting this means that the detectives' ability to apply a sound contextual understanding and standard operating procedures (SOPs) probably is just as important as having a high IQ-score. Study I and II showed that although both Norwegian and English detectives seem to have a high awareness with respect to their investigative decision-making phenomena (Study I), the experiment still yield substantial differences between the two expert groups when it comes to their practical integration of rational thinking and operational procedures (Study II). In Study III, the individual results on the hypothesis-generation task varied from a low 10% (one gold-standard hypothesis identified) to a high of 100% (all gold-standard hypotheses identified) in one of the case scenarios. Moreover, 7% of the police students were able to generate more than 65% of the overall

gold-standard hypotheses, which is about the same as the average performance of highly specialised British SIOs in Study II. Such an exceptionally high performance of some beginners lacking formal training and experience indicates that it may be worthwhile to identify early predictors of core investigative abilities. This line of research is currently in a very early stage and much work remains before a stable evidence-base can be established.

### Is the ‘Effective Detective’ a Myth?

Interestingly, all the groups in Study II and III, regardless of nationality and professional level, showed a clear tendency to ignore non-criminal explanations of the cases (e.g., suicide, accident). The majority of the participants (almost 90 %) produced less than 50% of the six unique non-crime hypotheses logically available in the two vignettes. Admittedly, there were obvious reasons to suspect murder or abduction in the two cases, but that did not imply that any of the competing hypotheses could be ruled out from the outset. The information given in the vignettes did not provide enough detail to rule out any of the alternatives.

Why then did the participants tend to disregard the non-crime hypotheses? First of all, the police worldwide are rewarded by how quickly they can detect and solve crimes, whereas less premium is placed on how they deal with non-crime or the prevention of crime (Knutsson, 2013; Tilley, 2009). This fundamental skewness in the system accounts for the one-sidedness in police officers’ attention. The inclination for ‘over-suspiciousness’ amongst police officers is well established in research on police culture (see e.g., Maguire, 1994; Packer, 1968; Reiner, 2010). If multiple investigative hypotheses have to fight for working memory priority (see, eg. McDonald & Hirt, 1997; Montgomery & Svensson, 1989; Waugh & Norman, 1965), it is perhaps no surprise that ‘crime’ trumps ‘no-crime’ in the minds of police officers. As noted by Brodeur (2010), a heroic act of solving a serious crime may seem more socially rewarding to police officers than the non-crime alternatives. Similar expectations were found by Winnæss and Helland (2014) in a recent study of Norwegian police students, and by Corsianos (2003) in a study of seasoned US detectives, with both groups favouring ‘high-profile’ cases over volume crime. Further evidence for a systematic preference for ‘criminal’ interpretations of ambiguous evidence comes from more cognitively oriented psychological research. For example,

Dror et al. (2005) found that forensic experts tended to detect matches between fingerprints more readily if the crime for which the suspect was accused was more (vs. less) severe. Similarly, Ask et al. (2008) found that police students had more faith in DNA, video, and identification evidence if it produced incriminating (vs. exonerating) information.

The legal grounds for commencing a criminal investigation is normally such that there is a reason to believe that a crime have been committed (Stelfox, 2009). Paradoxically, legal terms like ‘strong reason to believe’ frequently used in procedural law worldwide to restrict the police from abusing investigative actions might in it self ‘dominate’ the information search and thereby impede detectives from introducing alternative scenarios (See eg., Montgomery & Svenson, 1992). In both vignettes used for Study II and III, there was good reason to start an investigation and probably a reason to warrant arrests. However, the seemingly strong presence of information allowing for a suspicion of a serious crime may have suppressed the generation of competing explanations which should have been considered given the absence of corroborating evidence. For instance, the absent information in the vignettes implicitly told participants that the persons gone missing had neither been found, identified, nor declared dead. This should prompt hypotheses assuming kidnapping and all the non-crime alternatives ranging from voluntary runaway to suicide. It is reasonable to argue that both present and absent information should be considered equally diagnostic.

The seemingly fundamental human tendency to find the processing of negative or disconfirming information difficult was termed by Jenkins and Sainsbury (1969) as the feature-positive effect (FPE). The FPE might help explain why the non-crime hypotheses were so hard to generate even for highly skilled accredited detectives. As mentioned in the introduction, the underestimation of the diagnostic value of negative information in legal settings was first demonstrated by Wells and Lindsay (1980) who found that positive line-up identifications of suspects were considered far more informative than non-identifications. Rassin (2011) later demonstrated the same effect in an experimental study with 47 experienced judges. Similarly, in a study of 188 law students’ willingness to pass a guilty verdict, Eerland and Rassin (2012) found a striking asymmetry between the perceived diagnosticity of finding versus not finding evidence. Considering that deliberate reasoning is limited by cognitive constraints and in complex tasks the available information may already fully occupy working memory capacity

– simply ignoring conflicting information might psychologically be what to expect (Simon, 1957). A consistent trend can be discerned throughout society: the volume and complexity of the knowledge that we need to master both in our private life and in our professions have grown beyond our capacity (Schwartz & Ward, 2004).

In aviation, this limit was discovered in October 1935, when two of the best pilots in the US tragically crashed the brand new Boeing B-17 four engine aircraft during a ceremonial test flight (Gawande, 2010). The Boeing model was deemed, as a newspaper put it, “too much airplane for one man to fly”. Boeing almost went bankrupt and a group of test pilots got together and considered what to do. They came up with a checklist for pilots to use during training and flight. They had found out that the new plane was much better than previous models, but too complicated to be left to the memory of any pilot, however expert they were. Later, the B-17 flew a total of 1.8 million miles without one accident (Gawande, 2010). Perhaps it is time to realise that the investigation of complex crimes has entered its ‘B-17 stage’. The information load for investigators as well as the volume of information available for investigation has risen dramatically over the years (Stelfox, 2009). This makes it more likely that the judgements and decisions to be made are far too numerous and complex to be left to the detective’s working memory alone. Hence, expertise alone cannot be trusted to serve as a complete safeguard against fundamental cognitive limitations. A new paradigm, where the detective in the ‘hot-seat’ is supported by adequate knowledge, tested abilities, operational checklists, and evidence based control procedures is necessary.

If the need for a new paradigm is ignored, the potential harmful consequences are considerable. First, shallow processing of evidence—an inevitable consequence of information overload—may increase the risk of stereotyping in criminal investigations. The efficiency-promoting goals that characterize the police culture may make detectives favour hypotheses and information supporting guilt. Exonerating evidence or information supporting a non-criminal explanation may be ignored or go undetected. Innocent citizens, unfortunate enough to become the subject of such an investigation, may be seriously disadvantaged and wrongfully convicted. Mr. Westerlund’s story in the introduction of this thesis is an illustration of how damaging this can be not only to the innocent suspect, but also the next-of-kin, the local society, the reputation of the police, and all other parties involved. Second, competing investigative hypotheses and actions that do

not receive sufficient attention during an investigation may dramatically weaken the prosecution's case and open up unnecessary and potentially exonerating speculations in court. Only the guilty suspect will benefit from this.

It seems that England has come further in developing a new paradigm for criminal investigation than has Norway. On the other hand, the Norwegian Police University College established a solid Bachelor education for all officers and a newly launched Master Study in Criminal Investigation, in an attempt to equip future detectives with even better critical-thinking skills.

### Limitations

There are several potential limitations of the studies reported in this thesis. First, pertaining to Study I, in-depth interviews about police officers' decision-making awareness cannot compare with observation of how the officers apply their awareness in actual investigative settings. The method, however, brings several advantages compared with more observational methods. The protected communication situation and the use of semi-structured interview protocols allow reflection, probing, and elaboration on topics. The interviews were conducted with extensive use of open-ended questions and active listening before engaging in more specific probing questions. This is conducive to good knowledge retrieval and minimal interference. Hence, the in-depth interview method was chosen as it was considered more appropriate than its alternatives for generating rich, descriptive data, detailed insights and detectives' personal reflections on investigative decision-making.

Second, the pen-and-paper vignette study used in Study II and III cannot replicate the complexity and scope of real investigations and the generalisability of the results is consequently limited. In particular, for ethical and practical reasons such studies cannot simulate the potentially high stakes involved in a real criminal investigation of, say, a homicide or a kidnapping, where victims, public safety and officer careers are potentially at risk. However, this applies to any experimental research in this area. In the future should more complex and realistic designs be pursued – ideally through the development of digital full-scale judgement and decisions simulators.

Third, an obvious limitation with any quasi-experimental and correlational design is the lack of control over variables that co-vary with the treatment variables of interest. In the current studies, this pertains to



differences between officers both at different levels of experience and of differing nationality. As for experience, it was established in Study II that variations in age did not account for the observed differences between novices and experts. We cannot overlook however, that the participant groups differed in terms of other stable factors and these in turn, are related to investigative decision-making ability. In real-life research, extensive control is hard to achieve, partly due to the limited time-frame available when testing busy operational officers relieved from duty by their superintendents. Moreover, the potentially confounding variables related to national differences are also numerous, and include factors such as crime exposure, operational routines, professional status and culture. For instance, if senior detectives enjoy a higher social status in England than in Norway, then the superior performance of the English experts may be due to a stronger motivation to appear as an exceptionally good investigator. Moreover, if individuals attracted to the police occupation in England and Norway differ in terms of stable personality characteristics, then it may be that the two groups naturally grow apart over time due to different rates of improvement, independent of differences in training and accreditation (i.e., so-called selection–maturation interaction, see; Shadish et al., 2002). Motivation and maturation however are unlikely to account for the current findings. It is unlikely that any of these factors could predict that experts would outperform novices in one country (England) and be slightly worse than novices in the other (Norway). Nonetheless, the internal validity of the results remains somewhat limited.

A fourth limitation to the current research findings is that the generation and testing of investigative hypotheses represents only one of many skills required of a senior detective (ACPO, 2010; Fahsing & Gottschalk, 2008; Smith & Flanagan, 2000). The results reported in the thesis do not tell us about differences across nations and levels of experience in terms of other crucial skills, such as resource management, team leadership, and communication skills.

Fifth, the deductive and inductive subscales of the cognitive ability test (Cut-e) used in Study III only allowed for a rather limited operationalisation of general cognitive ability. It would have been interesting to examine relationships between investigative thinking and available scales testing general decision-making skills. For example, the Decision Making Individual Differences Inventory (Parker, Bruine de Bruin, & Fischhoff, 2007), the Maximization Scale (Schwartz et al., 2002), or more general scales such as the

Watson-Glaser Critical Thinking Appraisal (Watson & Glaser, 2002) may provide additional information on individual predictors. On the other hand, as shown by Bruine de Bruin et al. (2007), aptness for more complex real life decision-making is perhaps best captured through triangulation using multidimensional scaling, incorporating several constructs that have been proposed from earlier research on diagnostic decision-making, such as need for cognition (Ask, Greifeneder, & Reinhard, 2012), need for cognitive closure (Ask & Granhag, 2005; Rassin, 2010), creativity (Dean, Fahsing, & Gottschalk, 2007), and persistence and perseverance (O'Neill, 2011). As noted by Baron (1980), there are many problems in the study of individual differences in cognitive processes. For example, recent developments in the police profession may have introduced a growing emphasis on intellectually demanding tasks (Larsson, 2010; Weisburd & Neyroud, 2011). The modern police force may therefore attract more students with an aptitude for abstract reasoning than before. The lack of observed relationships between inductive and deductive reasoning and the ability to generate investigative hypotheses potentially reflects a high average, but lack of variability, in students' general cognitive ability.

## CONCLUDING REMARKS

The research reported in this thesis might leave an impression that the detective's judgement and decision-making is more prone to error and bias than other professional groups. There is, however, no basis for such a claim. Instead, one must recognize that criminal investigations are often based on inherently uncertain sources of information, which means that conclusions beyond reasonable doubt cannot be reached. That is not a defeat for detectives, but simply a consequence of how the law is meant to be applied in modern democracies. In 2005, Stelfox and Pease described cognition and detection as "reluctant bedfellows", and there is no doubt that the British police service has learned that the hard way (Roycroft et al., 2013). A clear and unmistakable message from the government was needed before some of the available knowledge from social sciences could be applied (Home Office, 2004).

Although the reforms in England and Wales seem to have bridged the gap between knowledge and expert practice better than Norway, it is somewhat surprising that the changes have not been followed up by any systematic pre-post research to examine the potential effects of the huge

investments and the ‘what-works’ approach. This fact makes the investigative landscape much more vulnerable in times of financial recession and cuts in government budgets. Moreover, true professions are characterised by a constant and documented debate around knowledge and practice (Abbot, 1988). Within the medical domain Sibbald, de Bruin, and van Merriënboer (2013) and Weiser et al. (2010) have shown how use of checklists may facilitate good decision-making. Likewise, Rassin (2014) found that raising peoples explicit awareness significantly reduced the aforementioned ‘feature-positive effect’. There are several similar studies on ‘what-works’ from social psychology and a number of applied domains, but few, if any, within the domain of investigative decision-making. This year (2016), the Norwegian Police is launching a big reform to improve the quality of their crime investigation on all levels (Politiforum, 2016). So far there are no signs of utilisation of the available evidence for research of ‘what-works’ or any indications of pre-post research to document the potential effects of the upcoming changes. If so, this is another opportunity lost, since such changes have a great potential for natural experiments which could serve as both a proper evaluation of the reform and also build a much needed evidence-base for ‘what-works’ in criminal investigation. A great deal is known about the errors human operators make and why they occur (e.g., Elliott, 2005; Fraser-Mackenzie et al., 2013; Yates, Veinott, & Patalano, 2003). This research has been applied to a number of diverse domains, such as the finance industry (e.g., Anderson, Lowe, & Reckers, 1993; Holm & Nystedt, 2008; Tversky & Kahneman, 1986), the aviation industry (e.g., Hutchins, 1995; Sexton, Thomas, & Helmreich, 2001; Zsombok & Klein, 1997), the health sector (e.g., Arkes et al., 1981; Swets, 1988; Weber et al., 1993), and in military command (e.g., Crandall et al., 1992; Freund, Kruglanski, & Schpitzajzen, 1985; Ross et al., 2002), yielding substantial improvements in recruitment, training and operations. To develop similar evidence-based interventions for criminal investigation requires organisational effort at a higher level and cultural change. Despite the welcoming fact that a high ranking police officer is the author of the present thesis, do the executive level of police organisations not seem to fully accept, label or mitigate cognitive biases as much as they should (Fahsing & Rachlew, 2009; Lieberman et al., 2015; Weisburd & Neyroud, 2013). As stated by Cockbain and Knutsson (2015) “the true professionalisation of policing is likely to require the expansion and amelioration of the police’s internal research capacity”(p.6). The present thesis documents a great potential for cross-jurisdictional research and

development which in the age of transnational crime and global terror seems vital for both tactical, strategic and political reasons (Oleszkiewicz, Granhag, & Kleinman, 2014).

Ultimately, the main contribution from psychology is not how each officer should solve each individual case, but rather how the different professional actors in the chain of criminal justice should be recruited, qualified and organised to best serve the challenging task of fair criminal investigation, prosecution, and trial. At present, the best available advice, both from an organisational and individual level, is probably to never be too conclusive and to stay somewhat in doubt.

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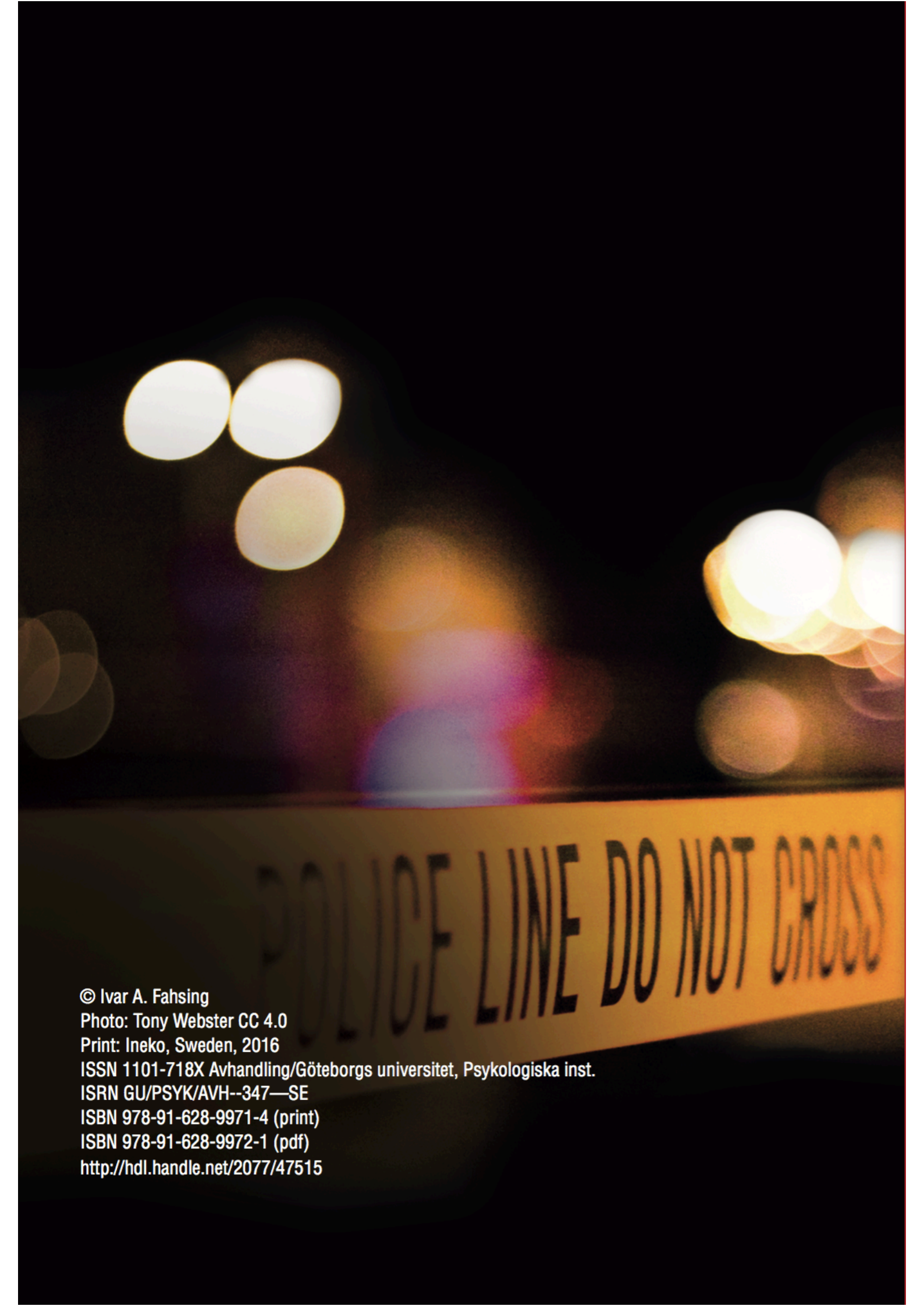
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