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The making of an expert detective: the role of experience in English and Norwegian police officers' investigative decision-making

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ABSTRACT

Biased decision-making in criminal investigations can impede or arrest the progress of justice. Previous research has not systematically addressed the effects of professional experience on the quality of detectives' decision-making. Using a quasi-experimental design, this study 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). Participants ($N = 124$) were presented with two semi-fictitious cases and were asked to report all relevant investigative hypotheses and necessary investigative actions in each case. The quality of participants' responses was gauged against a *gold standard* established by a panel of senior homicide experts. In the English sample, experienced detectives vastly outperformed novice police officers in the number of reported gold-standard investigative hypotheses and actions. In the Norwegian sample, however, experienced detectives did not perform any better than novices. We argue that English (vs. Norwegian) detectives may benefit more from professional experience due to their Professionalising Investigation Programme and a nationwide accreditation program, requiring them to engage in extensive standardized training, systematic evaluation and synchronized development. In contrast, Norway lacks such requirements. Methodological limitations and implications for police training and accreditation policies are discussed.

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Criminal investigation; homicide; decision-making; detective; expertise; accreditation

The chances of a sound and successful criminal investigation depend critically on the commanding detective's ability to make sense of incoming information, to generate all adequate investigative hypotheses, and to identify appropriate investigative actions (Ask & Alison, 2010). Professionalism, expertise, and accountability are fundamental elements of efficient and reliable investigations, but perhaps even more importantly, the very same dynamics are essential for the public trust in the police and the criminal justice system (O'Neill, 2012; Packer, 1968; Westera, Kebbell, Milne, & Green, 2014a). A number of studies have identified decision-making skills and cognitive abilities to be essential

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for an effective detective (e.g. Dean, Fahsing, Glomseth, & Gottschalk, 2008; Innes, 2003; Smith & Flanagan, 2000; Westera, Kebbell, Milne, & Green, 2014b).

The fundamental challenges facing human judgment and decision-making are well documented (e.g. Anderson, Lepper, & Ross, 1980; Gilovich, Griffin, & Kahneman, 2002; Janis, 1982; Nisbett & Ross, 1980), as is the inherent human tendency towards selective information search and confirmation bias (e.g. Greenwald, Pratkanis, Leippe, & Baumgardner, 1986; Nickerson, 1998; Snyder & Swann, 1978; Wason, 1960). Transferred to an investigative context, the preference for such 'positive testing strategies' (Klayman & Ha, 1987) entails serious implications. Specifically, there is an obvious risk that investigative actions become too focused on finding incriminating (i.e. confirming) evidence against a prime suspect, while no efforts are made to find potentially exonerating (i.e. disconfirming) information (Ask & Granhag, 2005). Recent research within forensic psychology has identified several situational and individual factors that can further compromise the execution of investigative tasks (Alison, Doran, Long, Power, & Humphrey, 2013; Ask & Granhag, 2005, 2007a, 2007b; Ask, Granhag, & Rebelius, 2011).

In a recent survey, highly experienced homicide detectives in Norway and England displayed strong consensus about factors that may detrimentally influence investigations (e.g. time pressure, limited resources, inadequate training). Importantly, detectives believed professional experience and training to be the single most important safeguards against such influences (Fahsing & Ask, 2013). From a scientific perspective, however, it remains unclear to what extent experience has a beneficial influence on investigative decision-making. Moreover, expertise is formed through various experiences (e.g. practical guidelines, formal training, certification procedures, on-the-job experience), and it is unclear whether different types of experience are equally beneficial.

In essence, solving crime is a task of abductive logic (Carson, 2009; Fraser-Mackenzie, Bucht, & Dror, 2013; Simon, 2012). Abduction is the cognitive process of identifying the best possible explanation for a set of observations (Josephson & Josephson, 1994; Peng & Reggia, 1990) and is characteristic of tasks like medical diagnosis (Feltovich, Johnson, Moller, & Swanson, 1984), scientific discovery (Thagard, 1989), and discourse comprehension (Kintsch, 1988). 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 investigative hypotheses to the most likely explanation. In the present study, we examine how presumed detective expertise, developed in two distinctly different training and accreditation regimes (England vs. Norway), relates to successful hypothesis generation and hypothesis testing in complex criminal investigations.

Defining detective expertise

Expertise can be understood as a socially recognized characteristic linked to knowledge, technique, skills, or a combination of them all, which distinguishes someone from novices and less experienced people within a discipline (Ericsson, 2006). According to this definition of expertise, expert chess players almost always will win games against recreational chess players, expert medical specialists are more likely to diagnose a disease correctly than novices, and so on. Here, the central question is whether 'expert detectives' display a similarly superior performance when compared to novices in the field.

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), and possess greater tacit knowledge in specific domains (Crandall, Kyne, Miltello, & Klein, 1992). The thought processes of experts also 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). Examining expertise from a cognitive perspective shows that expertise is not only about being faster and more efficient, but rather that experts seem to go about things differently. This leads to high performance in many cases, but certainly not always. For instance, a series of studies on the human ability to make reliable predictions shows that human clinicians, no matter how experienced, are inferior at computing and weighing information compared with mechanical computing (Dawes, 1996; Meehl, 2003). Moreover, when the task at hand requires mental flexibility and creativity, expertise drawing strongly on cognitive automatization might be outright counterproductive (Stanovich, 2009; Sternberg, 2002).

Hence, the definition and identification of expertise is not always an objective and straightforward task (Ericsson, Prietula, & Cokely, 2007). To our knowledge, the role of expertise in detectives' decision-making has not been tested directly in previous research. Because there are no established standards for the identification of an expert detective, we must resort to indirect and relative measures such as years of experience, formal qualifications, and recognition among peers (Chi, Feltovich, & Glaser, 1981). Most available definitions agree that true expertise cannot be achieved without extensive periods of education, deliberate practice, or a combination of both. 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). In the present study, we will adhere to this universal minimum criterion when identifying presumed expert detectives.

Professional experience, expertise, and biased decision-making

A prominent cause of poor decisions is the decision-maker's failure to identify all possible choice alternatives before they start evaluating and integrating information to arrive at a choice (Tversky & Kahneman, 1986). Optimally, the initial stage of abductive reasoning involves thorough problem recognition, problem framing, and option generation (Tversky & Kahneman, 1981), all of which depend on the decision-maker's domain-specific knowledge (Rikers, Schmidt, & Boshuizen, 2000; Winkler & Clemen, 2004). 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 practitioners produced more accurate diagnoses than their less experienced colleagues.

On the other hand, in a recent study Alison et al. (2013) found that professional experience was not related to British police officers' ability to generate investigative hypotheses in a simulated rape-investigation scenario. As the authors acknowledge, however, the

number of generated hypotheses may not be indicative of expertise per se; the benefits of experience may surface only when the *quality* of the generated hypotheses is taken into account, which was not done in their study (Alison et al., 2013). Arguably, the number of hypotheses generated is only of interest as long as they are truly diagnostic and relevant to the case at hand. To address this limitation, we used a panel of subject-matter experts to establish hypothesis quality in the present study.

A further desirable indicator of decision-making expertise is the ability to resist the biasing influence from contextual factors (Dror, Charlton, & Peron, 2006). Research has demonstrated several sources of contextual bias in criminal investigations, including time pressure, emotional involvement, and expediency-promoting occupational norms (Ask & Granhag, 2007a, 2007b; Ask et al., 2011), but the degree to which detective expertise protects against such bias has not been systematically investigated. Research on detectives' susceptibility to bias may be particularly informative when cast in light of previous research on the different phases of goal-directed behavior (e.g. Gollwitzer, 1990; Gollwitzer, Heckhausen, & Steller, 1990). Gollwitzer et al. (1990) observed that people tend to be more flexible and open-minded before having chosen a specific course of action (i.e. when in a 'deliberative' mind-set), and significantly less so once a choice has been made (i.e. when in an 'implemental' mind-set). In the context of a criminal investigation, a particular challenge 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 (ACPO, 2012), doing so too early may be hazardous, as evidenced by numerous miscarriages of justice (Findley & Scott, 2006; Leo, 2008).

In the study by Fahsing and Ask (2013), experienced detectives identified the decision to make an arrest as the most significant 'tipping point' in a criminal investigation, triggering a shift in investigators' mind-set from deliberation to implementation. That is, after a decision to arrest a suspect has been made, according to detectives, it becomes more difficult to maintain an open mind and consider multiple investigative hypotheses. Interestingly, the respondents reported detective experience and training as the most important factors protecting against the debilitating influence of decisional tipping points (Fahsing & Ask, 2013). If respondents' assumption is correct, then expert detectives should be more robust and display smaller shifts in mind-set in response to decisional tipping points, compared with novice police officers. This prediction was tested in the present study.

Different paths to detective expertise: the England and Norway examples

In 2004, the Association of Chief Police Officers (ACPO) and the Home Office in England and Wales commissioned the Professionalising Investigation Programme (PIP). At the time, there was a wealth of evidence demonstrating the necessity of improving the manner in which the police conduct investigations of crime (Home Office, 2001). Her Majesty's Inspector for the Constabulary (2001) stated that 'the investigation of murder should set a standard of excellence that all other criminal investigations can follow' (p. 115). Thus, the ACPO developed both advice to reduce biased decision-making, such as the Core Investigative Doctrine, and detailed procedural guidelines, like the Major Incident Room Standardised Administrative Procedures manual and The Murder Investigation

Manual, to facilitate a more robust and standardized approach to the investigation of serious and complex crime in England and Wales (ACPO, 2005, 2006, 2012).

All investigative roles, from handling volume crime (PIP Level 1) to operational and strategic management of complex crime (PIP Levels 3 and 4), must undergo a multi-level certification process through documentation of training and practical skills described in the National Occupational Standards (ACPO, 2010). A critical element of this process is the systematic training in identifying and documenting relevant investigative hypotheses and actions in criminal cases. The Senior Investigating Officer (SIO) constitutes the top operational role in this system, and a documented exceptional decision-making ability is one of the five required personal qualities of an accredited SIO (ACPO, 2010). Moreover, a national system of systematic quality reviews, annual refreshment training, and a number of subject-specific working groups were set up to facilitate continuous development of criminal investigators. The PIP program was implemented in most of the English and Welsh police service by March 2008, and Flanagan (2008) concluded that the program had successfully established a body of knowledge for investigative practice and delivered a recognizable framework for professionalizing investigation which had been previously absent.

Despite a number of high-profile miscarriages of justice exposing weaknesses in the conduct of criminal investigations in the Scandinavian countries (Fahsing & Rachlew, 2009; Rachlew, 2009), no action towards professionalizing police investigation comparable to PIP has been taken in Norway. While the Norwegian Police University College offers further education programs within criminal investigation, none of these are mandatory in order to become a full-time detective. Investigative skills are mainly developed on the job, through direct first-hand experience and through informal interaction with colleagues. Moreover, there are no detailed, standardized procedures in place to ensure generation and documentation of investigative strategies, action plans, or critical decisions. Nor is there a system for uniform quality reviews. Instead, the responsibility for training, documentation, and quality assessment is left up to the individual officer or to the local police authority. Thus, the traditional notion of an omnipotent police officer, capable of engaging in various complex tasks without formal specialization, still prevails in Norway and the Scandinavian countries (Dale, 1994; Fahsing, 2013; Hald & Rønn, 2013).

It should be noted that large national differences exist also at the level of basic police training. Since 1993, Norwegian police recruits must undertake a 3-year full-time Bachelor in Policing at a university college before receiving national police authorization. In contrast, the basic police training in England and Wales is not standardized at a national level and is practically rather than academically pitched, consisting of a 2-year probation period with a compulsory 25 weeks of so-called foundation training (Metropolitan Police, 2014).

In sum, the development of detective expertise follows considerably different paths in England compared with Norway. While the basic police training is more comprehensive and academically pitched in Norway, the system for developing detective expertise is more structured and formalized in England. In particular, we expect to see larger increases in detectives' ability to generate relevant investigative strategies and actions within the English nation-wide accreditation system than within the Norwegian system, which places more emphasis on local experience and peer learning.

The present research

The scope of the present research was to compare detectives' ability to generate investigative hypotheses and actions, as well as their vulnerability to investigative tipping points, across different qualification and training regimes and different levels of experience. We presented novice and experienced police officers from England and Norway with two crime scenarios based on real-life missing-person cases. To manipulate the presence of an investigative tipping point, we added to one of the two cases information that a person close to the victim had been arrested. Participants were asked to generate as many relevant investigative hypotheses and actions as possible for each case. We consulted an international expert panel consisting of 30 senior homicide detectives to produce a *gold standard* – a comprehensive set of relevant investigative hypotheses and investigative actions for the two cases – against which participants' responses were gauged. Hence, we were able to assess both the quantity and the quality of participants' hypothesis and action generation.

Four specific research hypotheses were formulated for the study: First, experienced detectives will generate a greater amount of relevant investigative hypotheses and actions than will novice police officers (H1). This prediction rests on the assumption that the experienced detectives have developed a richer repertoire of relevant schemas and crime scenarios, due to their extensive experience with violent-crime investigations. Second, the difference between experienced detectives and novice police officers in the generation of relevant investigative hypotheses and actions will be more pronounced among English officers than among Norwegian officers (H2). We expect this as a consequence of the nation-wide program for the professionalization of detectives and standardization of investigative routines in England and Wales, in combination with the absence of such measures within the Norwegian police. Third, participants will generate fewer relevant investigative hypotheses and actions when an investigative tipping-point (i.e. decision to arrest) is present in the case material (H3), as this is likely to trigger a shift from an open-minded deliberative mind-set to a rigid implemental mind-set (Gollwitzer et al., 1990). Fourth, the investigative hypothesis and action generation of experienced detectives will be less influenced by the presence of a tipping-point compared with novice police officers (H4). This is predicted because expert decision makers tend to be more robust than novices to irrelevant contextual influences (Chi et al., 1981), and because detectives in the study by Fahsing and Ask (2013) reported training and experience as the most important factors protecting against bias.

Method

Participants

A total of 124 police officers in England and Norway, representing five different police forces in each country, participated in the study. To qualify as an experienced homicide detective, participants were required to work as a homicide detective, have at least 10 years of experience as detective, and currently be in charge of major crime investigations. In addition, accreditation as SIO (i.e. having reached level 3 of the PIP program) was required for the English officers. To qualify as a *novice*, participants were required to

currently work as a patrolling officer, have no more than 2 years of policing experience, and have no further education as detective.

Recruitment of participants was facilitated through contact with the Commanding Officer of the Criminal Investigation Department (CID) in the involved police forces, who volunteered officers that met the above selection criteria. The recruitment process was the same in both countries. According to the National SIO database, our sample of English SIOs ($n = 31$) covered about 10% of the operational SIOs in England, Wales, and Northern Ireland at the time of the data collection. There is no formal SIO accreditation in Norway, and thus no national SIO database. However, a rough estimate is that our sample of experienced detectives ($n = 32$) constitutes slightly less than half of all detectives in Norway who meet the inclusion criteria. The total number of police officers in England and Wales is approximately 127,000 as of September 2014 (Home Office, 2015), and in Norway approximately 9000 as of December 2014 (Politiet, 2015).

The demographic and professional characteristics of the samples are reported in Table 1. As can be seen, the gender distribution was considerably more male-dominated in the English samples than in the Norwegian samples. Relevant comparisons (i.e. English SIO's vs. experienced Norwegian detectives, English novices vs. Norwegian novices) in terms of age and experience, however, revealed only minute differences. The only exception was the amount of further detective training, where English SIO's had received considerably more documented training than their Norwegian counterparts. This is probably due to the English accreditation system, which requires annual updating and further training.[1]

Materials

Two vignettes, each the length of an A4 page, were created as stimulus materials. The vignettes were fictional, but were inspired by several actual missing-person cases in Norway and England. The circumstances surrounding the cases were thoroughly masked or manipulated to prevent recognition of the cases and to allow for the insertion of investigative tipping points. Extensive pretesting and modification of the material was undertaken to make sure the vignettes allowed participants to generate several alternative investigative hypotheses. For instance, the missing persons were portrayed as females

Table 1. Frequencies (percentages) and means (standard deviations) for demographic variables in the experienced and novice samples of police officers in England and Norway.

	Experienced officers		Novice officers	
Variable	England ($n = 31$)	Norway ($n = 32$)	England ($n = 30$)	Norway ($n = 31$)
Gender				
Female	5 (16.1%)	19 (59.4%)	4 (13.3%)	18 (58.0%)
Male	26 (83.9%)	13 (40.6%)	26 (86.7%)	13 (42.0%)
Age (years)	45.9 (5.3)	44.4 (6.4)	28.7 (3.8)	26.3 (1.9)
Experience				
Police experience (years)	23.4 (5.9)	20.8 (7.8)	2.4 (1.3)	1.1 (1.1)
Detective experience (years)	17.1 (5.7)	14.3 (6.4)	0.0 (0.0)	0.0 (0.0)
Homicide case experience (years)	11.6 (6.9)	10.1 (4.5)	0.0 (0.0)	0.0 (0.0)
SIO homicide case experience (years)	5.5 (4.3)	5.7 (3.4)	0.0 (0.0)	0.0 (0.0)
Further detective training (weeks)	33.8 (20.7)	11.4 (9.1)	0.0 (0.0)	0.4 (0.7)

with a mixed cultural background to invite speculation about crimes stereotypically associated with different cultures (Ask & Alison, 2010; Innes, 2003; Macpherson, 1999).

Each vignette consisted of (1) a brief introduction to the background of the victim, their relationship with key persons in the case, and potential motives for violence against the victim; and (2) a longer section with preliminary findings in the investigation, including information obtained from witnesses, initial crime scene analyses, and subsequent investigative actions. The presence of investigative tipping points was manipulated by adding, to one of the two vignettes, information that a senior officer previously in charge of the investigation had decided to arrest a particular suspect in the case. The decision to arrest per se does not change the balance of evidence, so objectively the detectives' investigative hypothesis generation should not be altered. The order in which participants received the two vignettes, and the placement of the decisional tipping point, was counterbalanced. The vignettes are presented in the Appendix.

Procedure

The experimental sessions were held in a quiet room at participants' home station. Participants were told to turn off their mobile phones, not to talk to each other, and not to use any external aids while working with the materials. After being seated in the room, participants received a booklet containing information about the research, an informed consent form, a demographics questionnaire, task instructions, and the two crime vignettes.

Participants were instructed to imagine that the events in the vignettes had taken place on the previous day, that they had just been put in charge of the investigation, and that they had all the necessary operative resources at their disposal. They were given 30 minutes for each case to generate as many relevant investigative hypotheses and actions as possible. These were to be written down on two blank sheets, one for investigative hypotheses and one for actions. To prevent fatigue, participants were allowed a 5-minute break after the completion of the first vignette. After completing the entire booklet, participants were debriefed about the purpose of the research and thanked for their participation. The same experimenter was present for all experimental sessions to ensure an identical procedure.

Data preparation

To assess the quality of participants' responses, a so-called *gold standard* of relevant investigative hypotheses and actions was established for each of the two cases. An expert panel, consisting of 30 peer-recognized homicide-investigation experts in Norway and England, was recruited. The panel members, 15 from each country, were recruited among members of the ACPO National Homicide Working Group in England and Wales, and within the National Criminal Investigation Service of Norway and the Homicide Department of the Oslo Police Service. All panel members were among the most experienced active homicide detectives in the two countries, most of them in a position as senior supervising officers of homicide-investigation divisions or similar. Hence, they all had a background as operational SIO's, and more importantly, they worked with reviewing and enhancing the quality of complex investigations on a daily basis. First, we sent out the two crime vignettes to each expert individually, asking them to identify all the

investigative hypotheses that an officer in charge of the investigation must evaluate, and all the necessary investigative actions to be taken. Panel members were given as much time as needed to compile their individual recommendations. Second, we sent the accumulated list of unique investigative hypotheses and actions recommended by the experts back to the panel for revision. Panel members were encouraged to add any missing items or identify any irrelevant items. The second step was to be repeated for as many iterations as necessary to arrive at full consensus. Complete agreement was, however, achieved already in the first round. The final set of recommended investigative hypotheses and actions was treated as the gold standard against which participants' responses were gauged. Our process of collecting expert recommendations is similar to the *Delphi* process (see Waring, Alison, Cunningham, & Whitfield, 2013), which has previously been used successfully to integrate the views of police experts (Alison et al., 2013).

The gold standards for the two cases contained approximately the same number of investigative hypotheses (9 vs. 11) and gold-standard investigative actions (24 vs. 29). A trained coder analyzed participants' responses and counted the number of gold-standard investigative hypotheses and actions mentioned. A second coder was introduced to the scoring protocol and then independently read and scored 20% of the responses. The intraclass correlation coefficient (ICC) between the two coders was high, both for the number of gold-standard investigative hypotheses (ICC = .975) and for the number of gold-standard investigative actions (ICC = .969). Disagreements were resolved in discussion between the coders. To make the measures comparable across cases, the proportion of reported gold-standard investigative hypotheses and actions out of the possible maximum was calculated for each case and used as dependent variables in subsequent analyses. None of the respondents reported any investigative hypotheses or actions other than those included in the gold standard.

Results

Preliminary analyses

Quite naturally, participants' age differed greatly between the expert and novice groups (see Table 1). While age correlated significantly with the proportion of generated gold-standard investigative hypotheses ($r = .36$, $p < .001$) and actions ($r = .41$, $p < .001$), it did not account for significant portions of the variance (p's > .17), or affect the nature of the results, when included as covariate together with the independent variables in the main analyses. Hence, age was disregarded in all analyses reported below.

Main analyses

A 2 (country: England vs. Norway) × 2 (professional experience: experienced detective vs. novice) × 2 (tipping point: absent vs. present) mixed ANOVA, with tipping point as within-participants factor, was performed on the proportion of generated gold-standard investigative hypotheses. The means in each cell of the analysis are reported in the top panel of Table 2. As predicted in H1, there was a significant main effect of professional experience, $F(1, 120) = 44.18$, $p < .001$, $\eta_p^2 = .27$. As expected, experienced detectives generated a greater proportion of the relevant investigative hypotheses ($M = .58$, $SD = .21$) than did

Table 2. Mean Proportion of Generated Gold-Standard Investigative Hypotheses and Investigative Actions as a Function of Country, Experience, and Presence of Tipping Point.

	No tipping point		Tipping point	
Country and experience	*M*	*SD*	*M*	*SD*
	Gold-standard investigative hypotheses[a]			
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[b]			
England				
Novices	.38	.11	.40	.13
Experienced	.73	.14	.73	.13
Norway				
Novices	.62	.15	.60	.14
Experienced	.62	.13	.64	.13

[a]Values represent the proportion of generated gold-standard investigative hypotheses out of the possible maximum (9 for Case 1; 11 for Case 2).
[b]Values represent the proportion of generated gold-standard investigative actions out of the possible maximum (24 for Case 1; 29 for Case 2).

novices ($M = .39$, $SD = .19$), Cohen's $d = 0.95$. No other main effects were significant in the analysis. There was, however, a significant interaction between country and professional experience, $F(1, 120) = 66.98$, $p < .001$, $\eta_p^2 = .36$. As depicted in Figure 1, the pattern was consistent with the prediction in H2. Multiple comparisons using the Bonferroni correction were conducted to examine the precise location of mean differences. As expected, English SIO's ($M = .72$, $SD = .18$) significantly outperformed English novices ($M = .28$, $SD = .12$), $p < .001$, $d = 2.88$. In the Norwegian sample, however, experienced detectives and novices did not differ significantly, $p = .999$, $d = -0.28$. In fact, the experienced Norwegian detectives ($M = .45$, $SD = .16$) performed slightly worse than the Norwegian novices ($M = .50$, $SD = .20$). The English SIO's did better than experienced Norwegian detectives ($d = 1.59$)

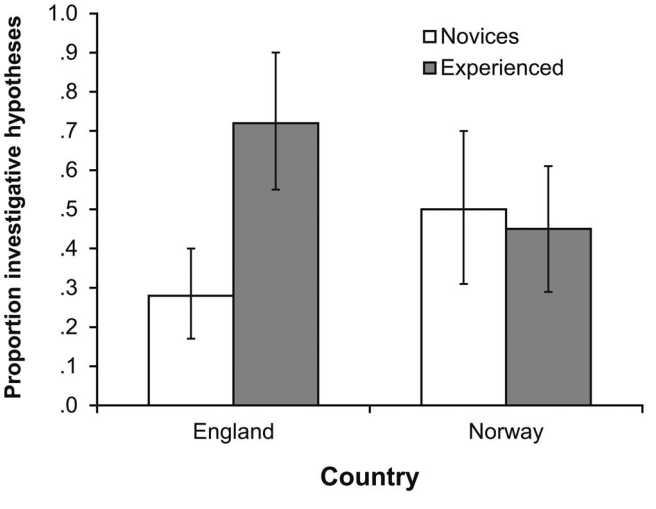

Figure 1. Mean proportion of generated gold-standard investigative hypotheses by country and level of experience. Error bars represent standard deviations.

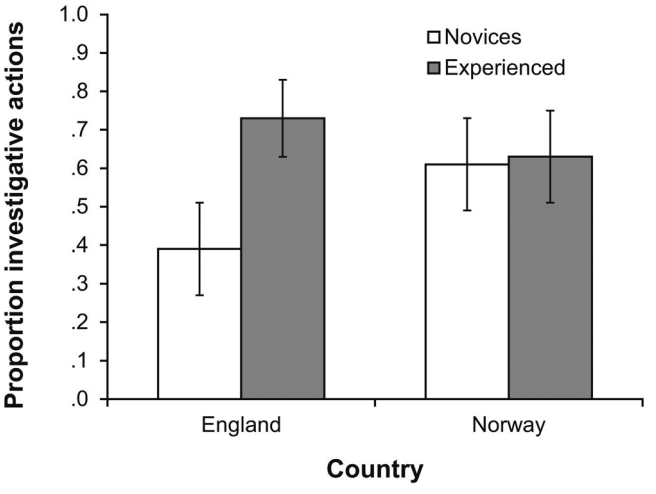

Figure 2. Mean proportion of generated gold-standard investigative actions by country and level of experience. Error bars represent standard deviations.

and Norwegian novices ($d = 1.16$), both p's < .001, who in turn outperformed English novices ($d = 1.20$ and $d = 1.33$, respectively), both p's < .001. None of the two-way or three-way interactions involving the tipping-point factor were significant, p's > .056. Hence, there was no support for H3 or H4.

A second mixed ANOVA was performed on the proportion of generated gold-standard investigative actions. The means in each cell of the analysis are reported in the lower panel of Table 2. Again, as predicted in H1, there was a significant main effect of professional experience, $F(1, 120) = 82.59$, $p < .001$, $\eta_p^2 = .41$. As expected, experienced detectives generated a greater proportion of the gold-standard actions ($M = .68$, $SD = .12$) than did novices ($M = .50$, $SD = .16$), $d = 1.27$. There were no other significant main effects in the analysis. Again, however, there was a significant interaction between country and professional experience, $F(1, 120) = 62.07$, $p < .001$, $\eta_p^2 = .34$. As depicted in Figure 2, the pattern was consistent with the prediction in H2. *Post hoc* analyses (Bonferroni) revealed that English SIO's ($M = .73$, $SD = .10$) significantly outperformed English novices ($M = .39$, $SD = .11$), $p < .001$, $d = 3.23$. In the Norwegian sample, however, the effect of professional experience was found to be non-significant, $p = .999$, $d = .25$. The experienced Norwegian detectives ($M = .64$, $SD = .12$) performed only marginally better than the Norwegian novices ($M = .61$, $SD = .12$). Again, the English SIO's did better than their Norwegian counterparts ($d = .82$) and Norwegian novices ($d = 1.09$), both p's < .01, who in turn outperformed English novices ($d = 2.17$ and $d = 1.91$, respectively), both p's < .001. None of the two-way or three-way interactions involving the tipping-point factor were significant, p's > .197. Thus, there was no support for H3 or H4 with regard to investigative action generation.

Additional analyses

Ideally, the number of generated investigative hypotheses and the number of investigative actions should be related, because additional hypotheses should be accompanied

by additional actions required to test those hypotheses. Finding such a correlation would indicate that police officers know not only what to do (actions), but also *why* they should do it (i.e. to test specific investigative hypotheses). Pearson correlations between the number of generated investigative hypotheses and actions were computed within each of the Country × Professional experience groups separately. While a positive correlation was found in all groups, it was only significantly larger than zero for English SIO's, $r(31) = .48$, $p = .006$, and Norwegian novices $r(31) = .42$, $p = .019$, and not for the experienced Norwegian detectives, $r(32) = .22$, $p = .226$, or English novices, $r(30) = .26$, $p = .165$. None of these correlation coefficients, however, differed significantly from each other, p's > .259.

In the two presented cases, all of the gold-standard investigative hypotheses were competing and mutually exclusive. Thus, for instance, ruling out that the missing person has run away, been struck by sudden illness or accident, or committed suicide effectively narrows down the investigation to two types of crime – kidnapping and/or murder. Ideally, then, all relevant investigative hypotheses should be identified with equal frequency at the outset of the investigation. We examined, therefore, how the frequencies of generated investigative hypotheses were distributed within each case (Figures 3 and 4). In the case involving a missing Kurdish girl (Figure 3), there were only ambiguous circumstances pointing toward the father. Nevertheless, all groups, except the English SIO's, were clearly biased toward investigative hypotheses involving the abduction or killing of the girl by family members. English SIO's were considerably more likely to identify alternative hypotheses, but did display a drop in the likelihood of considering non-criminal hypotheses (i.e. accident, illness, or suicide). The second case (Figure 4) was structurally similar to the first, with a married Chinese woman going missing. The vignette did, however, contain information about the discovery of a dead body of an Asian woman

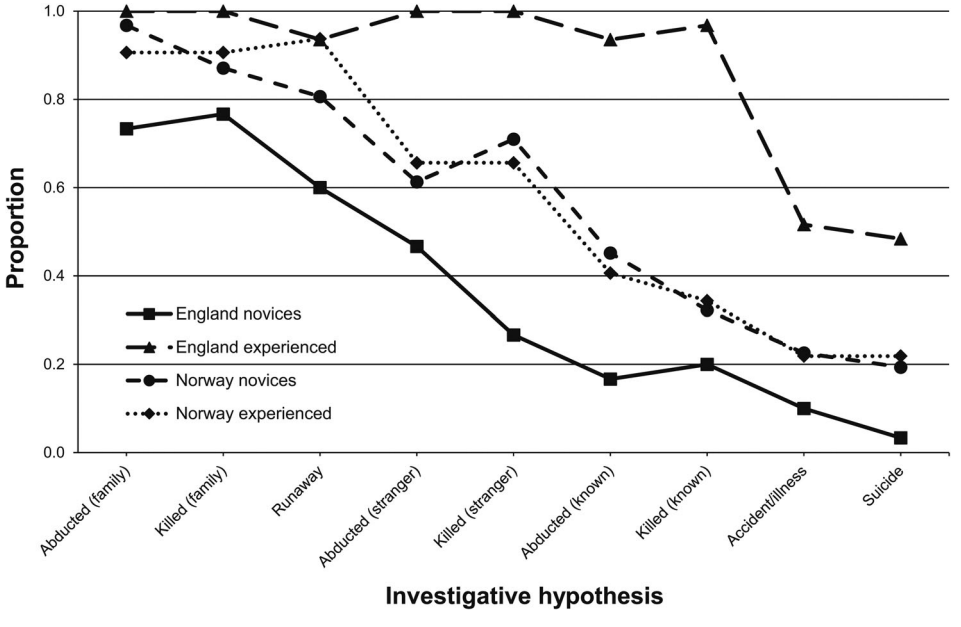

Figure 3. Proportion of participants who reported each of the gold-standard investigative hypotheses in the case involving a missing Kurdish girl.

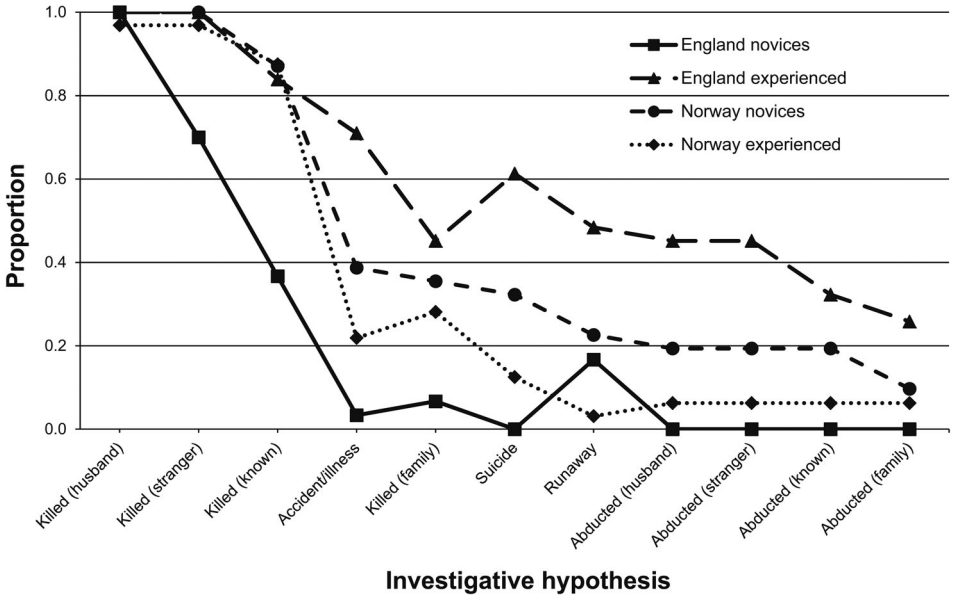

Figure 4. Proportion of participants who reported each of the gold-standard investigative hypotheses in the case involving a missing Chinese woman.

in the vicinity of the missing person's home. Although the identity of the body had not been established, all groups, including the English SIO's, displayed a clear bias toward investigative hypotheses involving murder. Again, however, English SIO's were better at identifying alternative hypotheses compared with the other three groups.

Discussion

Our findings suggest that professional experience may improve the ability to generate and test investigative hypotheses in criminal investigators. Overall, the more experienced participants in our study generated more alternative explanations and investigative actions than did the less experienced police officers. The beneficial role of experience was, however, only observed in the English (and not in the Norwegian) sample; experienced Norwegian detectives did not perform any better on our experimental task than did their inexperienced colleagues. Although we did not measure decision-making effectiveness directly, the relevant literature suggests that an adequate generation of relevant investigative hypotheses (i.e. what to investigate) and investigative actions (i.e. how to investigate) is beneficial to the outcome of actual criminal investigations and reduces the risk of bias (Alison et al., 2013; Ask, 2006; Macquet, 2009; Simon, 2012). Our findings thus imply that expertise, but only when developed under propitious circumstances, improves the quality of investigative decision-making.

To understand why English and Norwegian police officers may benefit differentially from investigative experience, it is useful to recall the differences between the two systems. As a consequence of the PIP program, the English police have a standardized four-step qualification system for detectives, comprehensive procedural guidelines, and detailed routines for systematic reviews and knowledge-sharing (Cook & Tattersall, 2008; McGrory & Treacy,

2012). Furthermore, English SIOs must undergo annual refreshment training. The Norwegian police, in contrast, have neither a nation-wide qualification program for detectives, or standardized requirements for further training. Instead, competence is developed through personal interest, on-the-job-learning, and non-compulsory education. Of critical importance for the present study, English SIOs receive mandatory training in the generation and documentation of investigative hypotheses and actions, whereas Norwegian detectives do not. It remains for future research to show whether this particular type of training alone accounts for the observed difference in performance, or whether several components of the PIP program act synergistically to improve performance.

The relatively high performance of Norwegian (vs. English) novices also deserves mention. Possibly, this can be attributed to differences in the nature of the basic police training between the countries. Since 2012, Norwegian police recruits receive some training and education with regard to investigative hypothesis generation and testing. Moreover, their academically pitched 3-year Bachelor in Policing may foster the kind of critical-thinking skills necessary to perform relatively well to this particular investigative challenge. The shorter, and more practically oriented, foundation training in England may not prepare recruits equally well for the task.

The complete lack of relationship between extensive professional experience and performance in the Norwegian sample may be surprising. However, this is not the first study failing to demonstrate a beneficial role of presumed expertise or detective experience. Alison et al. (2013) recently 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 Swedish experienced police investigators were actually less likely than undergraduate university students to consider alternative explanations of findings in a homicide investigation. In clinical settings, some studies have found that increased experience is associated with an unchanged, or even diminished, ability to perform accurate diagnoses among psychotherapists (Dawes, 1996) and physicians (Ericsson et al., 2007). Experienced physicians' ability to diagnose rare diseases picked up only after they had undergone a refresher course (Ericsson et al., 2007). As noted by Dror (2011), further scientific studies of expertise are crucial to understand its 'paradoxical functional degradation' (p. 184), and thereby contribute to the future development of expert performance. To develop true detective expertise, it appears that not only the mere number of years on the job, but also the *type* of experience gathered on the job is crucial. As stated by Ericsson et al. (2007), extensive practice alone will not do, it must also be *deliberate* in order to make you an expert.

The results did not support our prediction that the decision to arrest a suspect would act as an investigative tipping point (Fahsing & Ask, 2013). That is, contrary to expectations, 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 null finding may accurately reflect that strategic decisions, such as making an arrest, exert little influence on investigators' hypothesis generation and testing. We believe, however, that 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 case file. Regrettably, we did not include a 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. Second, participants were not involved in making the arrest decision, but instead read about a decision already made by a unknown 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. Interestingly, participants tended to ignore non-criminal explanations of the cases (e.g. suicide, accident), regardless of the presence or absence of an arrest decision. This corresponds well with previous observations of crime and guilt biases among law-enforcement personnel (Innes, 2003; Meissner & Kassin, 2002; Packer, 1968).

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 study, this limitation pertains to differences between officers both at different levels of experience and of different nationality. As for experience, it was established empirically that variations in age could not account for the observed differences between novices and experts. It cannot be excluded, however, that experts and novices differed in terms of other stable characteristics which, in turn, are related to investigative decision-making ability. It may be that the psychological makeup of police recruits has changed over the 15–20 years that separate novices and experts in our study. Recent developments of the police profession, at least in Norway,[2] have introduced a growing emphasis on lateral thinking and intellectually demanding tasks (Larsson, 2010; Weisburd & Neyroud, 2011). The modern police may therefore attract more recruits with an aptitude for abstract reasoning than before. Nevertheless, experienced English SIO's 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 fundamental.

The potentially confounding variables related to national differences are greater in number, including factors such as 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*; Shadish, Cook, & Campbell, 2002). Both motivation and maturation, however, are unlikely account for the current findings, as none of these factors would predict that experts would perform better than novices in one country (England) and slightly worse in the other (Norway).

A final caveat concerns the representativeness of our experimental task for criminal detectives' actual work. Admittedly, the generation and testing of investigative hypotheses represent only one of many skills required of a senior detective (ACPO, 2010). Our results are not informative about differences across nations and levels of experience in terms of other crucial skills, such as resource management, team leadership, and communication. There appears to be strong consensus among policing experts, however, that the ability to generate and evaluate alternative explanations is among the core defining features of an expert detective (ACPO, 2012; Cook & Tattersall, 2008; Simon, 2012;

Smith & Flanagan, 2000; Stelfox & Pease, 2005). Hence, despite its necessarily limited scope, the current study addresses a skill considered to contribute strongly to both the soundness and the success of criminal investigations.

In this study, we have demonstrated that professional experience is potentially beneficial to detectives' ability to identify relevant investigative hypotheses and formulate appropriate lines of inquiry. Importantly, however, increased experience does not guarantee expertise or improved performance. Our findings suggest, rather, that the type of basic education, practical training, standardised investigative procedures and formal evaluation that detectives undergo shapes the course of their professional development. The superior performance displayed by the English SIO's raises the question whether other nations would benefit from the introduction of a program for accreditation, training, and review similar to that already in place in England. While this cannot be answered on the basis of a single cross-sectional study, our findings do point in this direction. We hope that our study will inspire further, tightly controlled studies on the relative merits of different qualification and quality assurance systems, and inform policy makers seeking to create optimal conditions for the development of detective expertise.

Disclosure statement

No potential conflict of interest was reported by the authors.

Notes

1. Other, potentially relevant, population differences are more difficult to control for. For instance, differences in population size and crime rates (e.g., homicide rates have been higher in the UK [1.7 per 100,000 population] than in Norway [1.0] over a recent 10-year period; UNODC, 2013) may influence the possibility to gain professional experience; an English SIO may have been exposed to a greater variety of complex murder investigations than a Norwegian detective with the same number of years on the job.
2. A Bachelor's degree in Policing has since 1993 been compulsory for all new Norwegian police officers.

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Appendix

Case 1

Background:

Mheili Al Sayed, 17 years, lives with her mother, father, and a younger brother (12 years). Her parents are Kurds who emigrated from Northern Iraq in 2003. She is a college student. Her father works as a mechanic with the National Railway and her mother is a housewife. They live in a quiet suburb near a large park, restaurant, shopping area, and a railway station.

Sunday XX st of October at 12:15 PM (imagine this was yesterday) Raihed Mursha, female, 17 years who lives in city X called the local police and reported that her best friend Mheili Al Sayed, who also is 17 years old, has gone missing. She explained that the two of them were supposed to meet last night, and Mheili had planned to stay over that night. They talked on the mobile, just after 4 PM, and they planned to meet outside of the local cinema at 6 PM. Mheili had stated that she would walk the 2 miles from her parent's home. Raihed was outside the cinema at approximately 5:50 PM, but Mheili had never turned up. Instead, she received a text message from her saying, 'Help – I am be' (Nothing more). Raihed tried to call her back several times, but she did not answer. She got worried and walked the 2 miles to Mheili's home. She rung the bell several times, but no one answered. Raihed then walked back towards her own home and on the way she rung several of their common friends, but no one had heard from Mheili. The next morning around, 9 AM, she went back to Mheili's home. Mheili's mother opened the door, and when she saw Raihed she screamed: 'No, no, no' in Arabic and forcefully closed the door. Raihed went straight back home and discussed the situation with her parents. Together they agreed to call the police.

A police patrol contacted Raihed on Sunday afternoon at 5 PM. Raihed explained that Mheili, a couple of months ago, was dating a boy in their school named Javed Smith. However, when her little brother saw them together he told their parents. As a result, her parents locked her up for almost a week in the family home. After that Mheili terminated all contact with Javed.

At about 5:30 PM, the police patrol drove to Mheili Al Sayed's family's home where Mheili's father, Mohammed Al Sayed opened the door. He said that they had not seen Mheili since she left the house around 5:30 PM yesterday to go to visit a friend. She was supposed to be back home before 11:30 PM, but she had still not shown up. They were deeply concerned about their daughter, but had no theories on where she could be or what could have happened to her. On the patrol's request, they did not let the police patrol in to conduct a search of Mheili's room since they had visitors from Kurdistan staying over in that room. Instead, they asked the police to come back the next day. When the police patrol was about to leave and drive Raihed back home she observed a shoe and a sock in the park. She said that the Pink Nike Shoe was identical to the ones Mheili used to wear. The place was located right across the street approximately 150 m from Mheili's home. The officers took some photos, secured the scene, and called out a crime scene specialist.

The same evening a search warrant was issued for the Al Sayed house and surrounding premises. In the upper layer of the kitchen waste-bin, the officers found and secured a mobile phone, which was broken and bent out of shape.

The officer in charge decided to arrest Mheili's father, Mohammed Al Sayed, on suspicion of giving false evidence and conspiracy to the kidnap of his daughter.

Picture of Mheili (as received from Raihed):

[Photo of the missing person displayed here]

On Monday morning (the day after) you are appointed as the officer in charge of the investigation of Mheili's disappearance.

Case 2

Background:

Eric Leslie (28) and Huan Lee (26) have been married for 2 years after they met at a summer camp at The University of Hong Kong. Soon after she moved to Europe they moved in together. They live in a semi-detached house in a quiet living area. He works as a child protection officer in the local municipality and she as a prison psychologist at a nearby prison. They had few friends in the area since they just had moved in 6 months ago and both were newcomers in the area.

Wednesday the XX th of October at 9:30 PM Erik Leslie called the local police from his home to report his wife missing. He stated that on Monday this week, they had had a fight about when to start a family. He had always wanted children, but she wanted to get some more professional experience before she went into parenthood. It was a stupid quarrel since both of them agreed on having children together – the only disagreement was around the timing. He slept on the sofa that night and drove 20 km to work before she rose next morning. He did not hear from Huan during the next day and to underline his disagreement with her he moved into a nearby hotel the same afternoon. He stated he needed some time alone to 'reset' after the fight. Around 4:50 PM on Tuesday, he received a text message from her on his mobile saying: 'How are you? Are you coming home for dinner?' He did not answer it until around 8 PM and he said: 'I am staying at the Premiere Inn tonight – need to think. See you tomorrow.' She did not answer his message. He did not leave the hotel room that night – he had bought food, drinks, and a snack at a nearby supermarket before he checked in. The next morning he drove to work again. During the day, he sent two text messages to Huan's mobile phone. In the first message he said: 'Hi, I am buying dinner tonight..' in the next message he asked: 'Are you at work? Did you get my message?' She did not answer any of the messages. When he came home around 5:30 PM, she was not at home and around 6:00 PM he called her on the phone but no one answered. He started to get worried and therefore he called her at work – Kirby Prison. There they told him that she had not been to work that day, but she had been there yesterday and left, as normal, around 5:00 PM. Huan normally walks home from work. She is following a well-known path along a farming area just outside the town and through a small forest just 500 m down the road from their home. The walk takes about 15–20 minutes. Eric got really worried and called a childhood friend who lives in a neighboring town to get some help in the search for Huan. They agreed to meet outside the prison within 30 minutes. Eric walked the path from their house to the prison and called for Huan several times. He also looked for her along the path, but with no luck. At the prison, they talked to some of her colleagues and no one had noticed anything unusual the day before. In the CCTV outside the prison, they could see her leaving the main gate at exactly 5.05 PM. She was wearing a yellow windbreaker, blue jeans, and dark green Wellingtons. Together Eric and his friend walked back along the path taking wider routes outside of the path, but with no result. They also knocked on all doors in their own street to ask if any neighbors had seen or heard anything – also with no positive result.

The same night at 10 PM a man called the police and reported that he had walked his dog along the path to the prison. In a dense area of the forest, just about 200 m from the nearest house, the dog barked and acted strangely. The owner ran over and saw, under some big branches, the body of a woman of Oriental appearance in a yellow jacket and blue jeans. She was partly wrapped in black plastic rubber bags. The back of her head seemed to be totally smashed by a large rock. A police patrol and a forensic team were immediately sent to the scene.

Two CID officers were sent to his home down the road to talk to him to advise him what had been discovered and conduct a witness interview. As they walked up the driveway, one of them looked into the window of his car and saw a roll of black plastic rubber bags. When Eric was asked if he recently had used black plastic bags he answered: 'No, why are you asking me that?'

The same evening (imagine this is today) you are appointed as the officer in charge of the investigation of this case.

[Photo of the missing person displayed here]

Wedding-picture of Eric and Huan