

Structured Hypothesis Development in Criminal Investigation

- A method aimed at providing a broad and objective starting point for a criminal investigation

By Nina Sunde

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Abstract

The Structured Hypothesis Development in Criminal Investigation (SHDCI) method aims to assist detectives in developing an adequate set of hypotheses, which prepares the ground for a broad and objective investigation. The method aims to protect the innocent, while also enabling the detectives to discover the full scope of the incident under investigation. SHDCI builds on theory and principles from cognitive psychology, scientific methodology, logical reasoning, law and criminal investigation best practice. The method is developed in a Norwegian context, but builds on universally accepted legal principles, and SHDCI may therefore be relevant for implementation in other jurisdictions.

1. Introduction¹

When a serious incident has occurred, the manager of the investigation is often interviewed about the progress of the investigation. Statements like "we investigate widely" or "no stone should be left unturned" are frequently used and are metaphors of both the challenge of criminal investigation and the methodology in use to solve the case. The main task for the police is to uncover what has actually happened. A good methodology is a prerequisite for achieving that, in compliance with the requirements for quality and efficiency in a criminal investigation. The initial phase of an investigation is a challenging phase in many ways. A plan is developed to ensure that the investigative team searches for and secures relevant, accurate and reliable evidence that can shed light on the incident (Fahsing, 2016). In the Norwegian context, a method focused on hypothesis² testing is implemented as the best current practice (Bjerknes and Fahsing, 2018; The Norwegian

¹ The article is based on the text ANONYMISED. Content exclusively relevant to a Norwegian context is excluded in this version.

² When the term "hypothesis" is used, it refers to investigative hypotheses suitable for testing in a criminal investigation context.

Police Directorate, 2017; The Norwegian General Attorney, 2018). A prerequisite for success with a hypothesis-testing method is the capability to develop a qualitatively good set of hypotheses. Novalis' well-known quote serves as a good summary of why this is important: "Hypotheses are nets: only he who casts will catch".

This section presents the SHDCI method, which is designed to enable those responsible for the investigation to create sets of reasonable and relevant hypotheses, aimed at forming the basis for a broad and objective investigation of criminal incidents that have occurred. SHDCI builds on theory and principles from cognitive psychology, scientific methodology, criminal investigation best practice, and law. A fictitious criminal case is used to illustrate the practical use of the method. SHDCI can be divided into two phases: In *the brainstorming phase*, the hypotheses are developed. This is followed by *the articulation phase*, where the hypotheses are articulated and written down in an investigation plan. The section focuses on the first phase and provides an example of what the hypotheses might look like in an investigation plan. Formulation of the hypotheses is carried out in compliance with the principles presented by Kolflaath (2019), which are briefly outlined in Section 9.

2. Regulation and law – The quality requirement

Investigation is a law-regulated activity, and the universal principle of rule of law protects citizens from illegal use of force or coercive means. To be charged, the terms of the law must be fulfilled, and no one can be punished without judgment in the Court of Law. The International Covenant on Civil and Political Rights (ICCPR) UN General Assembly (1966), the Universal Declaration of Human Rights (UDHR) UN General Assembly (1948), the European Convention on Human Rights (ECHR) Council of Europe (1950), as well as national regulations, provide procedural rules for how the police should conduct criminal investigations. The *presumption of innocence* is a fundamental principle in any investigation and entails that everyone should be considered innocent until proven guilty. This principle is particularly important when someone is suspected of having committed a crime but should also be taken into account at the stage at which the investigation has not appointed a suspect. This is justified by the fact that the information that can prove the suspect is innocent may no longer exist when the investigation moves from the general case level to the person-focused level, and the investigation must therefore be planned in a way that ensures a broad and objective investigation, even before a suspect is appointed.

In a Norwegian context, similar to many other Nordic and European jurisdictions, both the prosecuting authority and the police investigators are obliged to attend to the objectivity requirement during the investigation. This is a normative legal requirement, but the law does not give clear instructions on how to fulfil this requirement. To investigate in an objective manner

requires insight into and understanding of the human being's inherent cognitive limitations. Furthermore, a knowledge-based methodology is required that safeguards objectivity in the investigation to the greatest extent possible (Bjerknes and Fahsing, 2018; Fahsing, 2016).

3. Investigation practice

Criminal investigation is a constructive enterprise and largely concerned with reducing uncertainty (Innes, 2007). In the initial phase of the investigation, the police often possess an incomplete information basis and very rarely the complete picture of what actually happened. The challenge is to verify and complement the information pieces by answering the six basic questions of the investigation: who, what, where, why, how and when (5WH) (Stelfox, 2013). To find out *whether* something criminal has happened and – if so – the scope of *what* has happened, the police must get into a position to uncover the details of the incident as accurately as possible. It is often necessary to extend the scope beyond the basis formed by the initial information, since the information is often incomplete and of unknown validity. This approach requires so-called background knowledge, which often consists of both theory- and experience-based knowledge (Heuer and Pherson, 2015; Rønn, 2013). For a successful investigation, capability for logical and methodical thinking, motivation, creativity, curiosity and perseverance are also important characteristics of the investigator (Fahsing, 2013).

The investigation team should develop hypotheses to safeguard a broad and objective foundation for further investigation. The Investigative Cycle (Fahsing, 2016)³ is included as a basic model for criminal investigation in the Norwegian context (Bjerknes and Fahsing, 2018) and is also published in international literature (e.g. in Griffiths and Milne, 2018). The model is in the syllabus for the bachelor police education and several postgraduate studies in the field of investigation at the Norwegian Police University College. The Investigative Cycle is a structured process for investigative tasks and consists of the stages, Collect, Check, Connect, Construct, Consider and Consult. In the fourth stage of The Investigative Cycle (Construct), the investigator should develop hypotheses based on information that has been collected, checked and analysed. However, the model gives no guidance on how the hypotheses are to be generated, nor does it indicate what is an adequate set of hypotheses, in either a qualitative or a quantitative sense. SHDCI may therefore be regarded as a tool for carrying out the fourth phase (Construct) of the Investigative Cycle. The method may be useful as a supplement or to other methods as well, for example the Matrix Forecasting and Behaviour Sequence Analysis developed by Keatley and Clarke (2020).

³ The model was originally described by Geoff Dean (2000) and named "The 5 c's of investigation". Fahsing (2013; 2016) restructured the model and extended it with an additional step, "consult".

As described, there are many requirements to be met in a criminal investigation. Being able to find out what has happened, while meeting the requirements of objectivity and presumption of innocence, is a mentally demanding exercise. Research has shown that detectives are susceptible to cognitive bias because of how we think, reason, and decide (see e.g. Rossmo, 2009). Bias may occur at all stages of the investigation, even during hypotheses development.

A well-known phenomenon in this concern is confirmation bias. This phenomenon occurs at the subconscious level, causing us to search for information that confirms the hypothesis we believe in and overlook or explain away information that does not fit with it (Nickerson, 1998). Confirmation bias has been identified as the cause of or contributing factor to several miscarriages of justice. Evaluations have suggested that the errors may relate to investigations being aimed at confirming a single hypothesis, claiming that a designated suspect was guilty of a criminal offence. Examples include the investigation of Brandon Mayfield, in connection with the terrorist attack in Madrid in 2004 (Koen, 2016), and of Norwegian Fritz Moen, who was convicted of the murder of two students in Trondheim in the 1970s (Rachlew, 2009). Other cognitive biases associated with miscarriages of justice include, for example:

- Primacy effect, which entails that information/evidence presented early is given greater weight than that presented later (Granhag and Ask, 2008).
- Availability bias, which means that probability is judged based on how easily accessible the information is (Stubbins and Stubbins, 2009).
- Group think, which is a group psychological phenomenon, where participants avoid challenging the consensus in the group (Rossmo, 2009; Janis, 1972).

Research has suggested that investigators tend to assume that a suspect is *guilty* (e.g., Meissner and Kassin, 2002), which may affect our ability to develop and investigate innocence hypotheses. However, the cognitive limitations may also affect the opposite dimension, by limiting our ability to think the *worst case*. Our stereotypical perceptions of what is normal or possible may affect our ability to develop and investigate hypotheses that something is worse than the initial information indicates, e.g. that a mother is capable of abusing and killing her own child. This limitation is often referred to as base rate fallacy (Stubbins and Stubbins, 2009).

Developing multiple hypotheses is often recommended, to mitigate confirmation bias and other effects of cognitive limitations. A good starting point may be to ask: What if the suspect is not guilty? (Lord, Lepper, and Preston, 1984). Rassin describes the need for innocence hypotheses: "Applied to the context of criminal investigation, decision makers should try to keep in mind as long as possible that the suspect may be innocent after all and that the incident took place in an alternative manner"

(Rassin, 2018 p. 228). Rassin emphasises that it is not only a matter of guilt or innocence but that the incident may have occurred in a different way than first assumed.

However, it is not only the limitations of how we think, reason, consider or decide that may obstruct the development of hypotheses. Another challenge is knowing when to stop, i.e. when the *set of hypotheses is sufficient*. Fahsing and Ask (2015) underline that the quantitative number of hypotheses does not necessarily serve as a benchmark for an adequate set of hypotheses, and that one rather should evaluate the quality of the hypotheses. So, the question is, how can you know that you have a sufficiently broad and objective basis in the set of hypotheses you have prepared? This is described somewhat differently in the literature. Some suggest that the hypothesis set should contain “all plausible alternatives” (Ask and Fahsing, 2018, p. 61) or state that, “based on all available information, all competing hypotheses and sub-hypotheses should be developed” (Bjerknes and Fahsing, 2018 p. 104 – my translation from Norwegian).

Deciding whether the set of hypotheses is sufficient is further complicated by another source of confusion. The term “hypothesis” is frequently used in the context of criminal investigations, but there are hardly any explanations that shed light on the term (Kolflaath, 2019). A hypothesis could therefore be designed to cover all the 5WH queries. When aiming for a set of hypotheses containing all plausible alternatives (Ask and Fahsing, 2018) or all competing hypotheses based on the available information (Bjerknes and Fahsing, 2018), this would result in an almost infinite number of hypotheses.

A golden rule that may work well in relation to this problem may be to keep it simple. In the early stages of a criminal investigation, there is often doubt as to whether one is facing a criminal incident or not. To solve this query, and prior to establishing *who*, *how* and *why*, the investigation must seek to uncover *what* has happened. SHDCI is therefore directed first and foremost towards the development of hypotheses revolving around *what* has happened.

The minimum requirements for a set of hypotheses can be deduced from the presumption of innocence. Operationalisation of this principle commits the police to actively investigate whether the suspect is innocent. This entails that at least one of the hypotheses in the set must be that the suspect has not committed the criminal act or that the required level of criminal guilt is not established. If no suspect is appointed, at least one of the hypotheses should state that the incident might be the result of something other than a criminal act. The requirement to include an innocence hypothesis is relevant in relation to meeting the evidentiary requirements – often expressed as “beyond reasonable doubt”. In his discussion of evidence assessment in court within jurisprudence, Kolflaath (2015) emphasises the role of innocence hypotheses in relation to the evidentiary

requirement. The requirement of proof implies that, after evidence has been provided, there should be no plausible narrative (story, version, scenario, course of events) that implies acquittal (Kolflaath, 2015). In order to satisfy the evidentiary requirement, the remaining hypothesis must be thoroughly tested, and all reasonable innocence hypotheses must be eliminated.

4. Other methods for hypotheses development

Developing hypotheses for problem solving is not novel, and descriptions of different methods can be found in academic literature. Those mentioned here are selected because they are relevant to discussion in an investigative context. The *brainstorming* method was originally developed by A. F. Osborn and can be described as a method for group-based creative problem solving, where participants impulsively express and present ideas and thoughts they come up with (Osborn, 1963).

Heuer and Pherson's *Simple Hypotheses* is a method of hypotheses generation in relation to intelligence work but is also relevant for criminal investigations (Heuer and Pherson, 2015). In this approach, the participants are instructed to write down up to three hypotheses and are encouraged to use situational logic, historical analogies and theoretical knowledge. Both Brainstorming and Simple Hypotheses aim to exploit the potential of groups. However, many detectives are individually assigned to cases and left alone with the planning of investigation steps. They may therefore benefit from a method they may use individually. Another limitation of the above-mentioned methods is that they do not safeguard the legal principles and obligations described in Section 3.

SHDCI attempts to meet the requirements for a high-quality criminal investigation, in which the presumption of innocence and the objectivity requirement, as well as the worst-case scenario, are taken into account. SHDCI can also be considered a measure to counteract issues such as confirmation bias, primacy effect, availability bias, representativeness bias, base rate fallacy and group think.

5. The development of SHDCI

SHDCI was developed and tested in relation to the course, *Postgraduate Education in Criminal Investigation* (Norwegian title: *Videreutdanning i etterforskning* (VEF), 15 ECTS). The course started in 2013 and has been continuously developed and updated. SHDCI has been used in the training and case-based exercises of more than 500 police practitioners attending the course from 2016 to 2020.

A significant part of the training in VEF has been devoted to practising investigative planning. The students were divided into investigative teams and assigned to investigate various fictitious scenarios. Their initial task was to develop hypotheses and relevant investigative activities to test them. At the first seminars in 2013, the students were asked to "think about hypotheses and write

them down". Then, they were given the opportunity to conduct a free and unstructured group-based brainstorming according to Osborn's method (described in Section 4).

Based on own observations, evaluation of students' presentations and feedback, it appeared that free brainstorming did not lead to a set of hypotheses that could serve as a foundation for a broad and objective investigation. Often, the set of hypotheses solely contained guilt hypotheses, meaning that the presumption of innocence was not adequately safeguarded. The students seemed to have far greater ability to develop guilt hypotheses, i.e. linking criminal circumstances to the information they had been given, than to develop explanations of the information which suggested it was not a criminal offence or that the perpetrator was innocent. Simultaneously, it seemed that the students struggled to think that what had happened in reality could be something more comprehensive or serious than was suggested by the information available to them. Thus, the free brainstorming did not seem to safeguard either the presumption of innocence or the worst-case scenario.

The free brainstorming also seemed to give plenty of room for the cognitive limitations and biases to influence the hypotheses' development. The students seemed to devote more attention to the first information they received than the subsequent, which may be indications of the primacy effect. In this particular situation, the name of the training scenario (robbery, rape, arson, domestic abuse) may have influenced the hypotheses' development. Another observed tendency was that, when the students had experience from their professional work of similar cases to that of the training scenarios, they often developed hypotheses that were related to their own experiences. Here, availability bias may have occurred. The students worked together in groups, and sometimes there seemed to be a dynamic in the group that made it difficult to be critical, to suggest alternatives, or to question the result. This was especially evident when the group's formal or informal leader claimed to have previous experience of incidents similar to the training scenario or had long experience as a detective. Group think may be a contributing factor to the observed tendencies.

The experience from this training underlines that free and unstructured brainstorming can be an ineffective process, especially when having little and uncertain information in the first phase of an investigation. Defining hypotheses based on the basic questions (5WH) can then give an almost infinite number of variations in the hypotheses. The students stated that it had been demanding to set a natural stopping point in the development of hypotheses. A time-consuming hypotheses' development process conflicts with the need for immediate action during the golden hour of an investigation. Therefore, it would be inappropriate to base the hypotheses on all the 5WH queries. In the initial phase of an investigation, the primary goal is to clarify *if* something criminal has occurred that should be investigated by the police, and – if so – *what* has happened.

The idea for the SHDCI method emerged after observing the limitations of free brainstorming during the training described above. In the next section, the principles and purpose of the SHDCI method are outlined, followed by a description of how it should be implemented. A visualisation procedure of the method is provided in Section 8, and an example of use in a fictitious case is offered in Section 9. Section 10 describes how the hypotheses should be articulated and included in an investigation plan, followed by an example.

6. SHDCI – the brainstorming phase

The purpose of SHDCI is primarily to enable detectives to provide a broad and objective starting point for planning investigations. This includes:

- Safeguarding the presumption of innocence in a structured manner
- Enabling the detection of signs of crime that the current case information does not yet cover or signs that the scope of the incident is more extensive/serious than the first information indicates (worst-case thinking)
- Preventing biases caused by cognitive limitations
- Facilitating a broad approach to the investigation, regardless of whether the investigator is working alone or in a team.

The SHDCI brainstorming phase is, as opposed to the free brainstorming described in the former section, a structured brainstorming approach - which guides the detective or the team through three main steps of queries. The queries are mainly focused around *what* has happened, and, if considered expedient, *who* could also be considered. The answers are written down in a document or into the model for visualisation of the method (see Section 7). The detective is guided to use the information in the case, together with his theoretical and experience-based knowledge, to answer the questions. This is theoretical knowledge of criminal law, i.e. about which acts are criminal and about the criminal liability conditions (Hald, 2013). Knowledge within criminology, such as the characteristics of crime types, modus operandi, knowledge about typical perpetrators and victims, is also regarded as important here, in relation to the ability to recognise signs or patterns that can form the basis for hypotheses development.

If SHDCI is used by a team, it is important to prevent individual cognitive biases, as well as group think, in the team. Participants should therefore first review the SHDCI queries individually and write down all the hypotheses they come up with. Once everyone has completed this task, all the team members should share their hypotheses with the team.

6.1 SHDCI queries

CRIMINAL INCIDENTS (WHAT HAS HAPPENED?)

1. What criminal offences may have occurred based on the information in the case? (These are placed along the horizontal line in the visualisation of the method marked with the number 1.)

- What is the most obvious?
- What is related and more serious – and up to the most serious?
- What is related and less serious – and down to the least serious?

2. What other criminal offences may have occurred – i.e. criminal offences that you believe do not fit in along the horizontal line? Try thinking of the opposite. Here, too, one must try to think: What could be more serious and, then, what could be less serious? (These are placed along the vertical line marked with the number 2.)

- What is more serious – and up to the most serious?
- What is related and less serious – and down to the least serious?

NON-CRIMINAL INCIDENTS / DID NOT HAPPEN (WHAT HAS HAPPENED?)

3. (These are placed in the box marked with the number 3.)

- If no suspected is appointed: What non-criminal circumstances may have occurred, based on the information in the case? (e.g. accident, reported as a result of misunderstanding, etc.)
- If a suspect is appointed: What could be reasons for him/her being innocent, based on the information in the case? (e.g. acted in self-defence, is under the age of criminal responsibility, is criminally insane)

It should be emphasised that the method is an aid in the process of finding relevant alternative hypotheses, first and foremost covering *what* has happened and, if considered relevant and expedient, *who* may be involved. Strict ranking of the result, in terms of gravity based on penalties, is not in itself part of the purpose of this method. In other words, it is not so important where the hypotheses end up, in relation to the list of questions or in the visualisation (see below), as long as the hypotheses are developed and included in the further investigative process.

7. SHDCI – visualisation

Visual thinking and reasoning are recognised as having many advantages over other forms of thinking in many different disciplines, such as architecture, mathematics, pedagogics and cognitive psychology (Dean, 2005). According to Wheatley (1997), logical thinking in mathematics is often dependent on prior visualisation, and mathematicians who are able to visualise while solving problems have greater chances of good achievements.

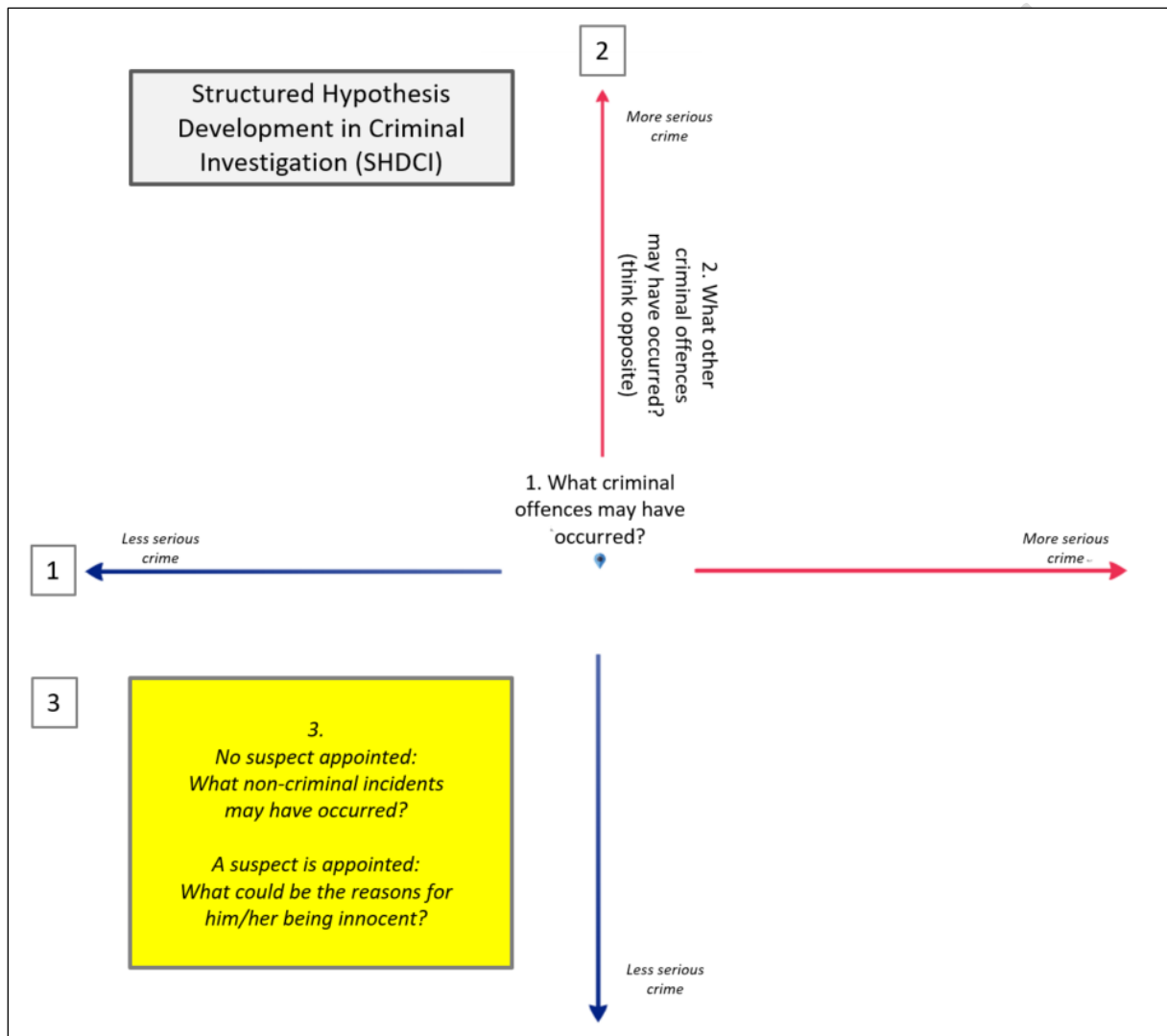


Figure 1: Visualisation of the Structured Hypothesis Development in Criminal Investigation method.

The abductive reasoning approach used in SHDCI is a form of logical thinking, and visualisation may also improve the performance here. The achievement in this context will be to create a set of hypotheses that is sufficiently broad and objective, in order to facilitate efficient and qualitatively good planning of the investigation.

The visualisation method is used in conjunction with the SHDCI queries.

1. Start by writing down the first criminal hypothesis you come up with, based on the present available information.

Based on this hypothesis, draw a horizontal line to the right for the more serious hypotheses and one to the left for the less severe, referring to line 1 in the figure. The following questions in the first step of the SHDCI queries are then answered, which would result in several hypotheses, and these are placed along the lines in both directions.

2. Vertical lines are then drawn up and down from the middle of the horizontal line. Then, answer the questions under the second step of the SHDCI queries and place them along the vertical lines, also here in the direction of the more or less serious.

The aim here is to generate hypotheses about criminal offences that go in other directions and that do not fit along the vertical line. The hypotheses must be plausible, which entails them not contradicting any reliable information available at this time. Contrary to the first step of the method, the hypotheses may not necessarily be as closely "related" and may constitute different types of crime. In practice, the development of hypotheses along the vertical line will be more loosely connected to the available information in the case and require the application of theory- and experience-based knowledge to a greater extent.

It may sometimes be challenging to rank the hypotheses due to the different elements they include. However, the main point of using the lines is not to rank the hypotheses strictly by severity but, rather, to be pushed towards thinking more broadly than your intuitive starting point – in the direction of both the more serious and the less serious plausible hypotheses about what has happened.

3. Then proceed to the third step of the SHDCI queries, concerned with non-criminal hypotheses. If a suspect has yet to be appointed, develop hypotheses explaining that nothing

criminal has happened. If a suspect is appointed, hypotheses involving innocence should also be developed.

Once the three steps of SHDCI queries are finalised, the detective/team will have a starting point for the second phase of the SHDCI – *the articulation phase* – where the hypotheses are written down in complete phrases and documented into an investigation plan. The hypotheses can often be formulated on the basis of the 5WH questions: *what* and – if it is appropriate – also *who*. If there is a great deal of uncertainty about who is suspected or who the victim is, it may be appropriate to distinguish this from the main hypotheses and, rather, to define sub-hypotheses, based on this query.

8. Example

The following fictitious case is used to illustrate the implementation of the method: Lara calls the police and says that she has been badly beaten by her husband, Sean, and that this is not the first time. She tells the police that she has pain in the head and in the upper body from the beating, and she is bleeding from a minor wound. Lara says that she is scared, and that she wants the police to come and take Sean away as soon as possible. According to Lara, she and Sean have an eleven-year-old daughter, Anna, who is also present in the house.

CRIMINAL INCIDENTS (WHAT HAS HAPPENED?)

1. What criminal offences may have occurred based on information in the case? (These are placed along the horizontal line marked with the number 1.)

- What is the most obvious?
 - ***Sean was violent to Lara, and she was injured***
- What is related and more serious – and up to the most serious?
 - ***Sean was violent to Lara for a long time***
 - ***Sean tried to kill Lara***
- What is related and less serious – and down to the least serious?
 - ***Sean threatened Lara***
 - ***Sean was violent to Lara, causing her to feel pain, but she was not seriously harmed***

2. What other criminal offences may have occurred – i.e. criminal offences that you believe do not fit in along the horizontal line? Try thinking of the opposite. Here, too, one must try to think: What could be more serious and, then, what could be less serious? (These are placed along the vertical line marked with the number 2.)

- What is more serious – and up to the most serious?
 - ***Lara was violent to Sean***
 - ***Sean was also violent to Anna***
 - ***Sean sexually abused Lara, in addition to the violence***

- What is related and less serious – and down to the least serious?
 - ***Anna witnessed violence against her father or mother (and is thus considered a victim⁴)***
 - ***Sean and Lara were violent towards each other (retaliation)***

NON-CRIMINAL INCIDENTS / DID NOT HAPPEN (WHAT HAS HAPPENED?)

3. (These are placed in the box marked with the number 3.) If there is no suspect: What non-criminal circumstances may have occurred, based on the information in the case?

- ***Sean is considered a suspect, as a result of the present available information***

If a suspect is appointed: What could be the reasons for him/her being innocent, based on the information in the case?

Sean is innocent because:

- ***The police have misunderstood the message***

⁴ According to Norwegian legislation and legal practice.

- **Lara reported Sean to the police to make trouble for him and/or to obtain an advantage herself (e.g. in a parental dispute about who the child should live with)**
- **Sean acted in self-defence**
- **Sean is mentally ill (not criminally responsible) and cannot be punished**
- **Lara is mentally ill; the emergency call to the police is based on a delusion**

Visualised, it may look like this:

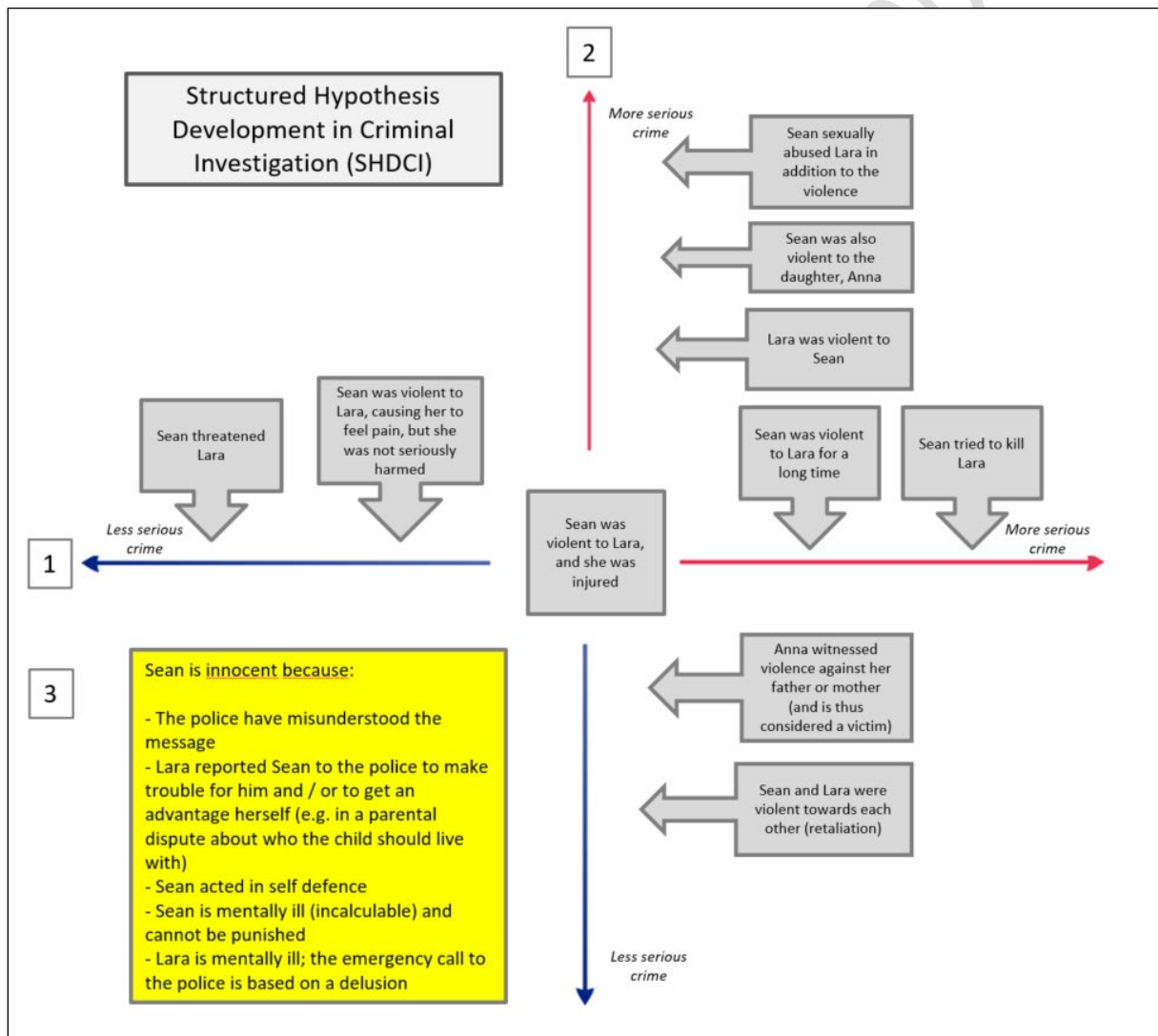


Figure 2: Example of using SHDCI in a planned criminal case.

9. SHDCI – the articulation phase and linking to law

After the brainstorming phase, the hypotheses should be articulated and documented in an investigation plan, to facilitate systematic testing during the further investigation of the case.

Kolflaath (2019) suggests content-, articulation- and interpretation principles for investigative hypotheses. These principles aim to increase clarity and accuracy, through standardisation of how the hypotheses should be articulated, and reduce uncertainty by limiting the room for interpretation in the further use of the hypotheses. The principles address the individual hypothesis, as well as the set of hypotheses.

The *content principles* are requirements for the content of a single hypothesis, regardless of how it is articulated.

- The hypothesis should constitute a possible explanation of information collected in the case and should be articulated as factual explanations, so-called *factual hypotheses* (contrary to *subsumption hypotheses* which are subsumptions of law paragraphs).
- It should be possible to test the hypothesis, which means that there should be potential investigation steps that may lead to information suitable to support or refute the hypothesis.

Content principles that relate to the set of hypotheses are:

- Any hypothesis should express something different from the others.
- The set of hypotheses should cover all the remaining, plausible possible explanations.

The *articulation principles* are requirements for how to express the hypotheses.

1. Hypotheses should be expressed in complete sentences.
2. Hypotheses should be expressed unambiguously.

The *interpretation principles* relate to understanding and deriving meaning from the hypotheses.

1. Hypotheses should be interpreted literally, meaning that the hypothesis leaves open everything that is not directly expressed in it.
2. A hypothesis should be interpreted as factual, which entails that it should not be assumed to be a certain subsumption of law paragraphs, even if such an association could be possible.

The example in Section 9.2 is an attempt to articulate hypotheses following these principles.

9.1 Linking to law

Many, but not all, of the hypotheses will include criminal conditions. In order to ensure an investigation is targeted towards clarifying criminal liability, it is important to identify which of the hypotheses can be linked to criminal offences, and to identify the legal conditions that must be elucidated in the further investigation. On the basis of the hypotheses and the legal sections, evidential themes can be identified and entered into the investigation plan. This is done by identifying the section and its conditions, and forming questions related to the particular case under investigation. The example is based on Norwegian law, where the sections have objective (what actions were carried out, how, when, where, etc.) and subjective conditions (intent, guilt), a structure which is shared by several other jurisdictions. Therefore, the methodology may easily be transferred to other jurisdictions.

9.2 Example of the hypotheses section of an investigation plan

	Hypotheses (arranged in random order)	Relevant sections in the Norwegian Penal Code	Evidential topics deduced from the objective conditions	Evidential topics deduced from the subjective conditions
H1	Sean tried to kill Lara	Section 275 cf. Section 16 Attempted homicide	- Did Sean do anything that led to Lara's death?	- Did Sean intend (see section 22) to kill Lara in the moment of action? - Did Sean realise the possibility that the violence could cause Lara to die?

H2	Sean has been violent to Lara for a long time	Section 282 Abuse in close relationships Section 283 Aggravated abuse in close relationships	<ul style="list-style-type: none"> - Has Sean threatened, forced, deprived of liberty, used violence or other degrading treatments (including psychological abuse) against Lara? - How long has this been going on? - How many instances/events have happened? - Have there been long periods without physical violence / psychological abuse, or has it been continuous? - How painful was this to Lara? - Was Lara injured? - Was Lara defenceless during the actions? - Were the actions adequate to create fear of new offences? 	- Did Sean perform the abusive actions against Lara with intent?
H3	Sean was violent to Lara once, and she was injured	Section 273 Bodily harm	<ul style="list-style-type: none"> - What injuries did Lara receive? - What was the duration of the injury, and what 	- Did Sean perform the violent actions against Lara with intent?

		Section 274 Aggravated bodily harm	<p>consequences did it have?</p> <ul style="list-style-type: none"> - How strong was the pain? - Was the injury significant? - Did the violence cause Lara to become physically helpless or unconscious? - Did the injury have the characteristics of abuse? - Were knives or other particularly dangerous tools used? 	- Did Sean cause harm to Lara with intent?
H4	Sean was violent to Lara, causing her to feel pain, but she was not seriously harmed	Section 271 Physical assault Section 272 Aggravated physical assault	- Has Sean been violent to Lara or physically offended her?	- Did Sean perform the physical assault with intent?
H5	Sean threatened Lara	Section 263 Threats	<ul style="list-style-type: none"> - Did Sean threaten to do something criminal against Lara? - Was the threat apt to cause serious fear? 	- Did Sean threaten Lara with intent?
H6	Sean has sexually abused Lara in addition to being violent to her	Section 291 cf. Section 292 Sexual assault involving intercourse	- Did Sean use violence or threaten Lara to	- Did Sean perform the sexual assault against Lara with intent?

			<p>make Lara engage in sexual activity?</p> <ul style="list-style-type: none"> - Was Lara unconscious? - Were there other reasons why she could not resist the actions? - Was the sexual assault done by insertion of penis / other object into mouth / vagina / rectum? 	
H7	Sean has also been violent to Anna (the child)	<p>Section 282 Abuse in close relationships (or alternatively: Sections 273/274 Bodily harm Section 272/27 Physical assault Section 263 Threats)</p>	<ul style="list-style-type: none"> - Is Anna Sean's daughter, in his household or under his care? - Did Sean abuse Anna? 	<ul style="list-style-type: none"> - Did Sean abuse Anna with intent?
H8	Anna has witnessed domestic violence against her mother/father and is therefore a victim	Section 282 Abuse in close relationships	<ul style="list-style-type: none"> - Did Anna witness Sean abusing Lara (or Lara abusing Sean)? 	<ul style="list-style-type: none"> - Was the perpetrator aware that the child was present and witnessed the violence?

H9	Sean and Lara have been violent towards each other	Section 271 2 nd paragraph, a) and b) Physical assault may be exempted from punishment due to retaliation	<ul style="list-style-type: none"> - Did Sean and Lara commit physical assault or bodily harm to each other? - Was it a retaliation of a prior provocative utterance / physical assault / bodily harm? 	<ul style="list-style-type: none"> - Did Sean perform physical assault against Lara with intent? - Did Lara perform physical assault against Sean with intent?
H10	<p>Sean is innocent because:</p> <ul style="list-style-type: none"> - The police have misunderstood the message - Lara reported Sean to the police to make trouble for him and/or to obtain an advantage herself (e.g. in a parental dispute about who the child should live with) - Sean acted in self-defence - Sean is mentally ill and cannot be punished - Lara is mentally ill; the report to the 	<p>Section 222 False accusation</p> <p>Section 18 Self-defence</p>	<ul style="list-style-type: none"> - Did Lara give incorrect information to the police about Sean being violent to her? 	<ul style="list-style-type: none"> - Did Lara understand that she gave incorrect information to the police? - Was Lara aware that it was the police she gave the information to?

	police is due to a delusion			
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10. Future research

SHDCI is designed to provide investigators and prosecutors with a tool for developing adequate sets of hypotheses, which form a broad and objective starting point in the investigation. No methods solve all problems, nor does SHDCI. The method fits well when what has happened is unclear. However, there may be instances where the uncertainty is not about what has happened but, rather, about who has done it, where and when it has happened, etc. In such cases, other methods will probably be better suited for the purpose. Approximately 500 students have used SHDCI for developing hypotheses, both individually and in groups. Many have provided oral and written feedback that it has been helpful in the investigation of many different case types, and that it contributes to the quality and efficiency of the investigation. This is also supported by the students' performance during their oral exam, where they demonstrated their implementation of the method in different scenarios. However, it is not sufficient to conclude with the necessary degree of certainty that the method serves the purpose of forming a broad and objective starting point for planning investigations, and research is necessary to explore this further.

Works Cited:

Ask, K. and Fahsing, I. A. (2018). Investigative decision making. In A. A. Griffiths and R.

Milne (Eds.), *The psychology of criminal investigation* (pp. 52-73). London:

Routledge.

Bjerknes, O. T. and Fahsing, I. A. (2018). *Etterforskning: Prinsipper, metoder og praksis*. [Criminal investigation: Principles, methods and practices] Bergen: Fagbokforlaget.

Council of Europe (1950). *European Convention for the Protection of Human Rights and Fundamental Freedoms (ECHR), as amended by Protocols Nos. 11 and 14*, 4 November 1950, ETS 5, available at: <https://www.refworld.org/docid/3ae6b3b04.html> (Accessed 27 April 2020).

Dean, G. (2000). *The Experience of Investigation for Detectives*. Unpublished PhD thesis. Brisbane, Australia: Queensland University of Technology.

Dean, G. (2005). The “cross+check” system: Integrating profiling approaches for police and security investigations. *Journal of Police and Criminal Psychology*, 20(2), 20-43.

Fahsing, I. A. (2013). Tænkestile: Effektivitet, dyder og krydspres i efterforskninger. [Thinking styles: Effectiveness, virtues and cross-pressure in criminal investigations]

In C. Hald and K. V. Rønn (Eds.), *Om at oppdage: Metodiske refleksjoner over politiets undersøgelsespraksis* (pp. 115-147). Fredriksberg C: Samfundslitteratur.

Fahsing, I. A. (2016). *The Making of an Expert Detective. Thinking and Deciding in Criminal Investigations*. PhD thesis. Gothenburg, Sweden: University of Gothenburg.

Fahsing, I. A. and 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, 22(3), 203-223.

Granhag, P. A. and Ask, K. (2008). Psykologiska perspektiv på bevisvardering. [Psychological perspectives on evidence evaluation] In P. A. Granhag and S. A. Christianson (Eds.), *Handbok i rättspsykologi* (pp. 407-422).

Malmo: Liber AB.

Griffiths, A. and Milne, R. (Eds.). (2018). *The psychology of criminal investigation: From theory to practice*. London: Routledge.

Hald, C. (2013). Spor: At opdage tegn på kriminalitet. [Traces: Detecting signs of crime] In C. Hald and K. V. Rønn (Eds.), *Om at opdage. Metodiske refleksjoner over politiets undersøgelsespraksis* (pp. 173-218). Fredriksberg C: Samfundslitteratur.

Heuer, R. J. and Pherson, R. H. (2015). *Structured analytic techniques for intelligence analysis* (2nd edition). Washington DC: CQ Press.

Innes, M. (2007). Investigation order and major crime inquiries. In T. Newburn, T. Williamson, and A. Wright, (Eds.), *Handbook of criminal investigation* (pp. 255-276). New York: Routledge.

Janis, I. L. (1972). *Victims of groupthink: A psychological study of foreign-policy decisions and fiascoes*. Boston: Houghton Mifflin.

Keatley, D. A., and Clarke, D. D. (2020). Matrix Forecasting and Behaviour Sequence Analysis: Part of the Timeline Toolkit for Criminal Investigation. *Journal of Police and Criminal Psychology*, 1-8.

Koen, W. J. (2016). Case study: Brandon Mayfield. In W. J. Koen and C. M. Bowers (Eds.), *Forensic science reform: Protecting the innocent* (pp. 332-338). Amsterdam: Academic Press.

Kolflaath, E. (2015). En metode for bevisbedømmelsen i straffesaker. [A method for evidence evaluation in criminal proceedings] In R. Aarli, M.

Hedlund and S. E. Jebens (Eds.), *Bevis i straffesaker* (pp. 507-534). Oslo: Gyldendal.

Kolflaath, E. (2019). Hypoteser i etterforskningsplaner. [Hypotheses in investigation plans] In E. H. Olsvik and P. Risan (Eds.), *Etterforskning under lupen*. (PHS Forskning 2019: 3) Oslo: Politihøgskolen.

Lord, C. G., Lepper, M. R. and Preston, E. (1984). Considering the opposite: A corrective strategy for social judgment. *Journal of Personality and Social Psychology*, 47(6), 1231.

Meissner, C. A. and Kassin, S. M. (2002). "He's guilty!": Investigator bias in judgments of truth and deception. *Law and Human Behavior*, 26(5), 469-480.

Nickerson, R. S. (1998). Confirmation bias: A ubiquitous phenomenon in many guises. *Review of General Psychology*, 2(2), 175-220. <https://doi.org/10.1037/1089-2680.2.2.175>.

Osborn, A. F. (1963). *Applied imagination: Principles and procedures of creative problem-solving* (3rd edition.). New York: Charles Scribner's Sons.

Rachlew, A. (2009). *Justisfeil ved politiets etterforskning: Noen eksempler og forskningsbaserte mottiltak*. [Errors of justice in criminal investigation: Some examples and research based countermeasures] PhD thesis. Oslo, Norway: Universitetet i Oslo.

Rassin, E. (2018). Reducing tunnel vision with a pen - and - paper tool for the weighting of criminal evidence. *Journal of Investigative Psychology and Offender Profiling*, 15(2), 227-233.

Rossmo, K. D. (2009). Organizational traps: Groupthink, rumour, and ego. In K. D. Rossmo (Ed.), *Criminal investigative failures* (pp. 23-34). Boca Raton: CRC Press.

Rønn, K. V. (2013). Mistanke: Hypoteser og forklaringer i opdagelsesarbejdet. [Suspicion: Hypotheses and explanations in discovery work] In C.

Hald and K. V. Rønn (Eds.), *Om at opdage. Metodiske refleksioner over politiets Undersøgelingspraksis* (pp. 255-299). Fredriksberg C: Samfundslitteratur.

Stelfox, P. (2013). *Criminal investigation: An introduction to principles and practice*.

New York: Routledge.

Stubbins, I. D. and Stubbins, N. (2009). On the horns of a narrative: Judgment, heuristics, and biases in criminal investigation. In K. D. Rossmo (Ed.), *Criminal investigative failures* (pp. 123-164). Boca Raton: CRC Press.

The Norwegian General Attorney (2018). Kvalitetskrav til straffesaksbehandlingen i politiet og ved statsadvokatembetene mv. (Kvalitetsrundskrivet 3/2018). [Quality requirements for the police and public prosecutors during criminal proceedings].

The Norwegian Police Directorate (2017). *Retningslinjer for bruk av etterforskningsplan. Versjonnummer 1.0*. [Regulations for using investigation plans].

UN General Assembly (1948). *Universal Declaration of Human Rights (UDHR)*, 10 December 1948, 217 A (III), available at: <https://www.refworld.org/docid/3ae6b3712c.html> (Accessed 27 April 2020).

UN General Assembly (1966). *International Covenant on Civil and Political Rights (ICCPR)*, 16 December 1966 United Nations, Treaty Series, vol. 999, p. 171, available at: <https://www.refworld.org/docid/3ae6b3aa0.html> (Accessed 27 April 2020).

Wheatley, G. (1997). Reasoning with images in mathematical activity. In L. English (Ed.), *Mathematical reasoning: Analogies, metaphors, and images* (pp. 281-298).

New Jersey: Lawrence Erlbaum Associates.

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